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A COMPARATIVE ANALYSIS OF VARIOUS SECTORAL INDEX BEHAVIOUR ON S&P CNX NIFTY INDEX IN INDIA

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ABSTRACT

Volatility in the stock return is an integral part of stock market with alternative bull and bear phases. To see the volatility of the indices, the study has been undertaken to analyse how far the sectoral indices are influenced the S & P CNX Nifty Index of National Stock Exchange (NSE). Out of the eight sectoral indices only four indices has taken for analysis due to multi-colinearity. The CNX FMCG Index, CNX Auto Index and CNX Infrastructure Index are highly correlated with CNX Nifty Index. The period of the study is considered as the date of every sectoral Index has launched by the National stock Exchange till 30th June 2011. The tools used for the study are correlation and ordinary least squares (OLS) regression. All the independent variables are explained well with dependent variable. In respect of OLS, all explained variables together interacted 99% with outcome variable. Out of the four explained variables CNX FMCG Index shows moderate level of coefficient of determination, followed by CNX Information Technology Index. Though CNX Infrastructure Index and CNX Auto Index shows highly significant level however they shows very low level coefficient of determination.

KEYWORDS: *OLS regression, S & P CNX Nifty Index, Sectoral indices, Volatility.*

INTRODUCTION

The Indian capital market has witnessed many changes in the past decade. Liquidity and transparency are the most important properties of any developed market. The regulatory and legal frameworks are also essential for capital market. (Dr.Prashant Joshi, 2011). As a result the Securities and Exchange Board of India (SEBI) was constituted on 12 April 1988 as a

non-statutory body through an Administrative Resolution of the Government for dealing with all matters relating to development and regulation of the securities market and investor protection and to advise the government. SEBI was given statutory status and powers through an Ordinance promulgated on 30th January 1992. (satish K. Mittal and Sonal Jain, 2009). The Ordinance was replaced by an Act of Parliament on 4 April 1992. The preamble of the SEBI Act, 1992 enshrines the objectives of SEBI is to protect the interest of investors in securities market and to promote the development and to regulate the securities market.

NATIONAL STOCK EXCHANGE

One of the major stock exchange in India has come much the control of SEBI as known as The National Stock Exchange (NSE). The National Stock Exchange of India was promoted by leading financial institutions at the behest of the Government of India and it was incorporated in November 1992 as a tax paying company. In April 1993, it was recognised as a stock exchange under the securities contracts (regulations) Act 1956. The capital market (Equities) segment of the NSE commenced operations in November 1994. The base period for the S & P CNX Nifty Index was in 3rd November 1995. The S & P CNX Nifty Index was launched in 1st April 1996. (Financial Markets By National Stock Exchange) NSE is the largest stock exchange for investing in India in terms of daily turnover and number of transactions for equities and derivatives. NSE has a market capitalization of about 6,393,418 million rupees (U.S. \$ 1,451.31 billion) in August 2010. Despite a series of exchanges with others existed, NSE and the Bombay Stock Exchange are the two major national stock exchanges in India with the vast majority of stock transactions. The benchmark index of the NSE is the S & P CNX Nifty are known as Nifty NSE (National Stock Exchange of fifty) as an index of fifty blue-chips in terms of market capitalization.

The NSE stands as the third largest stock exchange worldwide according to the number of transactions in shares. This is the second rapid growth stock market in the world with a growth of 16.6%. The NSE was promoted by leading financial institutions, banks, insurance companies and other financial brokers at the request of the Government of India and was united in November 1992 as a tax-paying company. (http://en.wikipedia.org/wiki/National_Stock_Exchange_of_India).

STOCK INDICES

A stock market index is created by selecting a group of stocks that are representative of the whole market or a specified sector or segment of the market. A stock market index is a measure of the relative value of a group of stocks in numerical terms. An index is important to measure the performance of investments against a relevant market index. An Index is calculated with reference to a base period and a base index value. An Index is used to give information about the price movements of products in the financial, commodities or any other markets. Financial indexes are constructed to measure price movements of stocks, bonds, T-bills and other forms of investments. Stock market indexes are meant to capture the overall behaviour of equity markets. There are three kinds of Indices in India.

MAJOR INDICES

These indices are broad-market indices, consisting of the large, liquid stocks listed on the exchange. They serve as a benchmark for measuring the performance of the stocks or portfolios such as mutual fund investments. They are S&P CNX Nifty, CNX Nifty Junior,

CNX 100, CNX 200, S&P CNX 500, CNX Midcap, Nifty Midcap 50, CNX Smallcap Index, S&P CNX Defty and India Vix.

