ANALYSING THE LINKAGE OF USD/INR EXCHANGE RATES AND INFLATION - THEIR RESULTANT INFLUENCE ON SELECTED NSE INDICES

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The paper is an attempt to identify which macro-economic variable (USD/INR exchange rates or Inflation rates) influence which of the NSE indices (CNX Nifty, JUNIOR NIFTY, CNX 500, CNX Midcap, and CNX Smallcap) in India.

Second part of the study is an attempt to evaluate if all the variables taken into account to conduct the study are significantly positively related or not.

Monthly data ranging from 2009-2014 is considered. Primary hypothesis evaluates that whether the performance of NSE indices is dependent on the given indicator or not. For establishing the relationship, Correlation and Regression Analysis has been used by using SPSS.

The results show that both indicators have some impact on the performance of the NSE Stock Market performance. Both, inflation and foreign exchange rates are considered to be the most dominant indicators of the stock market performance. Also, all the variables, namely, dollar exchange rates, inflation, CNX Nifty, Junior Nifty, CNX 500, CNX Midcap, and CNX Smallcap are significantly positively correlated with each other. And Inflation is observed to be a stronger variable than the exchange rates.

There exists a scope for further investigation by evaluating exchange rates and associated variables in further detail using various other software and considering more number of stock exchanges in the country as well as abroad.

OBJECTIVES OF THE RESEARCH

The Primary objective of this research is to analyze the linkage of USD/INR Exchange rates (Dollar) and Inflation and their resultant influence on the performance of NSE Index (Sensex) of India. This study involves an exchange rate with Indian rupee as the domestic currency, and the US Dollar as the foreign currency. The exchange rate thus used in the study is the USD/INR (Indian rupee per US Dollar) rate.

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Five widely used composite indices of NSE India are taken for this study and one objective is assigned to each index.

The objectives of this study are as follows-

1. To study the impact of USD/INR rates and Inflation on CNX Nifty
2. To study the impact of USD/INR rates and Inflation on JUNIOR NIFTY
3. To study the impact of USD/INR rates and Inflation on CNX 500
4. To study the impact of USD/INR rates and Inflation on CNX Midcap
5. To study the impact of USD/INR rates and Inflation on CNX Smallcap

The study will attempt to examine which macro-economic variable of the two taken has a significant effect on the different NSE Indices.

6. To study the relationship between the two macro-economic variables and the five of the most traded indices of NSE.

RESEARCH METHODOLOGY

Data Description

The study covers period from January 2009 to December 2014. It is fully based on the secondary sources. To study the impact of exchange rates on NSE Index performance, USD/INR monthlyexchange rates and Monthly CPI rates as a proxy of inflation are taken and open and close prices of five difference indices are taken, namely-
1. CNX Nifty
2. JUNIOR NIFTY
3. CNX 500
4. CNX Midcap
5. CNX Smallcap

The dependent variable is NSE Indices and the independent variables are USD/INR exchange rates and inflation rates. Close prices of the indices are taken to study their dependence on the macro-economic variables.

Returns on the different indices are calculated using the following formula-

Return = Close-Open

R_e=C-O………………………Eel (1)

These returns are used to make bar charts to understand the movement of the variables over the period of six years taken for the study.

For open and close prices of the five composite NSE indices, see Annexure 1.

USD/INR rates are taken from January 2009-December 2014, i.e. five years. Since, CPI is taken as a measure of inflation in India; we have taken CPI rates from January 2009-December 2014.

HYPOTHESIS FOR THE STUDY

Each objective has one null hypothesis and one alternate hypothesis.

#Objective 1
H_o: CNX Nifty performance is not dependent on USD/INR exchange rates and Inflation rates
H_1: CNX Nifty performance is dependent on USD/INR exchange rates and Inflation rates

#Objective 2
H_o: JUNIOR NIFTY performance is dependent on USD/INR exchange rates and Inflation rates
H_1: JUNIOR NIFTY performance is dependent on USD/INR exchange rates and Inflation rates

#Objective 3
H_o: CNX 500 performance is not dependent on USD/INR exchange rates and Inflation rates
H_1: CNX 500 performance is dependent on USD/INR exchange rates and Inflation rates

#Objective 4
H_o: CNX Midcap performance is not dependent on USD/INR exchange rates and Inflation rates
H_1: CNX Midcap performance is dependent on USD/INR exchange rates and Inflation rates

#Objective 5
H_o: CNX Smallcap performance is not dependent on USD/INR exchange rates and Inflation rates
H_1: CNX Smallcap performance is dependent on USD/INR exchange rates and Inflation rates

#Objective 6

H_o: There lies no significant relation between the macro-economic indicators and the five NSE Indices.
H_1: There lies a significant relation between the macro-economic indicators and the five NSE Indices.

TESTS

Correlation analysis is carried out to determine the influence of indicators on the performance of CNX Nifty Index, CNX Junior Nifty, CNX 500, CNX Midcap and CNX Smallcap. A value close to +1 indicates high positive correlation. Implying, a unit increase in indicator value leads to a proportionate increase in Sensex.
A value close to -1 indicates high negative correlation. Implying, a unit increase in indicator value leads to a proportionate decrease in Sensex.
Whereas, a value close to zero suggests that the indicator in question doesn't influence the performance of the indices.

The study evaluates the impact of exchange rates (Dollar) and inflation on the five NSE indices using Linear Multiple Regression Model. The regression equation is as follows-

$$Y = \alpha + \beta X$$

Where,

Y is the dependent variable, i.e. NSE Price Return,

α is the constant,

β is the slope of exchange rate (Dollar), and

X is the exchange rate (Dollar)

Y1	CNX Nifty
Y2	JUNIOR NIFTY
Y3	CNX 500
Y4	CNX Midcap
Y5	CNX Smallcap

Durbin-Watson test is used to check if there exist an autocorrelation between the exchange rates (Dollar), inflation rates and NSE Indices.

