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Investor Sentiment and Stock Market Dynamics in India

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INTRODUCTION

The relationship between investor sentiments and stock returns has long been a considerable debate in the field of empirical and behavioural finance.

Investor sentiment represents the expectation of market participants based on the market behaviour. For example, a bullish investor expects the returns to be above average and a bearish investor expects it to be below average (Brown and Cliff, 2004). Baker and Wurgler (2006) defines it as a belief about future cash flows and investment risks that is not justified by the facts at hand. Overall, investor sentiment is the propensity of the investors to believe the future trend of the market.

Literature provides contradicting view on the sentiment-based traders' impact on stock prices. The Efficient Market Hypothesis (EMH) introduced by Fama (1965) believes that financial markets are information efficient. Further, the Capital Asset Pricing Model (CAPM) holds that, in an efficient financial market, the prices of traded assets reflect all available information about market fundamentals. The argument is that investors in such markets are rational who always force the market prices to equal the present value of expected future cash flow; even if some investors are irrational their demands are offset by the arbitrageurs.

The belief of rationality in EMH has been challenged by modern empirical and behavioural finance literature. Under the behavioural finance theory, it is argued that investors are not necessarily rational, and they may be prone to exogenous sentiment waves. Their over optimism and pessimism about the market can lead to bias of irrationalities in investment decisions.

This study holds significance in the sense that investor's sentiments have vaguely been studied as a critical factor in determination of stock prices in India. Therefore, studying behavioural aspect will help in better understanding of financial markets. An Investor Sentiment index has been constructed using four variables which could influence investor's behaviour and investment decision. The sentiment index constitutes Advance Decline Ratio (ADR), Number of IPOs (NIPO), P/E Ratio and Mutual Fund Net Flow (MFNF). The main purpose of this research paper is to confirm whether investors' sentiments had any impact on returns generated on National Stock Exchange (NSE) and also to check whether there is a relationship between the variables included in the Index Return Model. However, macro-economic factors like Gross Domestic Product and Inflation are also taken into consideration along with Investor Sentiment to study their impact on Stock Market returns

INVESTOR SENTIMENT

Market sentiment is the overall attitude of investors toward a particular security or financial market. Market sentiment is the feeling or tone of a market, or its crowd psychology, as revealed through the activity and price movement of the securities traded in the market. For example, rising prices would indicate a bullish market sentiment, while falling prices would indicate a bearish market sentiment. Investor sentiment is not easy to measure, although it is not difficult to combine a number of imperfect proxies to arrive at a sentiment index.For the study the following 4 proxies have been used to gauge the sentiment index.

1.ADVANCE DECLINE RATIO

This Ratio gives a rough indication of the direction of the stock market. ADR represents the ratio of the number of advancing and declining stock prices. It basically compares the number of stocks trading above their previous closing price with those trading below. A rising value of ADR means the upward trend of the market; and a lower value shows the downward trend of the market.

2. INITIAL PUBLIC OFFERINGS (IPOs)

NIPO can be considered as the sentiment indicator since demand for IPO is often sensitive towards the market condition. An initial public offering (IPO) is the first time that the stock of a private company is offered to the public. IPOs are often issued by smaller, younger companies

seeking capital to expand, but they can also be done by large privately owned companies looking to become publicly traded.The number of IPOs being issued is usually a sign of the stock market's and

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economy's health.During recession, number ofIPOs drop because it's not worth the hassle if stock values are depressed.Whennumber of IPOs increase, it usually means the economy is getting back on its feet again.

3. P/E RATIO of NIFTY

P/E ratio of Nifty measures the average PE ratio of the 50 companies covered by the Nifty Index. PE ratio is also known as "price multiple" or "earning multiple". Nifty is considered to be in oversold range when Nifty P/E value is below 14 and it's considered to be in overvalued range when Nifty P/E value is near or above 22. The market quickly bounces back from the oversold region because intelligent investors start buying stocks looking to snatch up bargains and they do the exact opposite when Nifty P/E is in the overbought region.

4. MUTUAL FUND NET FLOW

Mutual fund flow is net new cash flow either flowing into or out of mutual funds. It is derived by subtracting the redemption of shares from investor's purchase of mutual fund shares. Mutual fund flow reports provide investors with critical monthly fund money flow trends and analysis. Studies have shown that the relationship between net aggregate equity fund flow and investor sentiment remains strong even after accounting for the effects of risk premium and inflation.

MACRO-ECONOMIC FACTORS:

1.GROSS DOMESTIC PRODUCT (GDP)

Gross Domestic Product (GDP) is the monetary value of finished goods and services produced within the country's borders in a specific time period. Though GDP is usually calculated on annual basis, it can be calculated on a quarterly basis as well. GDP includes all private and public consumption, government outlays, investments and exports minus imports that occur within defined territory. Simply, GDP is a broad measurement of a nation's overall economic activity.

2.CONSUMER PRICE INDEX (CPI)

A comprehensive measure used for estimation of price changes in a basket of goodsand services representative of consumption expenditure in an economy is called consumer price index.It is one of the most important statistics for an economy and is generally based on the weighted average of the price of commodities. Inflation is measured using CPI.

LITERATURE REVIEW

A large body of literature has provided empirical evidence about the relationship between investor sentiment and stock price. Studies that are focused on the time-series relationship between investor sentiment and stock price report that investor sentiment do predict stock returns.

Fisher and Statman (2000) find that the American Association of Individual Investors'sentiment index (proxy for individual/small investor sentiment) and Wall Street strategists' sentiment (proxy for institutional/large investor sentiment) are negatively correlated with the S&P 500 return in the following month.