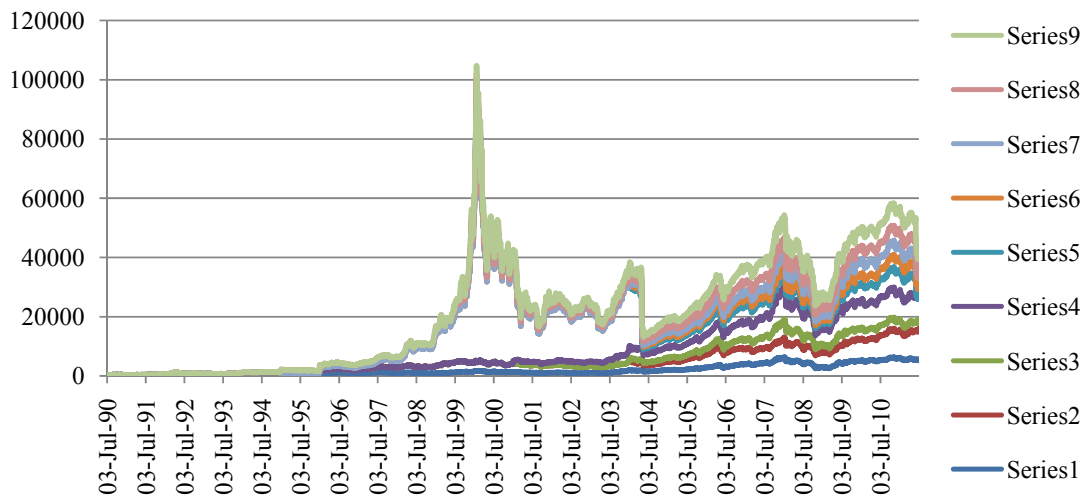
SECTORAL INDICES:

Sector-based index are designed to provide a single value for the aggregate performance of a number of companies representing a group of related industries or within a sector of the economy. They are CNX Auto Index, CNX Bank Index, CNX Energy Index, CNX Finance Index, CNX FMCG Index, CNX IT Index, CNX Media Index, CNX Metal Index, CNX MNC Index, CNX Pharma Index, CNX PSU Bank Index, CNX Realty Index and S&P CNX Industry Indices.

THEMATIC INDICES

Thematic indices are designed to provide a single value for the aggregate performance of a number of companies representing a theme. They are CNX Commodities Index, CNX Consumption Index, CNX Dividend Opportunity Index, CNX Infrastructure Index, CNX PSE Index, CNX Service Sector Index, S&P CNX Nifty Shariah / S&P CNX 500 Shariah and S&P ESG India Index.

GRAPH:1MOVEMENT OF S & P CNX NIFTY AND ITS SECTORAL INDICES



REVIEW OF PAST STUDIES

Nupur Gupta and Dr. Vijay Agarwal (2011) analysed Indian capital market with other Asian stock market. In this study they noticed that Indian capital has no longer cut off from international economic events and their stock index movements. The correlation of Indian stock market with five other major Asian economies: Japan, Hong Kong, Indonesia, Malaysia and Korea. As a result, there is a non normality feature in the stock return distribution of the six economies of Asia including India. The Indian stock markets shows a platykurtic

distribution, the volatility of its weekly returns were similar to its other Asian counterparts. A negative skewness of returns, both in the short and long run indicates concentration of these returns towards higher returns and good opportunity for investment.

M.Thiripalraju H Rajesh Acharya (2010) investigated the volatility of the Indian capital Markets in particular. The model of volatility of the equity data of NSE and BSE. The GARCH model has used to test the spill over effect between the benchmark indices of the two Indian stock markets. The results found that volatility transmission between the two markets.

M.Madhavi and Rahika.Raavi (2010) studied the performance of the sectoral indices in comparison with SENSEX. The analysis should be useful to the investors in their investment portfolio. The Major six sectoral indices were taken for this analysis, which have a significant impact on the total economic situation of the country. i.e BSE IT, BSE FMCG, BSE Oil and Gas, BSE BANKEX, BSE Metal and BSE Realty. The Correlation coefficients to establish the relationship between the selected sectoral indices and BSE. The results indicates all the indices are high range of positive correlation with SENSEX. In short the investors can follow the leading index for their investments in various sectors.

P.Srinivasan (2010) examines the random walk hypothesis to determine the validity of weak-form efficiency for two major stock market in India. The ADF and PP unit root tests clearly reveals that the null hypothesis of unit root is convincingly rejected in the case of stock market returns of two major indices. The implication of rejection of weak form efficiency for investors is that they can better predict the stock price movements, by holding a well diversified portfolio while investing in the Indian Stock markets.