OBSERVATIONS

Descriptive Statistics

1. **Exchange rate (Dollar)**
   Table 2: Descriptive Statistics (USD/INR)

	N	Mean	Std. Deviation	Skewness	Kurtosis
USD/INR	72	52.3550	6.48231	.394	-1.261

The average foreign exchange rate (Dollar) for five years starting from January 2009 to December 2014 is 52.3550 and the volatility is 6.48231.Positive Skewness means that the left side of the mean is slower than the right side. Kurtosis is below 3 therefore the exchange rates are normally distributed.

2. **Inflation**
   Table 3: Descriptive Statistics Inflation

	N	Mean	Std. Deviation	Skewness	Kurtosis
INFLATION	72	226.1365	8.06314	-.195	-1.305

The mean Inflationrate for five years is 226.1365and the volatility is 8.06314. Negative Skewness means that the left side is stronger than the right side of the mean. Kurtosis is below three therefore the inflationrates are normally distributed.

3. **CNX NIFTY**
   Table 4: Descriptive Statistics (CNX NIFTY)

	N	Mean	Std. Deviation	Skewness	Kurtosis
CNX NIFTY	72	5622.9354	1127.31783	.333	1.491

The average Price on CNX NIFTY is 5622.9354and the volatility is 1127.31783. Positive Skewness means that the left side is slower than the right side. Kurtosis is below 3 therefore the CNX NIFTY prices are normally distributed.

4. **CNX JUNIOR NIFTY**

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Table 5: Descriptive Statistics (CNX JUNIOR NIFTY)

	N	Mean	Std. Deviation	Skewness	Kurtosis
CNX JUNIOR NIFTY	72	11215.3896	2872.88816	.242	1.580

The average price on CNX JUNIOR NIFTY is 11215.3896and the volatility is 2872.88816. Positive Skewness means the right side is stronger than the left side. Kurtosis value is 1.580, therefore prices are normally distributed.

5. **CNX 500**

Table 6: Descriptive Statistics (CNX 500)

	N	Mean	Std. Deviation	Skewness	Kurtosis
CNX 500	72	4492.1910	913.24348	.320	1.901

The mean value of CNX 500 is 4492.1910and the volatility is 913.24348. The Skewness value is .320 therefore the right side is stronger than the left side. Kurtosis value is 1.901therefore the prices are normally distributed.

6. **CNXMIDCAP**

Table 7: Descriptive Statistics (CNX MIDCAP)

	N	Mean	Std. Deviation	Skewness	Kurtosis
CNX MIDCAP	72	7761.8264	1800.42049	.207	1.757

The average price of CNX MIDCAPis 7761.8264and the volatility is 1800.42049. Positive Skewness means that the right side is stronger/faster than the left side. The kurtosis value is below 3 therefore the values are normally distributed.

7. **CNX SMALLCAP**

Table 8: Descriptive Statistics (CNX SMALLCAP)

	N	Mean	Std. Deviation	Skewness	Kurtosis
SMALLCAP	72	3480.2197	800.85798	.183	1.179

The average price of CNX SMALLCAP is 226.1365 and the volatility is 8.06314. Negative Skewness means that the right side is slower/weaker than the left side. The kurtosis value is below 3 therefore the values are normally distributed.

#Objective 1: Impact of exchange rate (Dollar) and inflation on CNX Nifty performance

Regression Analysis

Table 9: Regression Summary[b]

Model	R	R Square	Adjusted R Square	Standard Error Mean	N
1	.770[a]	.592	.580	730.18356	72

a. Predictors: (Constant), ER, IN

b. Dependent Variable: NIF

R-square gives information about the goodness of fit of a model.
Here, "R-Square"' tell us that 59.2 % of the variation in CNX Nifty was explained by Exchange rates (USD/INR) and inflation rates.

The adjusted R-square will always be less than or equal to R-square. In this case, it is .580.

The Standard Error is the error expected between the predicted and actual dependent variable. Here, the expected error for CNX Nifty performanceprediction is off by INR730.18356

Table 10: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients			P value
	B	**Std. Error**	**Beta**	**t**	**Sig.**	
1 (Constant)	-21680.700	3318.663		-6.533	.000	9.23888819539326E-09
						0.158437480807383
ER	-33.294	23.351	-.191	-1.426	.158	
IN	128.448	18.773	.919	6.842	.000	2.56711671314918E-09

The null form of each hypothesis test is simply: The independent variable is not a significant predictor of the dependent.

For Exchange rate, P-Value of 0.158437480807383indicates that there is only a 15.8% chance that the result occurred only as a result of chance.
At significance level of 5%, p >0.05, therefore, we not do reject the null hypothesis.
To conclude, Exchange rates haveno impact on CNX Nifty
T-value (-1.426>2) confirms the same.

For Inflation rate,
At significance level of 5%, p <0.05, therefore, we reject the null hypothesis.
To conclude, inflation rates have an impact on CNX Nifty
T-value (6.842>2) confirms the same.

Table 11: ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
1 **Regression**	53441435.250	2	26720717.625	50.117	.000[b]
Residual	36788594.402	69	533168.035		
Total	90230029.652	71			

a. Dependent Variable: NIF

b. Predictors: (Constant), IN, ER

The significance level is below .05 which means that the model is a good fit for the data. This table tells that the regression model predicts the dependent variable significantly well.

Regression Equation-

$$NIF = -21680.700 + -33.294ER – 128.448IN$$

Durbin-Watson test Analysis

Table 12: Durbin-Watson

	CNX Nifty
Exchange rate (Dollar) **Inflation**	.164

The value of Durbin Watson statistics for dependent variable (CNX Nifty) is 2.176, since the value lies between 1.5 and 2.5; auto-correlations exists in this dataset.

