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A Study on Investors' Sentiment and Market Return of Indian Stock Market

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Behavioral finance, Principal component analysis, Investor sentiment, Sentiment index, Sentiment proxies, Stock market return

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G11, G12, G17, G4, G41

Abstract: This paper discovers the relationship of investor sentiment and market return over a period of 10 years. Using 30 market and macroeconomic variables as proxy to the investors' sentiment an investors' sentiment index has been created by applying the principal component analysis. Further analysis has been done by employing weighted least squares method. Results show that there is a significant positive relationship between investor sentiment and market return. The results of the study are helpful for retail investors, fund managers and policy-makers for a better understanding of the Indian stock market and to enhance their earnings by combining investor sentiment in to their decision-making. Further, asset pricing models such as CAPM, Fama-French three and five factor model and Carhart factor model, need to incorporate the investor sentiment for better explanation of prices. The results have paved the way to spread the present work in the context of foreign markets such as BRICS countries.

1. Introduction

For a long time, there has been a debate among the researchers of behavioral and empirical finance regarding the sentiment-return relationship. Contrasting opinions have been found in the literature regarding the relationship of sentiment with market return. A study shows that share prices do not follow any pattern and are independent (Fama, 1965). According to the capital asset pricing model, prices of securities reflect all of the available information provided market is efficient. Rational investors in these markets always try to push the market price of shares towards the present value of projected cash flows and arbitrageurs are always there to offset the demands of irrational investors, if any. Random walk theory suggests that share prices follow a random walk and cannot be predicted (Malkiel, 1973). So, it seems that sentiment has no role to play in the share market.

For a very long time the market efficiency and the rationality of the investors were trusted by the market participants for making financial decisions. But the idea of the market efficiency and rationality

of the investors has been losing its importance with the passage of time as it failed to explain the Black Monday, dot com bubble and 2005 global financial crisis.

Modern and behavioral finance challenges the theory of rationality. Investors are not always rational, rather they follow the herd behavior and try to earn better returns when market is rising and once there is downfall they are kicked out of the market. The behavior of irrational investors is affected by their psychology. Behavioral finance helps in understanding the psychology of these investors and helps in understanding their decision-making process. Behavioral finance takes into consideration the heuristics and biases framework for the pricing of assets. Heuristics are the shortcuts one can use to find a quick solution, simplify the difficult procedures and jettison the requirement of extensive calculation. Thus, the decisions can be made quickly.

In India the work on sentiment-return relationship is in its embryonic stage. We shall add to the sentiment-return relationship by building a methodology wherein we would identify the proxies for the investor sentiment and measure it using sentiment index. One of the advantages of such an index is that it helps in understanding the sentiment-return relationship and if such a relationship exists then it can be concluded that sentiment is an important factor in the share market.

Present study attempts to identify proxies to the investor sentiment for the construction of a sentiment index which can represent the sentiment of Indian investors. Sentiment proxies have been identified after the extensive study of the literature and PCA has been applied to identify significant factors which have been used as final proxies to the sentiment. Some new proxies have also been proposed. Further, the sentiment-return relationship has been examined using multiple regression analysis (GLS).

2. Review of Literature

Since 1965, a lot of research has been done on how changes in investor behavior affect the stock prices. According to Fama (1965), share prices do not follow any pattern and are fully independent. Malkiel (1973) gave the random walk theory according to which share prices follow a random walk and cannot be predicted. According to Shiller (1981) investors are irrational and factors other than fundamentals affect the stock prices. Black (1986) termed these investors as noise traders as they act irrationally. Also, they have very limited access to the private information. According to Chen *et al.* (1986), macroeconomic factors are also responsible for the changes in the share market returns. De Long *et al.* (1990) reported that irrational noise traders influence the assets prices with their random confidence and trust, and earn high expected income. Shefrin and Statman (1984) gave a framework based on the self-control theory (Thaler and H., 1981) and choice under uncertainty theory (Tversky & Kahneman, 1981) and showed that sentiment is an important factor in the stock market.

Fisher and Statman (2000) considered three groups for the measurement of sentiment *viz.* large, medium and retail-investors and tried to show the relationship between sentiment of these groups and return of large and small cap stocks. It was found that combined sentiment can be used to predict the market return. Baker and Wurgler (2004b) tried to decode the investor sentiment and tested whether the catering view as proposed by Baker and Wurgler (2004a) can explain the tendency to pay dividends. The study reported a significant relationship between the view as proposed by Baker and Wurgler (2004a) and tendency to pay dividends. Investors prefer dividend paying shares at the time of negative sentiment and

prefer riskier shares at the time of positive sentiment. Brown and Cliff (2004) defined the sentiment as the biasness which speculators have in the valuation of assets and the excessive optimism and pessimism.