N.RajivMenon,M.V.Subha and S.sagaran (2009) are tested the Indian stock market is any cointegrated with other leading stock markets of the world using Engle Granger Test of Cointegration. For the analysis they has selected BSE Index and NSE Index from India and SEC from china, NASDAQ from America, Hang Seng HSI from Hong Kong and STI from Singapore. The results find that the Indian Markets are related to some of the markets around the world.

Rakesh Kumar and Raj S Dhankar (2009) studied efficient capital market theory postulates the random walk behaviour of stock market, i.e, risk and return are normally distributed. The study examines the prices of Bombay Stock Exchange (BSE) listed indices: Sensex, BSE 100 and BSE 500. The returns are negatively skewed for all the indices over the period. Asymmetry is found in risk and return in case of daily and weekly returns. These findings bring out the importance of time horizon in investment strategy for the Indian stock market.

Satish K. Mittal and Sonaljain (2009) testified that market efficiency has always been the concern of market regulators, investors and researchers. Market efficiency test shows different and mixed evidences in the developing markets. For the study the closing price three indices are selected, i.e S & P CNX 500, CNX 100, and BSE 200. The findings of the study none of the anomalies exist in the Indian stock market as information efficient. Serial correlation and run test also support the Random walk theory and market efficiency hypothesis.

M.Selvam, M.Babu, G.Indhumathi and S.Krithiga (2009) found that the behaviour of the stock market volatility after derivatives for indices, as well as individual stocks. The major

stock indices are selected for the study. It uses GARCH techniques to capture the time-varying nature of volatility and volatility clustering phenomenon in the data. The study found that there are no significant changes in the volatility of the spot market.

Though there were numerous studies undertaken more of the researchers studied about relationship of CNX NSE Nifty with BSE, Asian stock market and their sectoral indices in India. This study adds to the existing literature in this field.

SCOPE OF THE STUDY

An Index is used to give information about the price movements of products in the financial, commodities or any other markets. Stock market indexes are meant to capture the overall behaviour of equity markets. An index is important to measure the performance of investments against a relevant market index.

Stock market indexes are useful for a variety of reasons. Some of them are:

- They provide a historical comparison of returns on money invested in the stock market against other forms of investments such as gold or debt.
- They can be used as a standard against which to compare the performance of an equity fund.
- It is an indicator of the performance of the overall economy or a sector of the economy
- Stock indexes reflect highly up to date information
- Modern financial applications such as Index Funds, Index Futures, Index Options play an important role in financial investments and risk management.

Index funds are funds which passively 'invest in the index'. The index funds track a broad index which is less volatile than specific sectors, thereby lessening the risk for investors. The sectoral indices were developed and these are comprehensively providing the necessary information to the investors to invest their funds for productive utilization of the country. To understand the importance of the stock market indices and the performance of the sectoral indices in comparison with prime index is more essential.(M.Madhavi & RadhikaRaavi 2010).Finally, indices serve as a benchmark for measuring the performance of fund managers. The investors are in a dilemma whether their investments are being safe or not. Still there is an ambiguity among the investors about the performance of the indices. In this backdrop, an attempt will be made to study sectoral indices in comparison with S&P Nifty index and suggest the individual investors and Asset Management Companies, Index funds manager, Insurance Companies, Banks and other financial institutions for their investment portfolios.

OBJECTIVES OF THE STUDY

- (1) To compare the association of sectoral Indices with S&P CNX Nifty Index.
- (2) To analysis, how far these sectoral Indices are influences the S&P CNX Nifty Index.

The following hypotheses were formed in order to get some answer for the above objectives.

HYPOTHESIS FORMULATED FOR THE STUDY

H 1: There is no correlation between sectoral indices and CNX Nifty Index. (Two tail test)

H 2: There is no positive significant change in the estimated coefficient determination of CNX Nifty Index in regression model due to sectoral indices.(One tailed test)

METHODOLOGY: SAMPLE SELECTION

The Indices consider for the study was S&P CNX Nifty Index as a dependent Variable and CNX FMCG Index, CNX Energy Index, CNX IT Index, CNX Auto Index, CNX Metal Index, CNX MNC Index (Sectoral Indices), CNX Infrastructure Index, CNX Service Index (Thematic Indices) as an independent Variables. The daily closing values of the indices are considered for the study. All these indices data are collected from National Stock Exchange (NSE) official website. These data are purely collected from secondary source. The study period commences from the first date of the every Index has launched by the National stock Exchange (NSE). To study the above said objectives, Pearson correlation parametric test and (Ordinary Least Square) regression analysis has been used. The statistical package SPSS 16 used for the analysis.