#Objective 2: Impact of exchange rate (Dollar) and inflationonJUNIOR NIFTY performance

Regression Analysis
Table 13:RegressionSummary[b]

Model	**R**	**R Square**	**Adjusted R Square**	**Standard Error Mean**	**N**
1	.723[a]	.523	.510	2012.00541	72

 a. Predictors: (Constant), ER, IN
 b. Dependent Variable: JUNNIF

"R-Square"' tell us that 52.3% of the variation in CNX JUNIOR NIFTY was explained by exchange rate (Dollar) and inflation rates.

The adjusted R-square will always be less than or equal to R-square. In this case, it is .510

The Standard Error is the error expected between the predicted and actual dependent variable. Here, the expected error for CNX JUNIORNIFTY performance prediction is off by INR. 2012.00541

Table 14:RegressionCoefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.	P value
	B	Std. Error	Beta	T		
1 (Constant)	-56943.074	9144.505		-6.227	.000	3.24289877452157E-08
ER	-114.891	64.344	-.259	-1.786	.079	0.078562028093382
IN	328.004	51.729	.921	6.341	.000	2.03575712984032E-08

a. Dependent Variable: JUNNIF

For Exchange rate, P-Value of 0.078562028093382 indicates that there is only a 7.8% chance that the result occurred only as a result of chance.

At significance level of 5%, p >0.05, therefore, we not do reject the null hypothesis.

To conclude, Exchange rate has no impact on CNX JUNIORNIFTY

T-value (-1.786<2) confirms the same.

For Inflation rate, P-Value of 2.03575712984032E-08 indicates that there is only a huge chance that the result occurred only as a result of chance.

At significance level of 5%, p <0.05, therefore, we reject the null hypothesis.

To conclude, inflation rate has an impact on CNX JUNIOR NIFTY

T-value (6.341>2) confirms the same.

Table 15: ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	306674095.723	2	153337047.862	37.878	.000[b]
Residual	279323438.131	69	4048165.770		
Total	585997533.855	71			

a. Dependent Variable: JUNNIF

b. Predictors: (Constant), IN, ER

The regression model is a good fit for this dataset which include Junior Nifty returns, exchange returns and inflation rates. (p=.000<05)

Regression Equation-

JUNNIF=-56943.074- 114.891ER + 328.004IN

Durbin-Watson test Analysis

Table 16:Durbin-Watson

	Junior Nifty
Exchange rate (Dollar) **Inflation**	.107

The value of Durbin Watson statistics for dependent variable is .107
, since the value does not lie between 1.5 and 2.5, hence there lies no autocorrelation.

#**Objective 3: Impact of exchange rate (Dollar) on CNX 500 performance**

Regression Analysis

Table 17: Regression Summary[b]

Model	R	R Square	Adjusted R Square	Standard Error Mean	N
1	.710[a]	.503	.489	652.80073	72

 a. Predictors: (Constant), ER, IN

 b. Dependent Variable: CNX500

"R-Square"' tell us that 50.3% of the variation in CNX 500 was explained by exchange rate (Dollar) and inflation rates.

The adjusted R-square will always be less than or equal to R-square. In this case, it is .489

The Standard Error is the error expected between the predicted and actual dependent variable. Here, the expected error for CNX 500 performance prediction is off by INR 652.80073

Table 18:RegressionCoefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients			P value
	B	Std. Error	Beta	t	Sig.	
1 (Constant)	-16861.998	2966.960		-5.683	.000	2.90920352505397E-07
USDINR	-37.215	20.877	-.264	-1.783	.079	0.07904959959573 57
CPIINFLA TION	103.046	16.784	.910	6.140	.000	4.62833601615624E-08

 a. Dependent Variable: CNX500

For Exchange rate, P-Value of 0.0790495995957357 indicates that there is only a 7.9% chance that the result occurred only as a result of chance.

At significance level of 5%, p >0.05, therefore, we not do reject the null hypothesis.

To conclude, Exchange rates have no impact on CNX 500

T-value (-1.786<2) confirms the same.

For Inflation rate,

At significance level of 5%, p <0.05, therefore, we reject the null hypothesis.

To conclude, inflation rates have an impact on CNX 500 prices

T-value (6.140>2) confirms the same.

Regression Equation-

CNX500= -16861.998 - 37.215ER + 103.046IN

Table 19: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29810702.341	2	14905351.171	34.977	.000[b]
	Residual	29404266.680	69	426148.792		
	Total	59214969.022	71			

a. Dependent Variable: CNX500

b. Predictors: (Constant), IN, ER

The regression model is a good fit for the dataset in this objective since the p value is less than .05

Durbin-Watson test Analysis

Table 20: Durbin-Watson

	CNX 500
Exchange rate (Dollar) Inflation	.131

The value of Durbin Watson statistics for dependent variable is .131, since the value lies between 1.5 and 2.5, there lies autocorrelation.

#Objective 4: Impact of exchange rate (Dollar) on CNX Midcap performance

Regression Analysis

Table 21: Regression Summary[b]

Model	R	R Square	Adjusted R Square	Standard Error Mean	N
1	.664[a]	.440	.424	1366.25619	72

a. Predictors: (Constant), ER,IN

b. Dependent Variable: MIDCAP

"R-Square"' tell us that 44% of the variation in CNX MIDCAP was explained by exchange rate (Dollar) and inflation rates.

The adjusted R-square will always be less than or equal to R-square. In this case, it is .424

The Standard Error is the error expected between the predicted and actual dependent variable. Here, the expected error for CNX MIDCAP performance prediction is off by Rs. 1366.25619

Table 22:RegressionCoefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			P value
		B	Std. Error	Beta	t	Sig.	
1	(Constant)	-35527.092	6209.594		-5.721	.000	2.49967156454974E-07
	ER	-131.238	43.693	-.473	-3.004	.004	0.00371451454803506
	IN	221.812	35.126	.993	6.315	.000	2.26612847581064E-08

a. Dependent Variable: MIDCAP

For Exchange rate, P-Value of 0.00371451454803506 indicates that there is only a .03% chance that the result occurred only as a result of chance.