In a study conducted by Kumar *et al.* (2006), the data of individual (retail) traders was used to study the effect of trading (retail) on the share returns. Study reported that sentiment is an important factor which can explain the return co-movement. Wang *et al.* (2006) concluded that sentiment is caused by market return and volatility and vice versa is not possible. Further, they concluded that there is no linkage of sentiment with return and volatility.

Baker and Wurgler (2006, 2007) gave a conceptual framework for the explicit measurement of investor sentiment and development of a methodology for the creation of the sentiment index. The study established that market return can be explained using investor sentiment. Sehgal *et al.* (2009) conducted a survey using a structured questionnaire to identify the possible factors which decide the investor sentiment and it was defined as an understanding of investors' behavior that affects stock market activity. Sehgal *et al.* (2010) created sentiment index using Vector Autoregression Model and evaluated its association with the performance of the market. The study reported that sentiment and market performance both cause each other.

Dash and Mahakud (2013) analyzed the linkage of sentiment with cross-section of returns over fourteen industry groups. The implication of the study was that fund managers can use the stocks of those industries which are less sensitive to the sentiment. Naik and Padhi (2016) reconnoitered the sentiment-volatility relationship and concluded that aggregate sentiment index affects the excess market return. Jitmaneeroj (2017) analyzed the relationship between price earnings ratio and sentiment. It was concluded that instead of getting into the trap of using PER as a proxy to the sentiment as per the conventional analysis, it's better to explore whether PER affects the sentiment or not.

Pandey and Sehgal (2019) constructed different sentiment indices. Study reported that the FF5f model cannot explain the excess return of the small stock and low price to book value portfolio, but the model performs better if the sentiment factor is incorporated in it. The study concluded that investor sentiment is an important factor in the Indian stock market. Further, the indices created have more predictive power and lead others indices created so far.

Sentiment helps companies to make decision regarding the timing of issue of shares. The initial public offers take place when the sentiment is high in the market (Gupta and Maurya, 2021; Gupta *et al.,* 2020). Volatility index of India was used as proxy to the sentiment. Sharma (2021) reported that sentiment affects the sectoral return volatility. The study established that volatility is high at the time of high sentiment and vice versa. It was found that EGARCH model is the most suitable for modelling sectoral volatility in the context of NSE.

It has been observed that many researchers are analyzing the sentiment-return relationship, especially in the western economies. Although work has been done in India to analyze the sentiment return relationship but with limited time period and limited number of variables. To the best of our knowledge the empirical work on the aforesaid relationship is in its embryonic stage in India. The present work is an effort to contribute to the present body of literature on the aforesaid subject and tries to understand sentiment return relationship, so that retail investors, policy makers and fund managers in the Indian equity market can make better decisions.

3. Objectives and Hypotheses

3.1. Objectives of the Study

The major objectives are:

- To identify proxies for the investor sentiment.
- To build sentiment index for the Indian stock market.
- To examine the sentiment-return relationship.

3.2. Hypotheses of the Study

Following hypotheses have been tested:

H_{01}: There are no factors responsible for the high/low investors' sentiments.

H_{02}: There is no significant relationship between investor's sentiment and stock market return.

4. Research Methodology

4.1. Proxies to the Sentiment

There is no definite indicator available which can be used to measure the sentiment. Existing literature suggests that different variables can be used to measure the unobservable sentiment and an index (Lee *et al.*, 2002; Baker and Wurgler, 2006; Sehgal *et al.*, 2010) can be which can represent it. Though it can be also be measured through the survey method (Brown and Cliff, 2005; Sehgal *et al.*, 2009) but it suffers from various limitations such as error in the data collection, processing, delay in the receipt of data, *etc.* Most of the studies have used the market related proxies to the sentiment which can gauge the investor sentiment. The use of proxies to represent the sentiment has advantages over the survey method such as generalization, authentic sources of data and sentiment of the economy.

Different studies used different numbers of proxies. Behavioral finance suggests that the closed end fund discount is the best proxy to the sentiment (Lee, 1991; Baker and Wurgler, 2006; Sehgal *et al.*, 2010). However, there is no consensus among researchers on how many variables can be used as a proxy. Table 1 lists some of the previous studies and the measures of sentiment used.