Brown and Cliff (2004) using different proxies for investor sentiment, note that the sentimentlevel and change are positively and strongly correlated with the contemporaneous stock market return. They also tested the causal relationship between sentiment level/change and stock return. It was suggested by them that the stock market return is a good predictor of individual and institutional investor sentiment in the short run. They found weaker relationship between sentiment and market return in short run (weekly data) and stronger evidence in case of long run (monthly data).

Baker and Wurgler (2006, 2007) argue that the stocks that are harder to arbitrage and whosevaluations are highly subjective are more likely to be affected by changes in individual investor sentiment. They show that the investor sentiment has similar impact for both value and growth stocks. They find that small stocks, young stocks, high volatility stocks, unprofitable stocks, non-dividend-paying stocks, extreme growth stocks and distressed stocks are the most heavily affected by periods of pessimism, and likely to suffer from over- or under-pricing, depending on investor sentiment.

Lee, Shleifer and Thaler (1991) state that small stocks are owned, in principal, by individualinvestors, peoples which are more likely to trade on noise, as opposed to institutional investors. As such, when the sentiment of noise traders is changing, the prices of small stocks could be influenced more than the prices of large stocks.

DeLong, Shleifer, Summers and Waldmann (1990) claim in their behavioral finance theorythat noise trader sentiment can persist for longer period in financial markets and cannot be arbitraged away easily due to its unpredictable nature.

Schmeling (2009) found that sentiment has an effect on returns in 9 out of the 18 countriesanalyzed. His results, which point towards country-specific characteristics, appear to suggest a stronger effect in countries marked by herd-like trading behavior, investor overreaction and lower market integrity (institutional development and information quality).

Verma and Soydemir (2009) find that individual and institutional investor sentiments aredriven by both rational and irrational factors. Their findings indicate that when the noise traders are bullish the rational investors are bearish and when the noise traders are bearish the rational investors are bullish.

Changsheng and Yongfeng (2012) also show that investor sentiment has incremental powerto explain return co-movement indicating that when investors are bullish the stock return is high and it is low when the investors are bearish.

Perez-Liston et al. (2014) estimate GARCH in- mean model and VAR model to find thatchanges in investor sentiment have a positive influence on excess returns. Their analysis also shows that the bullish shift in investor sentiment has negative effect on conditional volatility.

DATA AND METHODOLOGY

The data for different variables was obtained from the following websites: NSE Stock Exchange, IMF database, Money control. The sentiment index is constructed by compressing the constituents using Principal Component Analysis (PCA). The data was quarterly ranged from first quarter of 2005 up till last quarter of 2014. The impact of investor sentiment on stock returns is seen through the normalized coefficients. Augmented Dicky-Fuller Test is used to check the stationary of the variables. Johansen Cointegration test is used to determine the long run relationship between the variables. Vector Error Correction Model (VECM) is used to determine the short run dynamics between the variables, and also Variance Decomposition is used to determine the variations.

MODEL SPECIFICATION

IR = f (GDP, CPI, SENTIMENT)

$IR = \alpha + \beta 1GDPt + \beta 2CPIt + \beta 3SENTIMENTt + ut$

Where,

IR = Pt –P0/P0 where,

IR= Index Returns

Pt = current closing NSE index at time t and

P0 = closing NSE index at t-1;

GDP = Δ GDP growth rate per quarter, measured as:

GDPt – GDP0/ GDP0 where,

GDPt = GDP growth rate at time t

GDP0 = GDP growth rate at time t-1

CPI = Δ CPI growth rate per quarter, measured as:

CPIt – CPI0/ CPI0 where,

CPIt = CPI growth rate at time t

CPI0 = CPI growth rate at time t-1

SENTIMENT = Advance Decline Ratio, Number of IPOs, P/E Ratio and Mutual Fund Net Flow. Sentiment Level is gauged by using this index.

OBJECTIVES OF THE STUDY

1.To determine the impact of Investor Sentiment on Stock Returns.

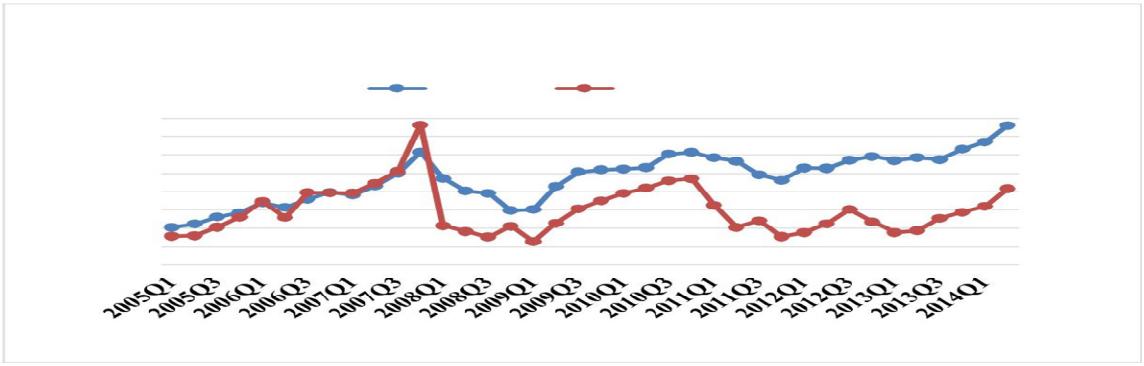
2.To know the long run relationship between Index Return, GDP, CPI and Investor Sentiment.