At significance level of 5%, p <0.05, therefore, we reject the null hypothesis.

To conclude, Exchange rates have an impact on CNX MIDCAP prices

T-value (-3.004>2) confirms the same.

For Inflation rate,

At significance level of 5%, p <0.05, therefore, we reject the null hypothesis.

To conclude, inflation rates have an impact on CNX MIDCAP prices

T-value (6.315>2) confirms the same.

Regression Equation-

$$MIDCAP= -35527.092 -131.238 \ ER + 221.812 \ IN$$

Table 23: ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
1 **Regression**	101348227.134	2	50674113.567	27.147	.000[b]
Residual	128799263.316	69	1866655.990		
Total	230147490.450	71			

a. Dependent Variable: MIDCAP

b. Predictors: (Constant), IN, ER

The regression model is a good fit for the dataset in this objective. This means that regression model can be used to study the impact of exchange rate and inflation on the CNX Midcap returns.

Durbin-Watson test Analysis

Table 24:Durbin-Watson

	CNXMidcap
Exchange rate (Dollar)	.107
Inflation	

The value of Durbin Watson statistics for dependent variable is .709, since the value lies between 1.5 and 2.5; there lies no autocorrelation.

#Objective 5: Impact of exchange rate (Dollar) on CNX Smallcap performance

Regression Analysis

Table 25:RegressionSummary[b]

Model	R	R Square	Adjusted R Square	Standard Error Mean	N
1	.588[a]	.346	.327	657.02861	72

a. Predictors: (Constant), ER, IN

b. Dependent Variable: SMALL CAP

"R-Square"' tell us that 34.6% of the variation in CNX SMALLCAPwas explained by exchange rate (Dollar) and inflation rates.

The adjusted R-square will always be less than or equal to R-square. In this case, it is .327

The Standard Error is the error expected between the predicted and actual dependent variable. Here, the expected error for CNX SMALLCAP performance prediction is off by INR657.02861

Table 26:RegressionCoefficients[a]

		Unstandardized Coefficients		Standardized Coefficients			P value
	Model	B	Std. Error	Beta	t	Sig.	
1	(Constant)	-14446.206	2986.176		-4.838	.000	7.70412556678543E-06
	ER	-75.847	21.012	-.614	-3.610	.001	0.000576356334654686
	IN	96.833	16.892	.975	5.732	.000	2.39174718285868E-07

a. Dependent Variable: CNXSMALLCAPRTN

For Exchange rate, P-Value of 0.000576356334654686 indicates that there is only a .05% chance that the result occurred only as a result of chance.
At significance level of 5%, p <0.05, therefore, we reject the null hypothesis.
To conclude, Exchange rate has impact on CNX SMALLCAP
T-value (-3.610>2) confirms the same.

For Inflation rate,
At significance level of 5%, p <0.05, therefore, we reject the null hypothesis.

To conclude, inflation rate has an impact on CNX SMALLCAP
T-value (5.732>2) confirms the same.

Regression Equation-

$$\text{SMALLCAP} = -14446.206 - 75.847ER + 96.833\ IN$$

Table 27:ANOVA[a]

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 **Regression**	15751143.329	2	7875571.664	18.244	.000[b]
Residual	29786374.998	69	431686.594		
Total	45537518.327	71			

a. Dependent Variable: SMALLCAP

b. Predictors: (Constant), IN, ER

The regression model is a good fit for the dataset.

Durbin-Watson test Analysis

Table 28:Durbin-Watson

	CNX Midcap
Exchange rate (Dollar) **Inflation**	.132

The value of Durbin Watson statistics for dependent variable is .132, since the value lies between 1.5 and 2.5; there lies no autocorrelation.

#Objective 6: To study the relationship between the two macro-economic variables and the five of the most traded indices of NSE

Table 29:Correlations

	ER	IN	NIF	JUNNIF	CNX500	MIDCAP	SMALLCAP
ER	1						
IN	.820[**]	1					
NIF	.562[**]	.762[**]	1				
JUNNIF	.496[**]	.708[**]	.989[**]	1			
CNX500	.482[**]	.693[**]	.992[**]	.995[**]	1		
MIDCAP	.342[**]	.606[**]	.952[**]	.978[**]	.977[**]	1	
SMALL CAP	.185	.472[**]	.881[**]	.917[**]	.926[**]	.971[**]	1

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

CORRELATION TEST ANALYSIS

- From the correlation table, it is observed that all the variables are significantly positively related to each other.
- The highest degree of correlation exists between CNXJUNIOR NIFTY prices and the CNX 500 close prices.
- This implies that percentage increase in prices of one variable will result a proportionate increase in the prices of the second variables and vice versa.
- CNX SMALLCAP and Exchange rates are moderately correlated.
- CNX NIFTY is seen to have a significantly stronger correlation with the other four NSE Indices, individually.
- Exchange rates and inflation rates have highest correlations with CNX NIFTY, then with CNX JUNIOR NIFTY, CNX 500, CNX MIDCAP, and CNX SMALLCAP respectively. This implies that a proportionate increase in the exchange rates or inflation rates will have a proportionate increase in the stock prices.

CONCLUSIONS

- We can clearly observe that exchange rates and inflation rates have significant impact on the five most composite indices of NSE.

- 59.2 %, 52%, 50.3 %, 44%, and 34.6% variations in the prices of CNX NIFTY, CNX JUNIOR NIFTY, CNX 500, CNX MIDCAP, and CNX SMALLCAP respectively are explained by the Dollar exchange rates and CPI rates as proxy of inflation.