TABLE:1 INDEX SPECIFICATION

Index	Base Period	Base Index Value	Date of launch	Method of Calculation
S&P CNX Nifty	3 rd Nov.1995	1000	3 rd July 1990	Free float Market Capitalization
CNX FMCG	1 st Jan. 1996	1000	1 st Jan. 1996	Free float Market Capitalization
CNX Infra	1 st Jan. 2004	1000	1 st Jan. 2004	Free float Market Capitalization
CNX Energy	1 st Jan.2001	1000	1 st Jan. 2001	Free float Market Capitalization
CNX IT	1 st Jan. 1996	1000	1 st Jan.1996	Free float Market Capitalization
CNX Auto	1 st Jan. 2004	1000	1 st Jan. 2004	Free float Market Capitalization
CNX Metal	1 st Jan. 2004	1000	1 st Jan.2004	Free float Market Capitalization
CNX MNC	31 st Dec. 1994	1000	1 st Jan. 1994	Free float Market Capitalization
CNX Services	1 st June 1999	1000	1 st May 1999	Free float Market Capitalization

TABLE:2 DESCRIPTIVE STATISTICS

	N	Range	Minimum	Maximum	Mean	Std. Dev.	Skewness
Nifty	5033	6033.43	279.02	6312.45	2059.41	1611.03	1.170
FMCG	3870	9448.18	920.82	10369.00	3799.19	2166.68	1.029
Infra	1869	5419.55	841.11	6260.66	2805.48	1154.73	.252
Energy	2622	11195.51	816.75	12012.26	5189.07	3061.12	.192
IT	3850	94739.08	762.47	95501.55	10472.48	11995.12	2.653
Auto	1869	3424.27	835.67	4259.94	2067.10	925.519	.703
Metal	1869	4965.52	528.43	5493.95	2576.12	1429.28	.231
MNC	4088	4585.82	740.02	5325.84	2167.65	1262.82	.957
Service	3023	6780.79	836.21	7617.00	3448.73	2006.80	.428

The descriptive statistics of the dependent and independent variables is presented in Table 2. It can be observed S&P CNX Nifty Index ranges from 279 to 6312, with number of observation 5033 and its mean value 2059. The CNX FMCG Index has ranges from 920 to 10369, with the number of observation 3870 and its mean value 3799. The CNX Infrastructure Index has ranges from 841 to 6260, with the number of observation 1869 and its mean value 2805. The CNX Energy Index has ranges from 816 to 12012, with the number of observation 2622 and its mean value 5189. The CNX IT Index has ranges from 762 to 95501, with the number of observation 3850 and its mean value 10472. The CNX Auto Index has ranges from 835 to 4259, with the number of observation 1869 and its mean value 2067. The CNX Metal Index has ranges from 528 to 5493, with the number of observation 1869 and its mean value 2576. The CNX MNC Index has ranges from 740 to 5325, with the number of observation 4088 and its mean value 2167. The CNX Service Index has ranges from 836 to 7617, with the number of observation 3023 and its mean value 3448. The Standard Deviation has ranges from 925 (CNX Auto Index) to 11,995 (CNX IT Index).

In the above table none of the variable skewness shows zero or lesser than 0.5. In order to run regression analysis the variables values must be normally distributed, therefore data transformation carried out and results given in the table No:3.

TABLE:3 TRANSFORMATION OF DATA

	Std. Dev.	Skewness	Skewness	Skewness	Skewness	Skewness	Final Skewness
	Statistic	Sqt(2)	Sqt (4)	Sqt (8)	Sqt (12)	Log 10	
NIFTY	.2309	.847	.629	.497		-.529	.497
FMCG	.2405	.595	.358			.101	.101
Infra	11.33	-.215				.032	-.215
Energy	22.71	-.145				.348	-.145
IT	.4433	1.218	.648	.379		.112	.112
Auto	9.95	.372				.428	.372
Metal	14.59	.012				-.111	.012
MNC	.0547	.705	.570	.500	.465	-.605	.465
Services	17.31	.167				-.246	.167

After transformation, all the variables of skewness are closed to 0 to 0.5, i.e CNX Nifty Index (.497), CNX FMCG Index (.101), CNX Infra (-.215), CNX Energy Index (-.145), CNX IT Index (.112), CNX Auto Index (.372), CNX Metal Index (.012), CNX MNC Index (.465) and CNX Service Index (.167). Thus, all the variables are assumed normally distributed from transformed data.

COLLINEARITY DIAGNOSTICS OF VARIABLES

Next to normality, one should check colinearity diagnostics. The colinearity check has conducted for the entire variable considered for the study.