3.To study the short run dynamics between Index return, GDP, CPI and Investor Sentiment

DATA ANALYSIS AND INTERPRETATION

TREND ANALYSIS

Fig. 1 : Trend analysis of Nifty Index & Sentiment Index



TREND ANALYSIS OF NIFTY INDEX & SENTIMENT INDEX

Fig.1.depicts the trend of Nifty Index and Sentiment Index (which is gauged by PrincipalComponent Analysis (PCA)) for the period from January 2005 to December 2014. It can be observed from the figure that these two indices show a similar trend. It seems that investor sentiment gradually increased with the increase in Nifty Index, but sentiment index fluctuates more than the Nifty Index. During the crisis in the year 2008 both the indices fell together and recovered gradually.

Fig.2 : Trend analysis of Index Return & Sentiment Change

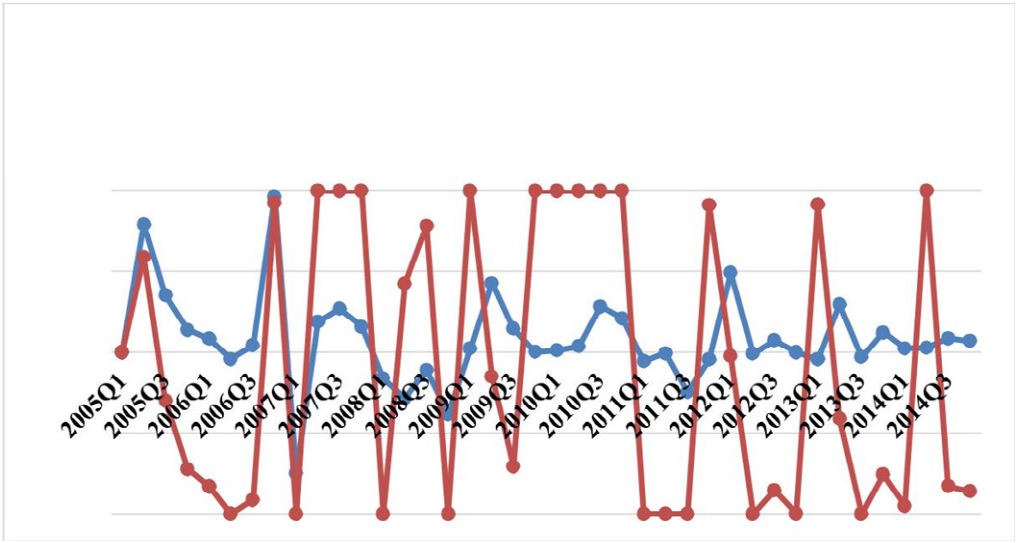


Fig. 2depicts the trend of Index Return and Sentiment Change for the period from January2005 to December 2014. It can be observed from the figure that these two indices show a similar trend. It seems that investor sentiment gradually changes with the change in Nifty Index, but sentiment change index fluctuates much more than the Nifty Index. Thus we conclude that the sentiment index significantly influence the market returns. It can be observed that when index return increases, sentiment also increases and vice versa. Thus it states that positive sentiment has a positive impact on market return and the negative sentiment has the negative impact.

CORRELATION TEST

Table 1: Correlation Test

Covariance Analysis: Ordinary
Date: 03/21/17 Time: 09:45

Sample: 2005Q1 2014Q4
Included observations: 40

Correlation				
Probability	INDEX RETURNS	GDP	CPI	SENTIMENT
INDEX RETURNS	1.000000			

GDP	0.246337	1.000000		
	0.1255	-----		
CPI	0.031807	0.559511	1.000000	
	0.8455	0.0002	-----	
SENTIMENT	0.383055	0.142781	0.012159	1.000000
	0.0147	0.3795	0.9406	-----

Table 1 depicts the correlation between Index Returns, GDP, CPI, and Sentiment.Correlation test can be seen as first indication of the existence of interdependency among the time series variables. But it is never appropriate to conclude that changes in one variable cause changes in another based on correlation alone. From the derived statistics we observe that the coefficient of correlation of all the variables is positive which indicate that there is a positive correlation between the variables. Thus we may state that there is weak positive correlation between GDP and Index Return as the coefficient is 0.24 with p-value of 0.12 which is not statistically significant at 5% level of significance. There is no correlation between CPI and Index Return as the coefficient is 0.03 with p-value of 0.84 which is not statistically significant at 5% level of significance. Whereas medium positive correlation exists between Sentiment and Index Return as the coefficient is 0.38 with p-value of 0.01 which is statistically significant at 5% level of significance. Medium positive correlation exists between CPI and GDP as the coefficient is 0.55 with p-value 0.00 which is statistically significant at 5% levelof significance. Whereas Sentiment and GDP has weak positive correlation as the coefficient
is 0.14 with p-value 0.37 which is not statistically significant at 5% level of significance. There is no correlation between Sentiment and CPI as the coefficient is 0.01 with p-value 0.94 which is not statistically significant at 5% level of significance.