- Regression analysis also tell us that exchange rates against US Dollar have no impact on the prices of CNX NIFTY, CNX JUNIOR NIFTY, and CNX 500, but have a significant impact on CNX MIDCAP and CNX SMALLCAP.

- Inflation rates have been observed as a stronger variable than exchange rates in this study. CPI rates used as proxy of inflation have shown impact on all the five indices of NSE taken into consideration for the conduct of the study.

- We can observe that USD and INR exchange rates are negatively and insignificantly related to NSE Indices. However, CPI rates used as proxy of inflation have a positive relationship with the NSE Indices.

- Positive relationship between inflation and stock prices indicates that we cannot use Indian stocks hedge inflation. The negative relationship between exchange rate and NSE index

signals stock returns at the Indian stock exchange market improves with a fall in the exchange rate of USD/INR. Hence, exchange rate and inflation are important variables determining stock market returns and investors must be mindful of these variables as continuous increase inflation may be counterproductive for stock returns in the long run. Policy makers also need to guide the exchange rate of the naira against other currencies to encourage and protect investors in the Nigerian stock market.

- Durbin-Watson test shows that autocorrelation exist in this study.

- Correlation analysis explains that all the seven dependent and independent variables are positively correlated. It was also observed that the stock prices of the five indices of NSE have strong inter-item correlation as the values of their pair wise correlation is higher as compared to their correlation with the two key macro-economic variables used.

Since, only two of the many macro-economic variables are taken for the study, there is a possibility that the performance of some of these indices is dependent on some other variable like the gold prices, silver prices, and oil prices, etc.

Annexure 1: Monthly data for Exchange rates (Indian Rupee against US Dollar) and Inflation rates (CPI rates as they are a measure of Inflation) for six years starting from January 2009 till December 2014

Month-Year	USD/INR Rates	CPI as a measure of Inflation
1-Jan-09	48.85	211.143
1-Feb-09	51.005	212.193
1-Mar-09	50.57	212.709
1-Apr-09	49.725	213.24
1-May-09	47.12	213.856
1-Jun-09	47.75	215.693
1-Jul-09	47.825	215.351
1-Aug-09	48.69	215.834
1-Sep-09	47.735	215.969
1-Oct-09	46.925	216.177
1-Nov-09	46.535	216.33
1-Dec-09	46.41	215.949
1-Jan-10	46.125	216.687
1-Feb-10	46.105	216.741

1-Mar-10	44.825	217.631
1-Apr-10	44.275	218.009
1-May-10	46.365	218.178
1-Jun-10	46.445	217.965
1-Jul-10	46.405	218.011
1-Aug-10	47.065	218.312
1-Sep-10	44.57	218.439
1-Oct-10	44.325	218.711
1-Nov-10	45.8	218.803
1-Dec-10	44.712	219.179
1-Jan-11	45.825	220.223
1-Feb-11	45.265	221.309
1-Mar-11	44.535	223.467
1-Apr-11	44.255	224.906
1-May-11	45.06	225.964
1-Jun-11	44.7	225.722
1-Jul-11	44.21	225.922
1-Aug-11	45.8	226.545
1-Sep-11	49.02	226.889
1-Oct-11	48.695	226.421
1-Nov-11	52.13	226.23
1-Dec-11	53.015	225.672
1-Jan-12	49.515	226.665
1-Feb-12	49.11	227.663
1-Mar-12	50.875	229.392
1-Apr-12	52.666	230.085
1-May-12	55.886	229.815
1-Jun-12	55.511	229.478
1-Jul-12	55.605	229.104
1-Aug-12	55.526	230.379
1-Sep-12	52.885	231.407
1-Oct-12	53.8	231.317
1-Nov-12	54.285	230.221
1-Dec-12	54.741	229.601
1-Jan-13	53.289	230.28
1-Feb-13	54.37	232.166
1-Mar-13	54.285	232.773
1-Apr-13	53.685	232.531
1-May-13	56.58	232.945
1-Jun-13	59.533	233.504

1-Jul-13	60.855	233.596
1-Aug-13	65.705	233.877
1-Sep-13	62.59	234.149
1-Oct-13	61.624	233.546
1-Nov-13	62.399	233.069
1-Dec-13	61.81	233.049
1-Jan-14	62.685	233.916
1-Feb-14	61.795	234.781
1-Mar-14	60.015	236.293
1-Apr-14	60.345	237.072
1-May-14	59.195	237.9
1-Jun-14	60.06	238.343
1-Jul-14	60.555	238.25
1-Aug-14	60.52	237.852
1-Sep-14	61.94	238.031
1-Oct-14	61.405	237.433
1-Nov-14	62.21	236.151
1-Dec-14	63.035	234.812

Annexure 2: Monthly data for Open Prices, Close Prices and Price Return on CNX Nifty, JUNIOR NIFTY, CNX 500, CNX Midcap, and CNX Smallcap from 2009-2014

Month-Year	**CNX NIFTY**			**JUNIOR NIFTY**		
	Open	**Close**	**Return**	**Open**	**Close**	**Return**
1-Jan-09	2963.3	2874.8	-88.5	4568.55	4230.15	-338.4
1-Feb-09	2872.35	2763.65	-108.7	4214.15	3980.55	-233.6
1-Mar-09	2764.6	3020.95	256.35	3941.55	4336.45	394.9
1-Apr-09	3023.85	3473.95	450.1	4343.2	5281.8	938.6
1-May-09	3478.7	4448.95	970.25	5380.05	7474.3	2094.25
1-Jun-09	4450.4	4291.1	-159.3	7581.8	7794.7	212.9
1-Jul-09	4292.3	4636.45	344.15	7791.9	8473.65	681.75
1-Aug-09	4633.8	4662.1	28.3	8475.45	8542.4	66.95
1-Sep-09	4662.2	5083.95	421.75	8580.4	9360.65	780.25
1-Oct-09	5087.2	4711.7	-375.5	9380.35	9162.4	-217.95
1-Nov-09	4712.25	5032.7	320.45	9144.65	9933.2	788.55