Table 1: Studies and Proxies Used

Studies	*Measure of sentiment*
Loughran & Ritter (1995)	Number of IPOs and FPOs in a month (NIFPO)
Ludvigson & Sydney (2001)	Dividend yield (DIVYIELD)
Baker & Wurgler (2002, 2004)	Ratio of equity in the total issue (EQRATIO)
Brown & Cliff (2004)	Advance/decline ratio (ADR), High-low index (HLI), Put-Call ratio (PCR), and Ratio of equity in the total issue (EQRATIO)
Baker & Wurgler (2006, 2007)	Number of IPOs and FPOs in a month (NIFPO) and Ratio of equity in the total issue (EQRATIO)

contd. table 1

Studies	*Measure of sentiment*
Kumar & Lee (2006)	Buy-sell imbalance (BSI)
Wang *et al.* (2006)	Advance/decline ratio (ADR)
Welch & Goyal (2008)	Dividend yield (DIVYIELD)
Sehgal *et al.* (2009)	Price-earnings ratio (PER)
Finter *et al.* (2010)	Net equity investment by mutual funds (EQMF) and Number of IPOs and FPOs in a month (NIFPO)
Sehgal *et al.* (2010)	Inflation (INFLAT), Liquidity in the economy (LIQECO)
Bohra & Dutt (2011)	Foreign portfolio investment (FPI)
Ray (2012)	Foreign exchange reserves (FEXRES) Proposed
Raza *et al.* (2012)	Foreign direct investment (FDI) Proposed
Yoshinaga & Castro Junior (2012)	Number of IPOs and FPOs in a month (NIFPO) and Ratio of equity in the total issue (EQRATIO)
Dash & Mahakud (2013)	Advance/decline ratio (ADR)
Hui & Li (2014)	Market turnover/trading volume (MKTTURN)
Huang *et al.* (2015)	Dividend yield (DIVYIELD)
Shing So & Lei (2015)	30 days moving average of traded quantity of shares (TRADEQTY), Number of trades (NUMTRADE) and VIX™,
Abakah & Abakah (2016)	Foreign exchange reserves (FEXRES) Proposed
Du *et al.* (2016)	Oil prices (OILPRICE)
Haq (2016)	Foreign direct investment (FDI) Proposed
Hassan *et al.* (2016)	Foreign direct investment (FDI) Proposed
Kumari & Mahakud (2016)	Inflation (INFLAT) and Trading volume ratio (TVR)
Naik & Padhi (2016)	Advance/decline ratio (ADR), Inflation (INFLAT), Price-earnings ratio (PER) and Term-spread *i.e.*difference between 364 days T-bills and 91 days T-bills (TERMSPRE)
Qadan & Nama (2018)	Oil prices (OILPRICE)
Chelley-Steeley *et al.* (2019)	Buy-sell imbalance (BSI)
Pandey & Sehgal (2019)	Bank deposits to market capitalization (BDEPMCAP), Net investment in equity by mutual funds (EQMF), Number of IPOs and FPOs in a month (NIFPO) and Ratio of equity in the total issue (EQRATIO)
McClure, 2020	Price to book value ratio (PBR)
Proxies proposed in the present study	Economic risk premium (R_m–R_f) (ECORPREM) *i.e.* the difference between return on S&P BSE 500 and interest rate on 364 days T-bills, Exchange rate (EXRATE), Index of industrial production (IIP), Prime lending rate (PLR), Proportion of companies traded (COMPTRAD), GDP and Retail trading volume (RTVOL)

Source: Authors' Observations from the Review of Literature

Based on the study of literature and accessibility to the data, we have selected 30 variables as proxy to the investor sentiment. Some of these variables are theoretical proxies which will be validated

after analysis. We have applied principal component analysis on these 30 proxies and created sentiment sub-indices which are referred as final sentiment proxies throughout the paper.

4.2. Data Set

The monthly data on all the above proxies has been collected from various websites *viz.* CSO, BSE, CDSL, Department for Promotion of Industry and Internal Trade, IMF, indexmundi.com, NSE, Federal Reserve Bank of St. Louis, OFX, RBI and SEBI. Total 120 monthly observations of each proxy ranging from January 2010 to December 2019 have been collected. Due to the outbreak of pandemic, the data for the year 2020 and 2021 has not been used as the market has been very volatile at this time.

Chow-Lin method (Chow and Lin, 1971) has been used to disaggregate the quarterly series to monthly series. We have detected and removed the outliers from the data because the presence of these results in bad estimation of the model and bad prediction. We have applied ADF Test to check the stationarity of data series. 12 out of 30 series were found to be non-stationary and to make them stationary, first order difference was taken.