TABLE : 4COLLINEARITY DIAGNOSTICS**VIF**

Variables	1 st Stage	2 nd Stage	3 rd Stage	4 th Stage	Final Stage
FMCG	23.35	22.66	14.05	10.61	9.49
Infra	29.31	13.00	11.78	7.57	3.01
Energy	41.78	41.48	-	-	-
IT	1.43	1.43	1.37	1.37	1.37
Auto	28.49	17.83	15.95	10.76	7.85
Metal	38.47	33.60	12.18	11.35	-
MNC	25.98	25.96	25.12	-	-
Services	79.50	-	-	-	-

(VIF = Variable inflation factor)

The table 4 represents the colinearity diagnostics for the entire variables. After deleting variables who secured highest VIF more than 10 as a thump in the first, second third and fourth stage, finally we have selected CNX FMCG Index, CNX Infrastructure Index, CNX IT Index and CNX Auto Index for analysis.

PEARSON CORRELATION COEFFICIENT

A correlation is a single number that describes the degree of relationship between two variables. The correlation coefficient may range from -1 to 1, where -1 or 1 indicates a “perfect” relationship. The further the coefficient is from 0, regardless of whether it is positive or negative, there is no relationship between two variables. The formula for manual calculation of Correlation as:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n\sum x^2 - (\sum x)^2} \cdot \sqrt{n\sum y^2 - (\sum y)^2}}$$

HYPOTHESIS TESTING IN CORRELATION MATRIX

H0: Both S&P CNX Nifty Index and sectoral Indices are independent.

H1: Both S&P CNX Nifty Index and sectoral Indices are dependent.

TEST: Multiple Correlation

SIGNIFICANCE LEVEL: 0.05

CONCLUSION: The null hypothesis is rejected ($P < .001$). The variables considered for the study was highly correlated with S&P CNX Nifty Index.

TABLE 5: CORRELATION

	NIFTY	Auto	FMCG	IT	Infra
NIFTY	1				
Auto	.880***	1			
FMCG	.919***	.916***	1		
IT	-.153***	.456***	.134***	1	
Infra	.930***	.664***	.795***	.177***	1

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

The Correlation between S &P CNX Nifty Index has high degree of positive correlation with CNX Auto Index (.880, $N = 1869$, $p < .01$), CNX FMCG Index (.919, $N = 3870$, $p < .01$), CNX Infrastructure Index (.930, $N = 1869$, $p < .01$) and negatively related with CNX IT Index (-.153, $N = 3850$, $p < .01$). The CNX Auto Index has very high degree of positive correlation with CNX FMCG Index (.916, $N = 3870$, $p < .01$), CNX Infrastructure Index (.664, $N = 1869$, $p < .01$) and CNX IT Index (.456, $N = 3850$, $p < .01$). The correlation with CNX FMCG Index has high degree of positive correlation with CNX Infrastructure index (.795, $N = 1869$, $p < .01$), and low degree of positive correlation with CNX IT Index (.134, $N = 3850$, $p < .01$). The CNX IT Index has low degree of positive correlation with CNX Infrastructure Index (.177, $N = 1869$, $p < .01$). In all the four variables CNX IT Index associated with rest of the variables at very low level.

REGRESSION ANALYSIS

LINEAR REGRESSION: A technique in which a straight line is fitted to a set of data points to measure the effect of a single independent variable. The slope of the line is measured the impact of that variable.

$$\hat{y} = \alpha + \beta_1 x_1 + \varepsilon$$

Where, \hat{y} = Dependent Variable

x_1 = Independent variable

α = Alpha or the intercept (where the line crossed vertical axis)

β_1 = beta or slope of the regression.

ε = error involved in estimating the dependent variable.

HYPOTHESIS TESTING IN LINEAR REGRESSION

There is no positively significant of coefficient determination of CNX Nifty Index with respect to CNX Auto Index, CNX FMCG Index, CNX Infrastructure Index and CNX IT Index.

TEST: Ordinary Least Square (OLS) Regression

SIGNIFICANCE LEVEL: 0.05

CONCLUSION: The null hypothesis is rejected ($P < .001$). The variables considered for the study has highly correlated with S&P CNX Nifty Index.

TABLE : 6 LINEAR REGRESSION

Particulars	R	R ²	Unstandardized beta	F	Sig	t	Sig
Auto	.880	.775	.013	6.420E3	.000	80.123	.000

With reference to table no 6, the regression was linearly fitted. ($F(1867) = 6.420$, $P = .000$). There was a relationship between CNX Nifty Index (dependent Variable) and CNX Auto Index (Independent Variable). Since the probability of the F Statistic ($P = 0.000$) was less than the level of significance (0.001), the null hypothesis that correlation coefficient (R) has equal to 0 was rejected.