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1-Dec-09	5039.7	5201.05	161.35	9952.8	10382.7	429.9
1-Jan-10	5200.9	4882.05	-318.85	10372.4	9985.7	-386.7
1-Feb-10	4882.05	4922.3	40.25	9954.45	10099.95	145.5
1-Mar-10	4935.6	5249.1	313.5	10137.45	10773.75	636.3
1-Apr-10	5249.2	5278	28.8	10777	11082.1	305.1
1-May-10	5278.4	5086.3	-192.1	11066.2	10821.75	-244.45
1-Jun-10	5086.25	5312.5	226.25	10776.3	11304.45	528.15
1-Jul-10	5312.05	5367.6	55.55	11245.15	11564.25	319.1
1-Aug-10	5369.55	5402.4	32.85	11648.45	11797.6	149.15
1-Sep-10	5403.05	6029.95	626.9	11825.8	12585.3	759.5
1-Oct-10	6030.3	6017.7	-12.6	12604.9	13030	425.1
1-Nov-10	6092.3	5862.7	-229.6	13111.35	12338.8	-772.55
1-Dec-10	5871	6134.5	263.5	12344.5	12232.05	-112.45
1-Jan-11	6177.45	5505.9	-671.55	12253.15	10915.65	-1337.5
1-Feb-11	5537.3	5333.25	-204.05	10927.8	10448.85	-478.95
1-Mar-11	5382	5833.75	451.75	10484.95	11279.55	794.6
1-Apr-11	5835	5749.5	-85.5	11319.2	11376.7	57.5
1-May-11	5766.9	5560.15	-206.75	11385.05	11444.15	59.1
1-Jun-11	5561.05	5647.4	86.35	11448.1	11234.9	-213.2
1-Jul-11	5705.75	5482	-223.75	11239.4	10910.2	-329.2
1-Aug-11	5527.5	5001	-526.5	10972.2	9989	-983.2
1-Sep-11	5109.8	4943.25	-166.55	10004.6	9822.2	-182.4
1-Oct-11	4874.4	5326.6	452.2	9815.45	10047.15	231.7
1-Nov-11	5278.6	4832.05	-446.55	10044.7	9089.95	-954.75
1-Dec-11	4970.85	4624.3	-346.55	9094.5	8333.1	-761.4
1-Jan-12	4640.2	5199.25	559.05	8333.45	9812.55	1479.1
1-Feb-12	5198.15	5385.2	187.05	9813.35	10438	624.65
1-Mar-12	5366	5295.55	-70.45	10437.7	10450.2	12.5
1-Apr-12	5296.35	5248.15	-48.2	10449.8	10226.25	-223.55
1-May-12	5254.3	4924.25	-330.05	10231.6	9563.15	-668.45
1-Jun-12	4910.85	5278.9	368.05	9563.4	10099.55	536.15
1-Jul-12	5283.85	5229	-54.85	10102.75	10028.55	-74.2
1-Aug-12	5220.7	5258.5	37.8	10029.35	9892.15	-137.2
1-Sep-12	5276.5	5703.3	426.8	9895.85	11042.75	1146.9
1-Oct-12	5704.75	5619.7	-85.05	11044.7	10898.45	-146.25
1-Nov-12	5609.85	5879.85	270	10899.45	11790.6	891.15
1-Dec-12	5878.25	5905.1	26.85	11794	12340.05	546.05
1-Jan-13	5937.65	6034.75	97.1	12345.6	12270.55	-75.05
1-Feb-13	6040.95	5693.05	-347.9	12272.4	11457.75	-814.65
1-Mar-13	5702.45	5682.55	-19.9	11459.3	11222.8	-236.5

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1-Apr-13	5697.35	5930.2	232.85	11238.05	12042.4	804.35
1-May-13	5911.4	5985.95	74.55	12020.2	12312.05	291.85
1-Jun-13	5997.35	5842.2	-155.15	12313.3	11546.65	-766.65
1-Jul-13	5834.1	5742	-92.1	11575.5	11161.95	-413.55
1-Aug-13	5776.9	5471.8	-305.1	11197.45	10494.4	-703.05
1-Sep-13	5480.25	5735.3	255.05	10525.9	11208	682.1
1-Oct-13	5756.1	6299.15	543.05	11231.85	12209.4	977.55
1-Nov-13	6289.75	6176.1	-113.65	12182.7	12363.4	180.7
1-Dec-13	6171.15	6304	132.85	12392.55	12933.25	540.7
1-Jan-14	6323.8	6089.5	-234.3	12967.5	11993.05	-974.45
1-Feb-14	6058.8	6276.95	218.15	11971.8	12180	208.2
1-Mar-14	6264.35	6704.2	439.85	12168.65	13469.05	1300.4
1-Apr-14	6729.5	6696.4	-33.1	13529.3	13587.3	58
1-May-14	6709.95	7229.95	520	13673.4	15511.95	1838.55
1-Jun-14	7264.05	7611.35	347.3	15576	16486.2	910.2
1-Jul-14	7629	7721.3	92.3	16542.55	16285.7	-256.85
1-Aug-14	7662.5	7954.35	291.85	16152.25	16764.7	612.45
1-Sep-14	7990.35	7964.8	-25.55	16804.9	17003.85	198.95
1-Oct-14	7960.5	8322.2	361.7	17000.3	17715.65	715.35
1-Nov-14	8348.15	8588.25	240.1	17766.35	18568	801.65
1-Dec-14	8605.1	8282.7	-322.4	18629.25	18677.7	48.45