AUGMENTED DICKY FULLER TEST

HYPOTHESIS
H0 = THERE IS A UNIT ROOT (i.e. THE DATA IS NON-STATIONARY)
H1 = THERE IS NO UNIT ROOT (i.e. THE DATA IS STATIONARY)

Table 2 : Unit Root Test (Augmented Dicky Fuller Test)

VARIABLES		**LEVEL**	**FIRST DIFFERENCE**
INDEX RETURNS	Intercept	-0.842875	**-4.909414***
		(0.7954)	**(0.0003)**
	Trend and Intercept	-3.033824	–
		(0.1368)	–
	None	1.514881	–
		(0.9657)	–
GDP	Intercept	1.534432	**-11.68099***
		(0.9991)	**(0.0000)**
	Trend and Intercept	-1.773372	–
		(0.6960)	–
	None	2.823245	–

		(0.9983)	–
CPI	Intercept	2.866494	**-6.006210***
		(1.0000)	**(0.0000)**
	Trend and Intercept	-2.623807	–
		(0.2726)	–
	None	6.465080	–
		(1.0000)	–
SENTIMENT	Intercept	**-3.259500***	-7.253347
		(0.0239)	(0.0000)
	Trend and Intercept	-3.255303	–
		(0.0889)	–
	None	-3.302075	–
		(0.0016)	–

*** indicates rejection of null hypothesis @ 5% level of significance.**

Table 2as per Augmented Dicky Fuller (ADF) test under all its assumptions of intercept,trend and intercept and none, the stationarity of all the variables is checked. The variables i.e. Index Returns, GDP, CPI are stationary at I(1) i.e. at first difference (intercept) and the variable Sentiment is stationary at I(0) i.e. at levels (intercept) with critical values for rejection of hypothesis (H0) of the existence of unit root it becomes evident that the obtained statistics for the above variables lies at -4.90, -11.68, -6.00 and -3.25 that fall below the critical value of 5% level of significance (-2.94) thus giving the probability value less than 0.05. There by leading to acceptance of hypothesis (H1) for the above series. Hence it can be safely concluded that on the basis of ADF test statistics that all the variables are found to be stationary at first difference and at levels respectively. Thus we reject the null hypothesis. Hence we can move to Johansen Cointegration test even if the variables are stationary at different levels, as per Hansen &Juzelius (2002)

JOHANSEN COINTEGRATION TEST

HYPOTHESIS

H0: THERE IS NO COINTEGRATION

H1: THERE IS COINTEGRATION

Table 3: Johansen Cointegration Test

Hypothesized No. of CE(s)	**Eigenvalue**	**Trace test**		**Max-eigenvalue test**		**No. of Cointegrating eqn(s)**
		t-statistics	**p-value**	**t-statistics**	**p-value**	
None *	0.915796	148.4701	0.0000	94.03141	0.0000	4
At most 1 *	0.525597	54.43868	0.0000	28.33653	0.0041	
At most 2 *	0.376113	26.10214	0.0009	17.92786	0.0126	
At most 3 *	0.193550	8.174286	0.0043	8.174286	0.0043	

Table 3depicts Johansen Cointegration. The Trace test and Maximum Eigenvalue test suggest that there are 4 Cointegrating equations. The p-value of both the tests are below 0.05. Therefore we accept the Hypothesis (H1) that there is cointegration.

Table 4: Normalized Cointegrating Coefficients

Normalized cointegrating coefficients (standard error in parentheses)

CHANGEIR	CHANGEGDP	CHANGECPI	SENTIMENT
1.000000	-25.84230	-27.81408	-0.120347
(1.82872)		(7.06004)	(0.05713)

Table 4depicts the normalized cointegrating coefficients. As there is cointegration wecheck for the Normalized Cointegrating Coefficients. The coefficients are Negative, i.e. they are positively related to the Index Returns. To calculate the t-value divide all the beta coefficients with their respective standard errors.

Therefore, the t-values of GDP, CPI and Sentiment are -14.13, -3.93 and -2.11 respectively. In the above calculations, the t-values of all the variables are more than 1.96. Therefore we can conclude that they are significant in determining the long run relationship.

Since the coefficients have negative sign which means the variables are positively related it also means that keeping all variables constant 1 unit change in GDP will cause 25.84 unit increase in Index Returns, further the CPI coefficients also show positive relationship which means keeping all other variables constant 1 unit change in CPI will cause 27.81 unit increase in Index Returns and Sentiment coefficient is also significant which means keeping all other variables constant 1 unit change in Sentiment will cause 0.12 unit increase in Index Returns.

VECTOR ERROR CORRECTION MODEL (VECM)

Table 5: Vector Error Correction Model (VECM)

Dependent Variable: D(INDEX_RETURNS)
Method: Least Squares (Gauss-Newton / Marquardt steps)
Date: 03/20/17 Time: 19:00
Sample (adjusted): 2005Q4 2014Q4
Included observations: 37 after adjustments
D(INDEX_RETURNS) = C(1)*(INDEX_RETURNS(-1) + 2375.78129715 *SENTIMENT(-1) - 5132.8476608) + C(2)*(GDP(-1) + 42.5958362738 *SENTIMENT(-1) - 99.8297168585) + C(3)*(CPI(-1) + 63.7501906418 *SENTIMENT(-1) - 102.987552557) + C(4)*D(INDEX_RETURNS(-1)) + C(5)*D(INDEX_RETURNS(-2)) + C(6)*D(GDP(-1)) + C(7)*D(GDP(-2)) + C(8)*D(CPI(-1)) + C(9)*D(CPI(-2)) + C(10)*D(SENTIMENT(-1)) + C(11) *D(SENTIMENT(-2)) + C(12)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-1.774191	0.429644	-4.129447	0.0004
C(2)	70.03729	34.62155	2.022939	0.0539
C(3)	32.60755	23.20320	1.405304	0.1722
C(4)	1.016429	0.316958	3.206825	0.0037
C(5)	0.385817	0.255879	1.507811	0.1441
C(6)	-28.43638	22.18912	-1.281546	0.2118
C(7)	-64.38355	24.48931	-2.629047	0.0144
C(8)	14.94312	63.13085	0.236701	0.8148
C(9)	5.873920	62.07073	0.094633	0.9254
C(10)	-603.2496	221.4358	-2.724264	0.0116
C(11)	-250.4093	152.2579	-1.644639	0.1126
C(12)	106.4800	203.1005	0.524272	0.6047