The correlation coefficient of the CNX Nifty Index and CNX Auto Index was 0.880, which would be characterised as a strong relationship. The model reveals that CNX Auto Index has 77% of the variance was explained in the study. The beta coefficient for the independent variable CNX Auto Index was very low (0.013), indicating positive and significant relationship with CNX Nifty Index. Higher numeric values for the independent variable CNX Auto Index (1.0) is associated with lower numeric value for the CNX Nifty Index (0.013). This shows for every one unit increase in the CNX Auto Index, the CNX Nifty Index increases by only 0.013.

$$\hat{Y} = 2.225 + 0.013 * \text{CNX Auto Index} + 8.421$$

TABLE NO: 7 LINEAR REGRESSION

Particulars	R	R ²	Unstandardized beta	F	Sig	t	Sig
FMCG	.919	.844	.820	2.100	.000	144.921	.000

Table no 7 shows the regression results of CNX Nifty Index with CNX FMCG Index. The regression was linearly fitted. ($F(3868) = 2.100$, $P = .000$). There was a strong relationship between CNX Nifty Index (dependent Variable) and CNX FMCG Index (Independent

Variable). Since the probability of the F Statistic (P= 0.000) was less than the level of significance (0.001), the null hypothesis that correlation coefficient (R) has equal to 0 was rejected.

The correlation coefficient of the CNX Nifty Index and CNX FMCG Index was 0.919, which would be characterised as a strong relationship. The model reveals that CNX FMCG Index has 84% of the variance was explained in the study. The beta coefficient for the independent variable CNX FMCG Index was 0.820, indicating positive and significant relationship with CNX Nifty Index. Higher numeric values for the independent variable CNX FMCG Index (1.0) is associated with lower numeric value for the CNX Nifty Index (0.820). This shows for every one unit increase in the CNX FMCG Index, the CNX Nifty Index increases by 0.820.

$$\hat{Y} = -294 + 0.820 * \text{CNX FMCG Index} + 27.69$$

TABLE NO: 8 LINEAR REGRESSION

Particulars	R	R ²	Unstandardized beta	F	Sig	t	Sig
Infrastructure	.930	.864	.012	1.190	.000	109.069	.000

Table no 8 shows the regression results of CNX Nifty Index with CNX Infrastructure Index. The regression was linearly fitted.(F(1867)= 1.190, P=.000).There was a relationship between CNX Nifty Index (dependent Variable) and CNX Infrastructure Index (Independent Variable). Since the probability of the F Statistic (P= 0.000) was less than the level of significance (0.001), the null hypothesis that correlation coefficient (R) has equal to 0 was rejected.

The correlation coefficient of the CNX Nifty Index and CNX Infrastructure Index was 0.930, which would be characterised as a strong relationship. The model reveals that CNX Infrastructure Index has 86% of the variance was explained in the study. The beta coefficient for the independent variable CNX Infrastructure Index was very low (0.012), indicating positive and significant relationship with CNX Nifty Index. Higher numeric values for the independent variable CNX Infrastructure Index (1.0) is associated with lower numeric value for the CNX Nifty Index (0.012).This shows for every one unit increase in the CNX Infrastructure Index, the CNX Nifty Index increases by only 0.012.

$$\hat{Y} = 2.179 + 0.012 * \text{CNX Infrastructure Index} + 5.07$$

TABLE NO: 9 LINEAR REGRESSION

Particulars	R	R ²	Unstandardized beta	F	Sig	t	Sig
IT	.153	.023	-.074	91.81	.000	-9.58	.000

Table no 9 shows the regression results of CNX Nifty Index with CNX IT Index. The regression was linearly fitted ($F(3848) = 91.81, P = .000$). There was a relationship between CNX Nifty Index (dependent Variable) and CNX Infrastructure Index (Independent Variable). Since the probability of the F Statistic ($P = 0.000$) was less than the level of significance (0.001), the null hypothesis that correlation coefficient (R) has equal to 0 was rejected.

The correlation coefficient of the CNX Nifty Index and CNX IT Index was 0.153, which would be characterised as a low relationship. The model reveals that CNX IT Index has only 2% of the variance was explained in the study. The beta coefficient for the independent variable CNX IT Index was -0.074, indicating negative relationship with CNX Nifty Index. This shows for every one unit increase in the CNX IT Index, the CNX Nifty Index decreases by -0.074.

$$\hat{y} = 2.864 - 0.074 * \text{CNX IT Index} + 171.58$$

MULTIPLE REGRESSION

Multiple regression is a statistical technique that allows us to predict someone's score on one variable on the basis of their scores on several other variables.

$$\hat{y} = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \varepsilon$$

Where, \hat{y} = Dependent Variable

x_1, x_2 & x_3 = Independent variable

α = Alpha or the intercept (where the line crossed vertical axis)

β_1, β_2 & β_3 = beta or slope of the regression.