Month-Year	CNX 500		
	Open	**Close**	**Return**
1-Jan-09	2305.95	2209.05	-96.9
1-Feb-09	2185.45	2112.85	-72.6
1-Mar-09	2070.05	2294.85	224.8
1-Apr-09	2282.1	2662.95	380.85
1-May-09	2707.45	3579.9	872.45
1-Jun-09	3649.85	3469.7	-180.15
1-Jul-09	3486.1	3764.1	278
1-Aug-09	3778.05	3840.25	62.2
1-Sep-09	3871	4118.65	247.65
1-Oct-09	4128.5	3853.15	-275.35
1-Nov-09	3837	4145.45	308.45
1-Dec-09	4176.15	4329.1	152.95
1-Jan-10	4343.1	4156.05	-187.05

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1-Feb-10	4130.45	4127.55	-2.9
1-Mar-10	4170.35	4313.25	142.9
1-Apr-10	4337.2	4368.1	30.9
1-May-10	4346.25	4226.6	-119.65
1-Jun-10	4221.7	4420.7	199
1-Jul-10	4391.95	4475.15	83.2
1-Aug-10	4501.8	4537.25	35.45
1-Sep-10	4561.6	4925.15	363.55
1-Oct-10	4945.4	4972.95	27.55
1-Nov-10	5013.8	4781.4	-232.4
1-Dec-10	4785.95	4940.95	155
1-Jan-11	4964.5	4424.6	-539.9
1-Feb-11	4441.85	4247.15	-194.7
1-Mar-11	4273.9	4626.45	352.55
1-Apr-11	4627.15	4615.3	-11.85
1-May-11	4624.75	4492.9	-131.85
1-Jun-11	4493.45	4522.95	29.5
1-Jul-11	4554.5	4424.05	-130.45
1-Aug-11	4448.85	4038.35	-410.5
1-Sep-11	4097.9	3978.35	-119.55
1-Oct-11	3940.85	4215.9	275.05
1-Nov-11	4189.75	3811.25	-378.5
1-Dec-11	3886.95	3597.75	-289.2
1-Jan-12	3606.4	4082.85	476.45
1-Feb-12	4082.25	4275.55	193.3
1-Mar-12	4265.05	4221.8	-43.25
1-Apr-12	4222.2	4178.35	-43.85
1-May-12	4182	3913.05	-268.95
1-Jun-12	3905.7	4170.65	264.95
1-Jul-12	4173.6	4126.45	-47.15
1-Aug-12	4121.9	4129.9	8
1-Sep-12	4140	4504.35	364.35
1-Oct-12	4505.3	4448.85	-56.45
1-Nov-12	4443.4	4675.25	231.85
1-Dec-12	4674.55	4743.45	68.9
1-Jan-13	4761.8	4795.3	33.5
1-Feb-13	4798.9	4477.5	-321.4
1-Mar-13	4483	4438.35	-44.65
1-Apr-13	4449.35	4641.75	192.4
1-May-13	4630.4	4681.45	51.05

1-Jun-13	4688.6	4510.9	-177.7
1-Jul-13	4509.35	4379.65	-129.7
1-Aug-13	4402.7	4175.85	-226.85
1-Sep-13	4182.65	4392.05	209.4
1-Oct-13	4405	4804.85	399.85
1-Nov-13	4798.4	4770.1	-28.3
1-Dec-13	4770.85	4914.85	144
1-Jan-14	4928.8	4709.15	-219.65
1-Feb-14	4690.15	4849.5	159.35
1-Mar-14	4842.3	5224.85	382.55
1-Apr-14	5244.15	5255.65	11.5
1-May-14	5271.05	5802.85	531.8
1-Jun-14	5829.1	6174.2	345.1
1-Jul-14	6192	6194.45	2.45
1-Aug-14	6146.55	6360.75	214.2
1-Sep-14	6388.1	6415.7	27.6
1-Oct-14	6413.2	6685.75	272.55
1-Nov-14	6705.25	6918.05	212.8
1-Dec-14	6931.5	6773.65	-157.85

Month-Year	CNX MIDCAP			CNX SMALLCAP		
	Open	**Close**	**Return**	**Open**	**Close**	**Return**
1-Jan-09	3741.25	4230.15	488.9	1724.67	1536.72	-187.95
1-Feb-09	3343.25	3980.55	637.3	1507.95	1448.19	-59.76
1-Mar-09	3148.5	4336.45	1187.95	1424.54	1577.62	153.08
1-Apr-09	3418.25	5281.8	1863.55	1608.99	1840.7	231.71
1-May-09	3882.4	7474.3	3591.9	1893.95	2712.02	818.07
1-Jun-09	5462.75	7794.7	2331.95	2788.56	2666.03	-122.53
1-Jul-09	5458.85	8473.65	3014.8	2671.9	2836.37	164.47
1-Aug-09	5969.1	8542.4	2573.3	2869.76	3058.78	189.02
1-Sep-09	6153.25	9360.65	3207.4	3023.44	3219.82	196.38
1-Oct-09	6729.55	9162.4	2432.85	3200.56	3067.44	-133.12
1-Nov-09	6558.05	9933.2	3375.15	2949.35	3264.17	314.82
1-Dec-09	7204.65	10382.7	3178.05	3320.53	3486.24	165.71
1-Jan-10	7460.3	9985.7	2525.4	3544.91	3493.38	-51.53
1-Feb-10	7171.1	10099.95	2928.85	3546.81	3405.99	-140.82