4.3. Measurement of Investors Sentiment

Our study does not differentiate between rational and irrational components and aims at measuring the sentiment at an aggregate level. We have applied principal component analysis to arrive at significant components and these components are then used to represent the investor sentiment. After extracting the factor loadings for original sentiment proxies and after procuring factor loadings for each orthogonal proxies, an index has been created using the formula given in equation 1.

$$SI = \alpha . \sum_{i=1}^{n} \beta_i . PC_i \tag{1}$$

Where,

SI = Generalized sentiment index

i = i^{th} principal component (i^{th} final proxy to the IS)

n = Total number of principal components (total number of final proxies)

α = Constant

β_i =Regression coefficient of i^{th} principal component

PC_i = i^{th} principal component

The data for some of the proxies takes some time to reveal the sentiment, accordingly the lagged data for such proxies has been used (Baker and Wurgler, 2006).

Total 11 principal components with eigen value more than 1 explain 75% of the total variance. The Kaiser-Meyer Olkin (KMO) came out to be 0.835 showing that principal component analysis of the variables is a good idea. We have obtained 11 series for these components and these are termed as final proxies to the sentiment. After the identification of maximum factor loadings, the proxies have been grouped based on their respective principal components in Table2, and these principal components have been named accordingly.

Table 2: Grouped Variables, Principal Components and Factor Loading

Principal Component	*Final Sentiment Proxy*	*Number of Proxies in the Given Principal Componen*	*Proxies*	*Factor Loading*
PC1	Market Performance Ratios	3	PBR	0.893
			DIVYIELD	-0.878
			BDEPMCAP	-0.757
			MKTTURN	0.947
PC2	Trading Indicators	3	NUMTRADE	0.955
			TRADEQTY	0.867
PC3	ADR, FPI, Economic Risk Premium and Equity Investment in MFs	4	ADR	0.602
			FPI	0.754
			ECORPREM	0.665
			EQMF	-0.812
PC4	BSI, FDI and Retail Trading Volume	3	BSI	0.862
			FDI	0.405
			RTVOL	0.861
PC5	Price Earning Ratio, Liquidity, Exchange Rate and Foreign Exchange Reserve	4	PER	0.524
			LIQECO	0.739
			EXRATE	0.600
			FEXRES	0.500
PC6	No. of Companies Traded, VIX and Oil Prices	3	COMPTRAD	0.622
			VIX	-0.466
			OILPRICE	0.811
PC7	Equity Ratio, Term Spread and GDP	3	EQRATIO	0.324
			TERMSPRE	0.827
			GDP	-0.674
PC8	PCR and High Low Index	2	PCR	-0.800
			HLI	0.545
PC9	Inflation	1	INFLAT	0.854
PC10	TVR, NIFPO and IIP	3	TVR	-0.453
			NIFPO	0.467
			IIP	0.792
PC11	Prime Lending Rate	1	PLR	0.836

Source: Authors' calculation based on PCA results obtained in IBM SPSS 20.

The equation 2 gives the generalized measure of sentiment index proposed by the present study.

$$SI = \alpha + \beta_1 PC_1 + \beta_2 PC_2 + \beta_3 PC_3 + \beta_4 PC_4 + \beta_5 PC_5 + \beta_6 PC_6 + \beta_7 PC_7 + \beta_8 PC_8 + \beta_9 PC_9 + \beta_{10} PC_{10} + \beta_{11} PC_{11} \quad (2)$$

Further, the coefficient of each principal component depends upon the regression analysis run and the type of the analysis.

4.4. Sentiment and Market Return Relationship

To examine the relationship of investors' sentiment with market return multiple regression analysis has been used taking final sentiment proxies as independent variables and market return as a dependent variable. To measure the market return we have used the percentage return of S&P BSE 500 Index. Following regression equation has been established (Equation 3) (generalized/weighted least squares) in the IBM SPSS 20 Statistics—

$$S\&P\ BSE\ 500\ Percentage\ Return = \alpha + \sum_{i=1}^{n} \beta_i PC_i \quad (3)$$

Where,

S&P BSE 500 Percentage Return = Market return

α = Constant

β_i = Regression coefficient of i^{th} principal component

PC_i = i^{th} principal component (final sentiment proxy)

5. Results and Data Analysis

5.1. Sentiment and Market Return

The results are in Table 3, 4 and Equation 4. The stepwise weighted regression gives 10 models and model 10 is found to be the best model and suggests that there is a relation of 10 PCs *viz.* PC1, PC2, PC3, PC4, PC5, PC6, PC8, PC9, PC10 and PC11, with the market return. The value of r^2 is 0.733 and adjusted r^2 is 0.701, which indicates that the relationship is strong and the model is worthy of attention. The p-values of the significant coefficients are less than 0.10, so we reject the null hypothesis that coefficients are zero.