R-squared	0.532173	Mean dependent var	153.5486
Adjusted R-squared	0.326329	S.D. dependent var	556.3054
S.E. of regression	456.6014	Akaike info criterion	15.34211
Sum squared resid	5212122.	Schwarz criterion	15.86457
Log likelihood	-271.8289	Hannan-Quinn criter.	15.52630
F-statistic	2.585321	Durbin-Watson stat	1.855960
Prob(F-statistic)	0.023847		

Table 5depicts the output of Vector Error Correction Model (VECM). C(4),C(7) and C(10) are statistically significant at 5% level of significance which shows that there is a short run relationship.

Since the coefficient value of index return is 1.016429.It denotes the speed at which the Index Return corrects itself.C(7) coefficient is -64.38355 which means the speed of adjustment for GDP back to the

equilibrium is 64.38355. Further C(10) shows a coefficient as -603.2496 which means Sentiments are corrected at a speed of 603.2496.

VARIANCE DECOMPOSITION OF VECM

Table 6: Variance Decomposition of Index Returns Variance Decomposition of CHANGEIR

Period	S.E.	CHANGEIR	CHANGEGDP	CHANGECPI	SENTIMENT
1	0.133631	100.0000	0.000000	0.000000	0.000000
2	0.141891	90.85405	0.055195	8.516096	0.574656
3	0.152165	80.00781	0.118010	14.87950	4.994686
4	0.153375	78.99559	0.474148	15.59871	4.931554
5	0.153458	78.91295	0.537480	15.59566	4.953910
6	0.153787	78.67316	0.544534	15.60557	5.176727
7	0.153992	78.57378	0.602549	15.57896	5.244709
8	0.154356	78.53013	0.611194	15.50691	5.351761
9	0.154794	78.29185	0.681644	15.46379	5.562717
10	0.155144	78.06766	0.684063	15.57600	5.672280

The above table represents the Variance Decomposition of Index Returns.

The forecast error variance of Index Returns due to GDP is very low. For instance in the first quarter the forecast error variance explaining index return due to GDP is 0% which increases to 0.53% in the 5th quarter. Furthermore over a long run the effect does increase and just goes upto 0.68% in the 10th quarter.

The forecast error variance of Index Returns due to CPI in the first quarter is 0% which increases 14.87% in the 3rd quarter. Furthermore over a long run the effect does increase slowly and goes upto 15.57% in the 10th quarter.

The forecast error variance of Index Returns due to Sentiment in the first quarter is 0% which increases to 4.95% in the 5th quarter. Furthermore over a long run the effect does increase and goes upto 5.67% in the 10th quarter. In other words we can say that the effect increases over the long run.

While the forecast error variance of Index Returns due to Index Returns in the 1st year is 100% which decreases to 78.91% in the 5th year which Furthermore in the long run decreases to 78.06% in the 10th year. In other words we can say that the effect decreases over the long run.

Fig.3 Variance Decomposition of Index Return

Fig.3 (a)

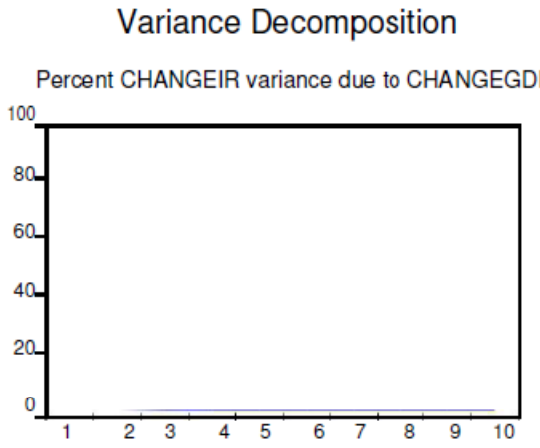


Fig.3 (b)

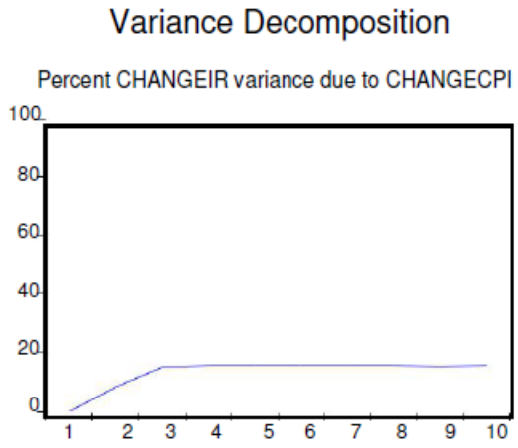


Fig.3(c)

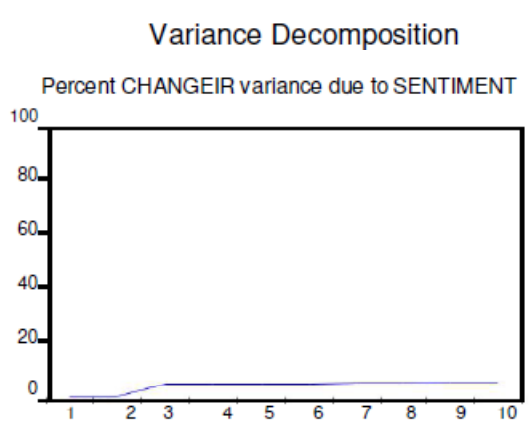


Fig.3(d)