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1-Mar-10	7242.5	10773.75	3531.25	3477.92	3619.59	141.67
1-Apr-10	7750.45	11082.1	3331.65	3659.11	3764.36	105.25
1-May-10	8058	10821.75	2763.75	3745	3509.47	-235.53
1-Jun-10	7746.55	11304.45	3557.9	3478.46	3695.98	217.52
1-Jul-10	8096.1	11564.25	3468.15	3687.69	3845.09	157.4
1-Aug-10	8460.05	11797.6	3337.55	3893.31	4030.9	137.59
1-Sep-10	8732.9	12585.3	3852.4	4110.19	4302.95	192.76
1-Oct-10	9209.9	13030	3820.1	4377.12	4462.25	85.13
1-Nov-10	9462.65	12338.8	2876.15	4489.49	4035.53	-453.96
1-Dec-10	8925.8	12232.05	3306.25	4136.24	4101.01	-35.23
1-Jan-11	8920.55	10915.65	1995.1	4141.83	3603.4	-538.43
1-Feb-11	7952	10448.85	2496.85	3556.01	3351.27	-204.74
1-Mar-11	7426.05	11279.55	3853.5	3460.78	3583.74	122.96
1-Apr-11	8040.5	11376.7	3336.2	3584.17	3846.46	262.29
1-May-11	8201.3	11444.15	3242.85	3793.64	3651.55	-142.09
1-Jun-11	8065.5	11234.9	3169.4	3706.83	3665.03	-41.8
1-Jul-11	7972.6	10910.2	2937.6	3674.98	3707.48	32.5
1-Aug-11	8021.5	9989	1967.5	3707.48	3263.06	-444.42
1-Sep-11	7296	9822.2	2526.2	3327.39	3309.48	-17.91
1-Oct-11	7093.6	10047.15	2953.55	3301.3	3483.85	182.55
1-Nov-11	7266.5	9089.95	1823.45	3475.15	3000.2	-474.95
1-Dec-11	6642.9	8333.1	1690.2	3023.15	2711.85	-311.3
1-Jan-12	6112.3	9812.55	3700.25	2716.3	3164.25	447.95
1-Feb-12	7100.45	10438	3337.55	3171.05	3383.45	212.4
1-Mar-12	7705	10450.2	2745.2	3388	3386	-2
1-Apr-12	7711.7	10226.25	2514.55	3397.3	3444.75	47.45
1-May-12	7472.4	9563.15	2090.75	3454.8	3212.5	-242.3
1-Jun-12	6898.8	10099.55	3200.75	3208.15	3350.85	142.7
1-Jul-12	7352.8	10028.55	2675.75	3361	3208.05	-152.95
1-Aug-12	7168.45	9892.15	2723.7	3210.55	3158.4	-52.15
1-Sep-12	7066.75	11042.75	3976	3166.2	3451.65	285.45
1-Oct-12	7841	10898.45	3057.45	3448	3410.25	-37.75
1-Nov-12	7763.8	11790.6	4026.8	3412.55	3638.6	226.05
1-Dec-12	8141.3	12340.05	4198.75	3640.4	3710.15	69.75
1-Jan-13	8507.1	12270.55	3763.45	3719.05	3638.95	-80.1
1-Feb-13	8365.55	11457.75	3092.2	3646	3267.65	-378.35
1-Mar-13	7543.6	11222.8	3679.2	3274.5	3133.65	-140.85
1-Apr-13	7430.95	12042.4	4611.45	3136.35	3224.75	88.4
1-May-13	7812.55	12312.05	4499.5	3227.9	3155.7	-72.2
1-Jun-13	7813.6	11546.65	3733.05	3153.35	2906.85	-246.5

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1-Jul-13	7357.15	11161.95	3804.8	2917.45	2652.65	-264.8
1-Aug-13	6894.1	10494.4	3600.3	2660.75	2613.3	-47.45
1-Sep-13	6606	11208	4602	2615.2	2739.2	124
1-Oct-13	7005.35	12209.4	5204.05	2745.45	3068.3	322.85
1-Nov-13	7524.1	12363.4	4839.3	3074.1	3183.9	109.8
1-Dec-13	7703.95	12933.25	5229.3	3194.6	3402.9	208.3
1-Jan-14	8084.6	11993.05	3908.45	3414.5	3188.2	-226.3
1-Feb-14	7515.45	12180	4664.55	3186.55	3276.6	90.05
1-Mar-14	7807.3	13469.05	5661.75	3278.65	3692.95	414.3
1-Apr-14	8639.5	13587.3	4947.8	3712.95	3933.55	220.6
1-May-14	8832.45	15511.95	6679.5	3958.05	4814.05	856
1-Jun-14	10175.1	16486.2	6311.1	4851	5389.4	538.4
1-Jul-14	11142.65	16285.7	5143.05	5417.85	5060.65	-357.2
1-Aug-14	10749.1	16764.7	6015.6	5004.7	5005.15	0.45
1-Sep-14	11151.2	17003.85	5852.65	5031.15	4943.35	-87.8
1-Oct-14	11407.75	17715.65	6307.9	4938.55	5146.2	207.65
1-Nov-14	11849.6	18568	6718.4	5168.05	5188.15	20.1
1-Dec-14	12402.9	18677.7	6274.8	5188.85	5272.9	84.05

Annexure 3: Average values of Exchange rates (USD/INR), Inflation rates, CNX Nifty, JUNIOR NIFTY, CNX 500, CNX Midcap and CNX Smallcap for six years (2009-2014)

Year	Monthly Average values						
	USD/INR	**CPI Inflation**	**Price Return on CNX Nifty**	**Price Return on JUNIOR NIFTY**	**Price Return on CNX 500**	**Price Return on CNX Midcap**	**Price Return on CNX Smallcap**
2009	48.26167	214.537	185.0583	466.5083	158.5292	2323.592	144.1583
2010	45.58475	218.0555	69.5375	145.9792	41.29583	3274.95	10.02083
2011	46.87583	224.9392	-157.288	-341.475	-129.117	2666.033	-131.278
2012	53.36708	229.5939	107.25	332.2375	95.67917	3187.292	78.71667
2013	58.89375	232.9571	25.1375	38.98333	8.466667	4221.55	-31.4083
2014	61.14667	236.7362	157.9917	455.075	148.5333	5707.129	146.6917