Further, the variance inflation factor (VIF) is less than 10 for significant coefficients, which means that coefficients are not correlated to each other and multicollinearity is absent (Rawlings, Pantula and Dickey, 1998). Also, after looking at the p-value of F statistic and value of model number 10, which is less than 0.10, it can be concluded that the coefficients are not equal and independent of each other. The value of Durbin-Watson test statistic is near to 2, so it can be opined that the model is free from the autocorrelation (Durbin and Watson, 1971).

Table 3: Model Summary for the Relationship Between S&P BSE 500 Index Percentage Return and Sentiment

Model Number	*r*	r^2	*Adjusted* r^2	*Standard Error of the Estimate*
1	.534	.285	.277	.8502154
2	.690	.476	.464	.7320422
3	.748	.559	.545	.6748942
4	.791	.626	.610	.6246323
5	.814	.662	.643	.5972198
6	.825	.681	.659	.5836411
7	.836	.699	.674	.5705700
8	.845	.714	.688	.5589972
9	.851	.724	.695	.5524788
10	.856	.733	.701	.5466407

Source: Authors' calculation on the basis of Results Obtained in IBM SPSS 20.

Table 4: Multiple Regression Coefficients of Model 10

Dependent Variable: SPBSE500
Independent Variables: PC1, PC2, PC3, PC4, PC5, PC6, PC8, PC9, PC10 and PC11
Method: Weighted Least Squares

Variable	*Coefficient*	*Standard Error*	*t-Statistic*	*Probability*	*VIF*
PC1	.533689	.056382	9.465641	.0000	1.0000
PC2	.094769	.056382	1.680852	.0965	1.0000
PC3	.436683	.056382	7.745116	.0000	1.0000
PC4	-.124189	.056382	-2.202652	.0304	1.0000
PC5	.259582	.056382	4.604017	.0000	1.0000
PC6	.289030	.056382	5.126309	.0000	1.0000
PC8	-.099376	.056382	-1.762553	.0816	1.0000
PC9	.189376	.056382	3.358814	.0012	1.0000
PC10	.137133	.056382	2.432232	.0171	1.0000
PC11	-.132616	.056382	-2.352115	.0210	1.0000
C	-2.62E-08	.056084	-4.66E-07	1.0000	1.0000
r	.856138	F-Statistic		23.05745	
r^2	.732973	Probability of F-Statistic		.000000	
Adjusted r^2	.701184	Durbin-Watson Statistics		1.934096	

Source: Authors' Calculation on the basis of Results Obtained in IBM SPSS 20.

A multiple linear regression was calculated to predict the percentage return of S&P BSE 500 index based on 11 principal components *viz.* (PC1) Market Performance Ratios; (PC2) Trading Indicators; (PC3) ADR, FPI, Economic Risk Premium and Equity Investment in MFs; (PC4) BSI and Retail Trading Volume; (PC5) Price Earning Ratio, Liquidity, Exchange Rate and Foreign Exchange Reserve; (PC6) No. of Companies Traded, VIX and Oil Prices; (PC7) Equity Ratio, Term Spread and GDP; (PC8) PCR and High Low Index; (PC9) Inflation; (PC10) TVR, NIFPO and IIP; and (PC11) Prime Lending Rate. A significant regression equation was found ($F(8, 86) = 28.574$, $p < .100$), with an r^2 of 0.733 which implies that 73.3% variation in the market return is explained with the help of final proxies to the sentiment.

Participants' predicted return of S&P BSE 500 index is equal to 0.000(C) + 0.534 (PC1) + 0.095 (PC2) + 0.437 (PC3) - 0.124 (PC4) + 0.260 (PC5) + 0.289 (PC6) - 0.099 (PC8) + 0.189 (PC9) + 0.137 (PC10) – 0.137 (PC11). All the variables were significant predictors of percentage return of S&P BSE 500 Index.