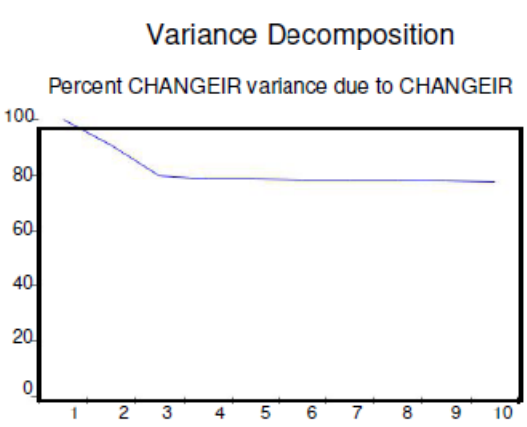


Table 7: Variance Decomposition of GDP
Variance Decomposition of CHANGEGDP

Period	S.E.	CHANGEIR	CHANGEGDP	CHANGECPI	SENTIMENT
1	0.017616	5.067282	94.93272	0.000000	0.000000
2	0.019481	4.241317	90.70143	5.053664	0.003591
3	0.022981	5.050970	86.86335	7.988041	0.097637
4	0.023936	6.276198	81.52149	10.71691	1.485403
5	0.027050	5.795115	84.31734	8.696926	1.190616
6	0.027730	5.663329	81.42020	11.49888	1.417596
7	0.029957	5.659750	82.42488	10.57106	1.344315
8	0.030485	5.966813	80.15366	11.78037	2.099153
9	0.032329	6.557540	80.82722	10.74867	1.866567
10	0.032663	6.473274	79.48198	12.12558	1.919164

The above table 7 represents the Variance Decomposition of GDP.
The forecast error variance of GDP due to Index Returns in the first quarter is 5.06% which increases to 6.27% in the 4th quarter. Furthermore over a long run the effect does increase slowly and goes upto 6.47% in the 10th quarter.
The forecast error variance of GDP due to CPI in the first quarter is 0% which increases to 10.71% in the 4th quarter. Furthermore over a long run the effect fluctuates but increases upto 12.12% in the 10th quarter.
The forecast error variance of GDP due to Sentiment in the first quarter is 0% which increases to 1.48% in the 4th quarter. Furthermore over a long run the effect does increase and goes upto 1.91% in the 10th quarter. That means over the long run the effect will go on increasing.
While the forecast error variance of GDP due to GDP itself in the first quarter is 94.93% which decreases to 84.31% in the 5th quarter which furthermore over a long run decreases to 79.48% in the 10th quarter. That means the effect keeps on decreasing over the long run.

Fig.4 Variance Decomposition of GDP

Fig.4 (a)

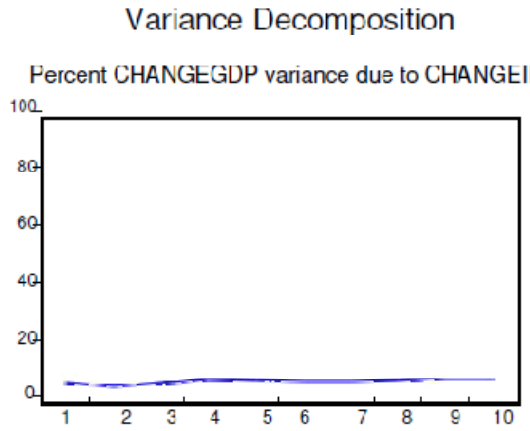


Fig.4 (b)

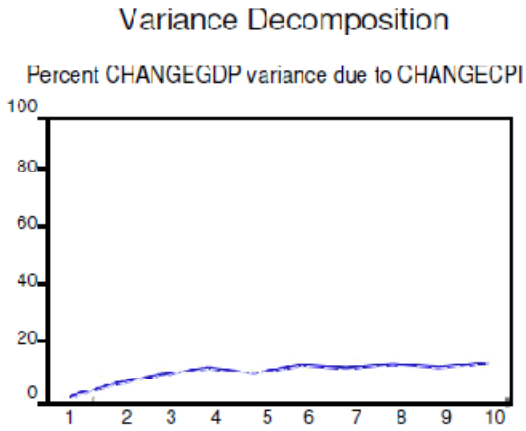


Fig.4 (c)

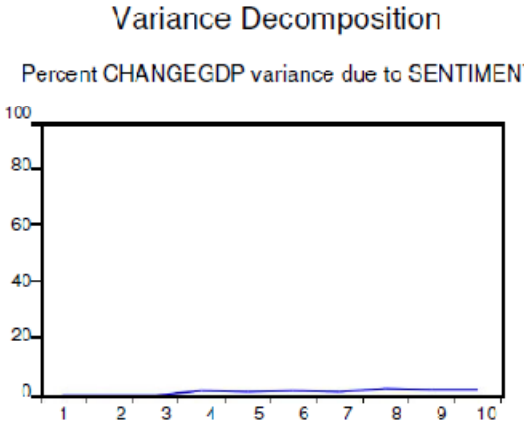


Fig.4 (d)