ε = error involved in estimating the dependent variable.

HYPOTHESIS TESTING IN MULTIPLE REGRESSION

H₀: All independent variables are having absolutely no effect (have a coefficient of "0")

H₁: At least any one of the independent variable is having effect on dependent variable.

NAME OF THE TEST: Multiple Regression

SIGNIFICANCE LEVEL : 0.05, The following regression equation has applied.

Conclusion: The null hypothesis is rejected ($P < .001$). The variables considered for the study was moderately influencing on S&P CNX Nifty Index.

TABLE :10 MULTIPLE REGRESSION

(*** indicates significant at 1% level, Figures in the parentheses indicate 't' values.)

DEPENDENT VARIABLE: CNX Nifty Index

INDEPENDENT VARIABLES: CNX Auto Index, CNX FMCG Index, CNX IT Index and CNX

INFRASTRUCTURE INDEX

Independent Variable	Regression Model				
	1	2	3	4	5
Constant	1.515*** (89.58)	0.743*** (53.88)	2.082*** (301.81)	1.574*** (107.11)	0.141*** (2.59)
CNX Auto	0.004*** (53.15)	-	0.007*** (118.29)	0.004*** (61.29)	0.001*** (4.429)
CNX FMCG	0.183*** (35.32)	0.415*** (92.96)	-	0.177*** (34.89)	0.690*** (43.92)
CNX IT	0.013*** (8.108)	0.048*** (21.06)	0.001 (0.575)	-	0.008 (1.244)
CNX Infra	0.007*** (159.33)	0.006*** (95.02)	0.008*** (177.192)	0.007*** (158.92)	-
F value	6.30***	3.28***	4.99***	8.25***	5.12***
R value	0.996	0.991	0.994	0.996	0.945
R ² value	0.993	0.982	0.988	0.993	0.893
DF	4,1844	3,1845	3,1845	3,1865	3,1845
N	1848	1848	1848	1868	1848

$$\hat{y}_0 = \hat{\alpha} + \hat{\beta}_1 x_1 + \hat{\beta}_2 x_2 + \hat{\beta}_3 x_3 + \hat{\beta}_4 x_4 + \varepsilon \quad \text{----- (1)}$$

$$\hat{y}_1 = \hat{\alpha} + \hat{\beta}_2 x_2 + \hat{\beta}_3 x_3 + \hat{\beta}_4 x_4 + \varepsilon \quad \text{----- (2)}$$

$$\hat{y}_2 = \hat{\alpha} + \hat{\beta}_1 x_1 + \hat{\beta}_3 x_3 + \hat{\beta}_4 x_4 + \varepsilon \quad \text{----- (3)}$$

$$\hat{y}_3 = \hat{\alpha} + \hat{\beta}_1 x_1 + \hat{\beta}_2 x_2 + \hat{\beta}_4 x_4 + \varepsilon \quad \text{----- (4)}$$

$$\hat{y}_4 = \hat{\alpha} + \hat{\beta}_1 x_1 + \hat{\beta}_2 x_2 + \hat{\beta}_3 x_3 + \varepsilon \quad \text{----- (5)}$$

Based on ANOVA table for the linear regression, Model 1(F(4,1844) = 6.30, p<0.001), Model 2 (F(3,1845) = 3.28, p<0.001), Model 3 (F(3,1845) = 4.99, p<0.001), Model 4 (F(3,1865) = 8.25, p< 0.001) and Model 5 (F (3,1845) = 5.12, p< 0.001), there was a relationship between outcome variable (CNX Nifty Index) and predictor variable (Sectoral Index). Since the probability of the F statistic (p<0.001) was less than the level of significance (0.01), the null hypothesis that correlation coefficient (R) was equal to 0 was rejected. The research hypothesis that there was a relationship between the variables was supported.

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Given the significant F-test result, R² can be interpreted. The R² is ranges from 89.3 percent to 99.6 percent for different regression models. This indicates all the independent variables are explained well about the dependent variable.

In regression model 1 shows the beta coefficient of independent variable, CNX FMCG Index was (0.183, p<.001) indicating positive and significant relationship with outcome variable. This indicates every one unit increases in CNX FMCG Index, the growth of the CNX Nifty Index increases by 18.3%. Rest of the variables CNX IT Index(0.013, p<0.01), CNX Auto index (0.004, p<0.01) and CNX Infrastructure Index(0.007, p<0.01), indicates positive relationship with outcome variables at very low level. Higher numeric values for the independent variables (1.0) are associated with lower numeric values of the outcome variable in all the cases.