As per the model number 10, there are 10 final sentiment proxies, the p-value of which is less than 0.10 *viz.* PC1, PC2, PC3, PC4, PC5, PC6, PC8, PC9, PC10 and PC11. So, we reject the secondary hypotheses H_{021}, H_{022}, H_{023}, H_{024}, H_{025}, H_{026}, H_{028}, H_{029}, H_{0210} and H_{0211} and conclude the significant sentiment return relationship. Further, the p-value of PC7 is more than 0.10, so there is no reason to reject the H_{0S7} which implies the insignificant relationship between market return and PC7. Hence this principal component is irrelevant in predicting the market return.

Most of the final sentiment proxies have a positive relationship with the market return, which suggest that investors are fearful when there is downfall in the market and market sentiment decreases.

Therefore, it can be conjectured that at the time of high (low) sentiment market return is also high (low). Thus, we have found that our calculated sentiment index is working well in the Indian stock market in the time period we have taken.

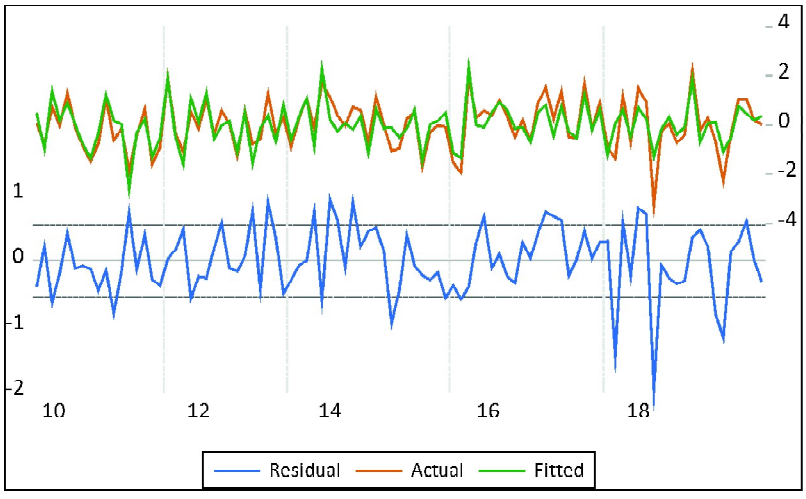

Figure 1: Actual, Fitted and Residual Graph

Source: Authors' Own Compilation

5.2. Testing the Model for Robustness

We have tested our weighted OLS model for robustness using different graphs and tests such as residuals graph, serial correlation test, heteroscedasticity test and CUSUM chart. Results and their interpretation are as follows:

The figure 1 shows that fitted values of the model are close to actual values. This implies that model fitting is good.

Table 6 gives the results of the Serial Correlation LM Test. The probability is 0.8750 which means that the null hypothesis of no serial correlation is accepted (at 10%). Thus, there is no serial correlation in our model. OLS estimators are not the best linear unbiased estimators when there is the presence of heteroskedasticity in the model.

Table 6: Breusch-Godfrey Serial Correlation LM Test

Null Hypothesis: No serial correlation at up to 2 lags			
F Statistic	.133747	Probability-F(2,82)	.8750
Observed r^2	.308894	Probability-Chi-Square(2)	.8569

Source: Authors' Own Compilation

We have checked our model for the presence of heteroscedasticity. Results given in table 7 show that the p-value is 0.9037 which means that null hypothesis of homoscedasticity is accepted. It means that our model is free from heteroscedasticity and regression coefficients are best unbiased linear estimators.

Table 7: ARCH Heteroskedasticity Test

F Statistic	.014729	Probability-F (1,92)	.9037
Observed r^2	.015047	Probability-Chi-Square (1)	.9024

Source: Authors' Own Compilation

We have used the CUSUM test to check the stability of regression coefficients of our model. Figure 2 shows that the model lies well within the 10% level of significance limits (V-mask) shown by the red lines. The analysis of the chart tells that the model is stable.

6. Conclusion

The current study examined whether sentiment of Indian investors can be measured and used to analyze its impact on the market return, by considering the S&P BSE 500 Index. PCA has been employed for the construction of investor sentiment index considering selected sentiment proxies which represent the sentiment of Indian investors. The analysis has been done using the weighted OLS method which