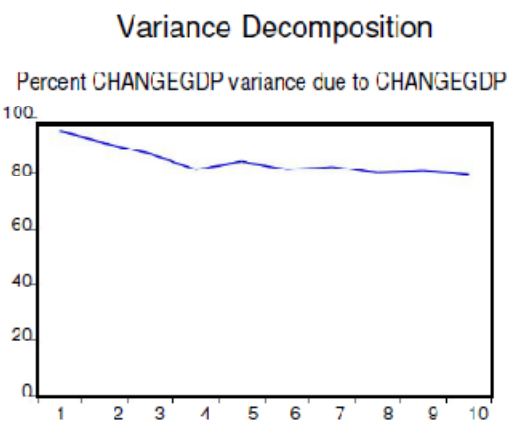


Table 8: Variance Decomposition of CPI

Variance Decomposition of CHANGECPI

Period	S.E.	CHANGEIR	CHANGEGDP	CHANGECPI	SENTIMENT
1	0.011470	3.944901	0.321699	95.73340	0.000000
2	0.012832	6.584356	0.961493	81.07222	11.38193
3	0.014495	5.828255	3.844973	63.86645	26.46032
4	0.015399	12.90896	3.590744	59.96634	23.53396
5	0.016366	14.74240	5.165356	54.46968	25.62256
6	0.017525	14.87655	5.309027	48.31160	31.50283
7	0.018503	18.59092	6.124912	44.87568	30.40849
8	0.019235	19.37946	5.886779	44.05707	30.67669
9	0.020054	18.94086	5.829121	42.27449	32.95552
10	0.020788	20.47979	5.746210	40.00375	33.77024

The above table represents the Variance Decomposition of CPI.
The forecast error variance of CPI due to Index Return is 3.94% in the first quarter which increases to 12.90% in the 5th quarter. Furthermore over a long run the effect does increase and goes upto 20.47% in the 10th quarter.
The forecast error variance of CPI due to GDP is 0.32% in the 1st quarter which increases to 3.84% in the 3rd quarter. Furthermore over a long run the effect does increase slowly and goes upto 5.74% in the 10th quarter.
The forecast error variance of CPI due to Sentiment is 0% in the 1st quarter which increases to 26.46% in the 3rd quarter. Furthermore over a long run the effect increases and goes upto 33.77% in the 10th quarter. That means over the long run the effect goes on increasing.
While the forecast error variance of CPI due to CPI itself is 95.73% in the 1st quarter which decreases to 63.86% in the 3rd quarter which furthermore decreases to 40% in the 10th quarter. That means over the long run the effect keeps on decreasing.

Fig.5 Variance Decomposition of CPI

Fig.5 (a)

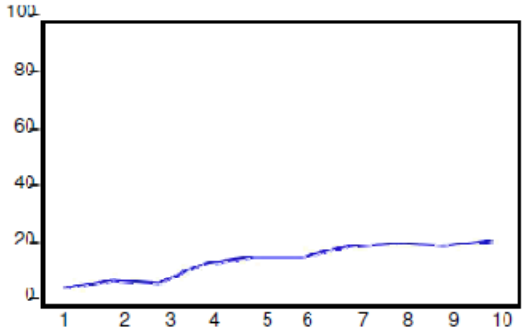


Fig.5 (b)

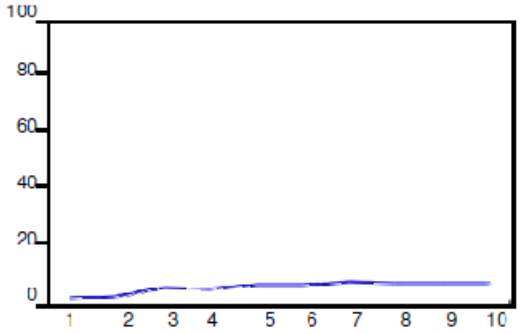


Fig.5 (c)

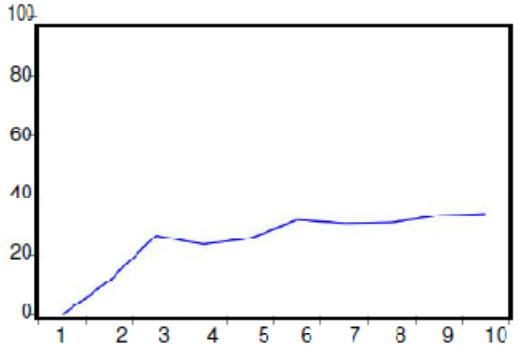


Fig.5 (d)

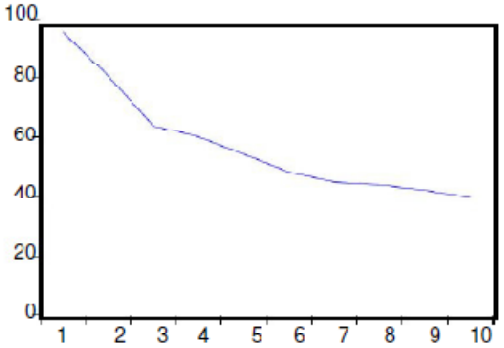


Table 9: Variance Decomposition of SENTIMENT

Variance Decomposition of SENTIMENT

Period	S.E.	CHANGEIR	CHANGEGDP	CHANGECPI	SENTIMENT
1	1.223616	48.44044	0.053965	3.672036	47.83356
2	1.605394	48.27763	0.519000	9.392297	41.81107
3	1.988811	46.91458	0.419717	12.15163	40.51407
4	2.261373	42.20227	0.354899	14.95526	42.48758
5	2.498325	40.36657	0.502446	15.97828	43.15271
6	2.693639	39.06888	0.559267	16.92818	43.44367
7	2.877242	37.79507	0.490189	17.64664	44.06810
8	3.048793	37.11119	0.441005	17.88765	44.56016
9	3.215694	36.91044	0.477264	17.82808	44.78422
10	3.374730	36.56952	0.497216	18.03243	44.90084