RESULT: $\hat{y}_1 = 1.515 + 0.004 * \text{CNX Auto Index} + 0.183 * \text{CNX FMCG Index} + 0.013 * \text{CNX IT Index} + 0.007 * \text{CNX Infra Index} + 0.268$

In regression model 2 depicts results of the beta coefficient after excluding independent variable “CNX Auto Index” from the regression model 1. This regression model explained how far CNX Auto Index interacted with CNX Nifty index [0.011 (0.993 – 0.982)]All independent variable are positively associated with dependent variable. The beta coefficients of independent variables are (0.415, p < .001), (0.048, p<.001), (0.006, p<.001) for CNX FMCG Index, CNX IT Index and CNX Infrastructure Index respectively. Out of the three independent variables, the CNX FMCG Index has highest beta compared to CNX IT Index and CNX Infrastructure Index.

RESULT: $\hat{Y}_{:2} = 0.743 + 0.415 * \text{CNX FMCG Index} + 0.048 * \text{CNX IT Index} + 0.006 * \text{CNX Infra Index} + 0.679$

In regression model 3 depicts results of the beta coefficient after excluding the independent variable “CNX FMCG Index” from the regression model 1. This regression model explained how far CNX FMCG index interacted 0.005 (0.993-0.988) with CNX Nifty Index. The beta coefficient of the independent variables are, CNX Auto Index 0.007, ($p < .001$), CNX Infrastructure Index 0.008, ($p < .001$). Though all the independent variables are positively associated with dependent variable, but their interaction at very low level.

RESULT: $\hat{Y}_{:3} = 2.082 + 0.007 * \text{CNX Auto Index} + 0.001 * \text{CNX IT Index} + 0.008 * \text{CNX Infra Index} + 0.449$

In regression model 4 shows regression results of the beta coefficient after excluding the independent variable “CNX IT Index” from the regression model 1. This regression model, does not show any difference with regression model 1 (0.993 - 0.993). All independent variable are positively associated with dependent variable as in the case of regression model 1. The beta coefficient of the independent variables are, CNX Auto Index 0.004, ($p < .001$), CNX FMCG Index 0.177, ($p < 0.001$) and CNX Infrastructure Index 0.007, ($p < .001$). Out of the four variables, only the CNX FMCG Index beta value is high.

RESULT: $\hat{Y}_{:4} = 1.574 + 0.004 * \text{CNX Auto Index} + 0.177 * \text{CNX FMCG Index} + 0.007 * \text{CNX Infra Index} + 3.958$

In regression model 5 shows results of the beta coefficient after excluding the independent variable “CNX Infrastructure Index” from the regression model 1. This regression model, clearly indicates that CNX Infrastructure Index interacted with dependent variable at 10% (0.993 -0.893). All independent variable are positively associated with dependent variable. The beta coefficient of the independent variables are CNX Auto Index 0.001, ($p < .001$) and CNX FMCG Index 0.690, ($p < 0.001$). Thus CNX FMCG Index has high influence on dependent variable.

RESULT: $\hat{Y}_{:5} = 0.141 + 0.001 * \text{CNX Auto Index} + 0.690 * \text{CNX FMCG Index} + 0.008 * \text{CNX IT Index} + 0.279$

CONCLUSION

This study discuss how far the sectoral indices associated with CNX Nifty Index. There are four indices considered for the analysis, out of the four indices CNX Infrastructure Index is highly interacted with CNX Nifty Index, followed by CNX FMCG Index and CNX Auto Index. The CNX IT Index was negatively associated with CNX Nifty Index. As a researcher, we witnessed many occasions. This is mainly their association mainly depend due to appreciation and depreciation of Indian currencies in the international money market. With respect to simple linear regression CNX FMCG has played major role, out of four indices considered for the study. Only the CNX FMCG Index has high influences on the Dependent Variable (CNX Nifty Index).

When applied all variables together, the regression results shows that CNX Infrastructure was highly interacted with CNX Nifty Index with low coefficient of determination. Multiple

regression results are consistent with simple regression. Out of the four exploratory variable CNX FMCG Index shows high coefficient of determination as compared to CNX IT Index, CNX Infrastructure Index and CNX Auto Index. From the above analysis it is clear that the investors can invest in the CNX FMCG Index considering the beta coefficient is nearer to CNX Nifty Index (0.82) and other sectoral indices appear to be defensive as beta coefficients are very low and even CNX IT Index shows a negative beta.

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