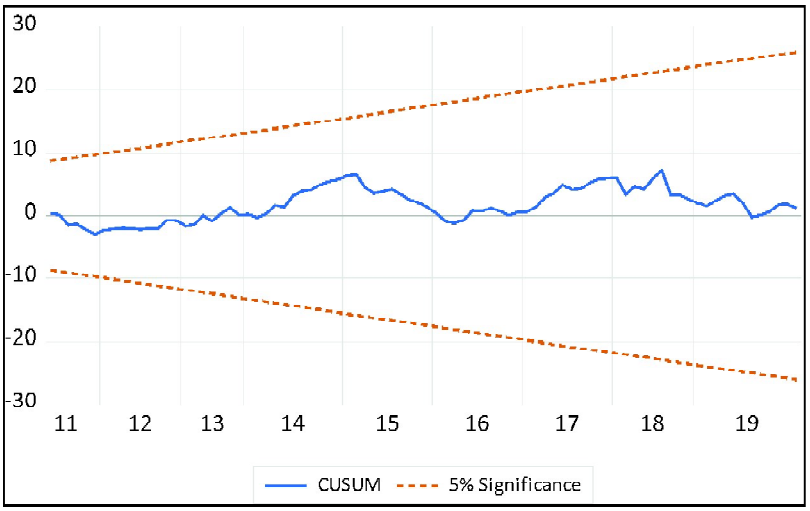

Figure 2: CUSUM Diagnostic Test Chart

Source: Authors' Own Compilation

gives more weight to the points near to the regression line and less weight to the points which are far away from the regression line. The weighted OLS improves the model fitting in the sense that it enhances the value of r and r^2.

Regression estimation results show that sentiment affects the market return significantly. Results imply that at the time of bullish sentiment investors earn higher returns and vice versa. Their money is lost when sentiment is bearish and it may turn into a snowball effect also.

On the basis of above findings, it can be concluded that the relationship of sentiment and market return is significant. We have established that market return can be predicted using some selected sentiment proxies *viz.* Market Performance Ratios; Trading Indicators; ADR, FPI, Economic Risk Premium and Equity Investment in MFs; BSI and Retail Trading Volume; Price Earning Ratio, Liquidity, Exchange Rate and Foreign Exchange Reserve; No. of Companies Traded, VIX and Oil Prices; PCR and High Low Index; Inflation; TVR, NIFPO and IIP; and Prime Lending Rate. These proxies were found to be significant predictors of the market return. Thus, the secondary hypotheses *viz.* H_{021}, H_{022}, H_{023}, H_{024}, H_{025}, H_{026}, H_{028}, H_{029}, $H_{0210}$and H_{0211} were rejected which implies the significant relation between the aforesaid final proxies and market return.

The final sentiment proxy "Equity Ratio, Term Spread and GDP" was found to be insignificant in predicting market return. Thus, the secondary hypothesis H_{027} is accepted which implies the insignificant relationship of "Equity Ratio, Term Spread and GDP" and market return. Our results are in conformity with Sehgal *et al.* (2010), Dash and Mahakud (2013b), Naik and Padhi (2016) & Pandey and Sehgal (2019) who also documented the significant impact of sentiment on market return.

Now the above findings posit questions like: can sentiment predict the portfolio return equally under different market conditions or different economic conditions or can sentiment be used to predict

the volatility or industrial return. We aim at answering these questions with further research in this area.

The results may help retail investors, policy makers and other decision. Researchers and market professionals need to pay more attention to sentiment as it has an important role to play in the Indian stock market. Further, an understanding of the sentiment may help firms to decide the timings for the securities issue. Asset pricing models and return models such as CAPM, Fama-French three and five factor models and Carhart four factor model need to incorporate the investor sentiment as one of the factors for better explanation of prices.

The data for the year 2020 and 2021 has not been used due to the pandemic and high volatility in the market during this period. Further, the findings are limited to the 30proxies selected and used for the present study. Use of survey methods or inclusion/exclusion of some proxies may expand the study.

We wish to conduct study taking data of pandemic period into consideration as this will help us in analyzing the effect of sentiment on return at the time of high volatility. Also, it will give us an idea whether this index works well in a situation of pandemic.

Also, we wish to analyze the effect of our index on market return in the context of developing foreign financial markets such as BRICS countries. However, in this process some elements of the index may have to be removed and some new elements may have to be added depending upon the non-availability or availability of the data.

References

Abakah, E. J., & Abakah, M. K. (2016). Foreign Exchange Reserve and Its Impact on Stock Market: Evidence from Ghana. (S. Banerjee, Ed.) *Journal of Finance and Economics, 4*(5), 136-141. doi:10.12691/jfe-4-5-2

Baker, M., & Wurgler, J. (2002). Market Timing and Capital Structure. (S. Nagel, Ed.) *The Journal of Finance, 57*(1), 1-32. doi:doi.org/10.1111/1540-6261.00414

Baker, M., & Wurgler, J. (2004). A Catering Theory of Dividends. (S. Nagel, Ed.) *The Journal of Finance, LIX*(3), 1125-1166. doi:10.1111/j.1540-6261.2004.00658.x

Baker, M., & Wurgler, J. (2004). Appearing and Disappearing Dividends: The Link to Catering Incentives. (G. W. Schwert, Ed.) *Journal of Financial Economics, 73*, 271-288. doi:10.1016/j.jfineco.2003.08.001

Baker, M., & Wurgler, J. (2006). Investor Sentiment and the Cross-Section of Stock Returns. *Journal of Finance, 61*, 1645-1680.