The above table represent the Variance Decomposition of Sentiment
The forecast error variance of Sentiment due to Index Return in the first quarter is 48.44% which decreases to 42.20% in the 4th quarter. Furthermore over the long run the effect decreases and goes down to 36.56% in the 10th quarter.
The forecast error variance of Sentiment due to GDP in the first quarter is 0.05% which increases to 0.41% in the 3rd quarter. Furthermore over the long run the effect keeps on increasing slowly and just goes upto 0.49% in the 10th quarter.
The forecast error variance of Sentiment due to CPI in the first quarter is 3.67% which increases to 12.15 % in the 3rd quarter. Furthermore over the long run the effect keeps on increasing and goes upto 18.03% in the 10th quarter.
While the forecast error variance of Sentiment due to Sentiment itself in the 1st quarter is 47.83% which decreases to 40.51% in the 3rd quarter and then again starts to increase slowly in the long run till the 10th quarter.

Fig.6 Variance Decomposition of Sentiment

Fig.6 (a)

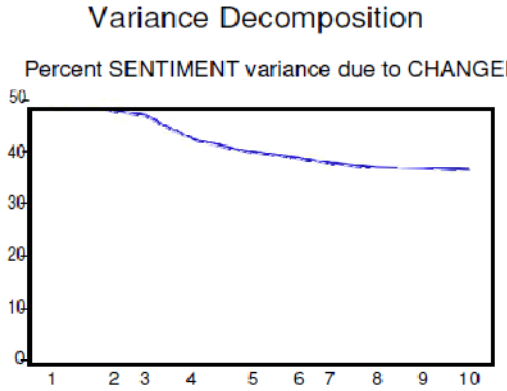


Fig.6 (b)

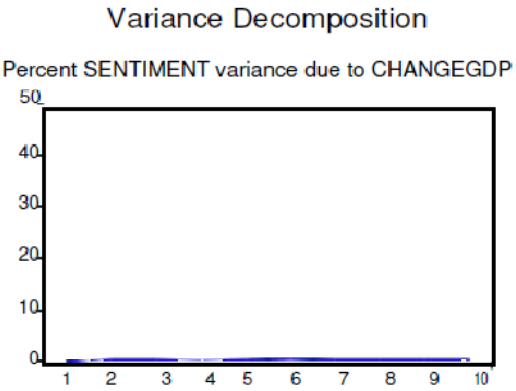


Fig.6 (c)

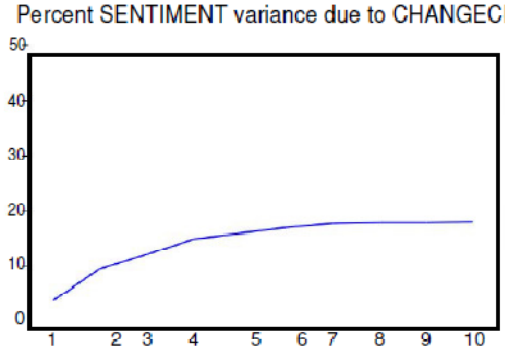
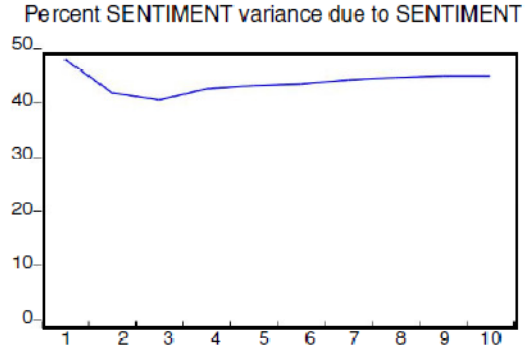


Fig.6 (d)



CONCLUSION

The present study investigated whether there is an impact of investor sentiment on stock returns by considering Nifty returns. The method of Principal Component Analysis (PCA) has been employed to construct the investor sentiment index using several market related implicit sentiment proxies such as

Advance Decline Ratio, Number of IPOs, P/E Ratio and Mutual Fund Net Flow. The irrational component of sentiment has been generated by regressing each of the sentiment indicators on macroeconomic fundamentals such as GDP and CPI (inflation). After constructing the sentiment index the study also decomposed it into positive changes and negative changes of investor sentiment to represent the bullish and bearish sentiments, respectively. The analysis has been done using the Unit root test (ADF), Johansen Cointegration, Vector Error Correction Model (VECM), and Variance Decomposition of VECM.

The main findings from the study may be summarized as follows:

The results from the Unit Root test (ADF) state that the variables Index Returns, GDP, CPI are stationary at I(1) and Sentiments I(0) respectively. Since the variables are stationary at different level i.e. I(1) and I(0) we can still use the Johansen Cointegration test as per Hansen and Juselius(2002). Therefore the results from the Johansen say that there is a long term relationship between the variables and also as the Normalized coefficients is also significant. This indicates that the sentiment index significantly influences the market returns. When the sentiment index decomposed into positive and negative sentiment the study finds an asymmetric relationship. It is found that while the positive sentiment has a positive impact on market return. The negative sentiment index has negative impact. These results imply that when investors are more optimistic about the market they earn more returns and their excessive optimism leads them to speculate more which tempt them to invest even more. Subsequently, they tend to lose when the sentiment goes bearish.

The result of Vector Error Correction Model (VECM) says that there is short term relationship between the variables.

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