Black, F. (1986). Noise. *Journal of Finance, 41*, 529-543.

Bohra, N. S., & Dutt, A. (2011). Foreign Institutional Investment in Indian Capital Market: A Study of Last One Decade. *International Research Journal of Finance and Economics* (68). Retrieved from http://www.eurojournals.com/finance.htm

Brown, G. W., & Cliff, M. T. (2004). Investor Sentiment and the Near-Term Stock Market. *Journal of Empirical Finance, 11*(1), 1-27.

Brown, G. W., & Cliff, M. T. (2005). Investor Sentiment and Asset Valuation. *The Journal of Business, 78*(2), 405-440.

Chelley-Steeley, P. L., Lambertides, N., & Savva, C. S. (2019). Sentiment, Order I, and Co-Movement: An Examination of Sto Retail and Institutional Trading Activity. (A. J. Doukas, Ed.) *European Financial Management, 25*(1), 116-159. doi:10.1111/eufm.12146

Chen, N.-F., Roll, R., & Ross, S. A. (1986). Economic Forces and the Stock Market. *The Journal of Business, 59*(3), 383-403.

Chow, G. C., & Lin, A.-l. (1971). Best Linear Unbiased Interpolation, Distribution, and Extrapolation of Time Series by Related Series. *The Review of Economics and Statistics, 53*(4), 372-375. doi:10.2307/1928739

Chuang, W.-J., Ouyang, L.-Y., & Wen-Chen, L. (2010, March). The Impact of Investor Sentiment on Excess Returns: A Taiwan Stock Market Case. *International Journal of Information and Management Sciences, 21*(1), 13-28. Retrieved June 9, 2018, from ijims.ms.tku.edu.tw/list.asp

Dash, S. R., & Mahakud, J. (2013b). Investor Sentiment, Risk Fand Stock Return: Evidence from Indian Non Financial Companies. *Journal of Indian Business Research, 4*(3), 194-218.

De Long, J. B., Shleifer, A., Summers, L. H., & Waldmann, R. J. (1990, August). Noise Trader Risk in Financial Markets. *Journal of Political Economy, 98*(4), 703-738. doi:10.1086/261703

Du, D., Gundeson, R. J., & Zhao, X. (2016, December 3). Investor Sentiment and Oil Prices. (M. d. Jong, & D. diBartolomeo, Eds.) *Journal of Asset Management, 17*(2), 73-88. doi:10.1057/jam.2015.39

Durbin, J., & Watson, G. S. (1971). Testing for Serial Correlation in Least Squares Regression. III. *Biometrika, 58*(1), 1-19. doi:10.2307/2334313

Fama, E. F. (1965). The Behavior of Stock-Market Prices. *The Journal of Business, 38*(1), 34-105. Retrieved November 30, 2020, from www.jstor.org/stable/2350752

Finter, P., Niessen-Ruenzi, A., & Ruenzi, S. (2012). The impact of Investor Sentiment on the German Stock Market. (G. Fandel, & W. Breuer, Eds.) *Zeitschrift für Betriebswirtschaft (Journal of Business Economics), 82*(1), 133-163. doi:10.1007/s11573-011-0536-x

Fisher, L. K., & Statman, M. (2000). Investor Sentiment and Stock Returns. *Financial Analysts Journal, 56*(2), 16-23.

Fuller, W. A. (1976). *Introduction to Statistical Time Series* (2nd ed.). New York: John Wiley and Sons. Retrieved December 2018

Grudkowska, S. (2016). JDemetra Reference Manual Version 2.2. *2.1*, 215. (S. Grudkowska, Ed.) Œwiêtokrzyska, Warszawa, Poland: Narodowy Bank Polski. Retrieved November 15, 2020, from European Union Website: https://ec.europa.eu/eurostat/cros/system/files/jdemetra_reference_manual_version_2.1_0.pdf

Gupta, L., & Maurya, S. (2021). Trends and Determinants of Primary Market Activities: Evidences from India. *Orissa Journal of Commerce, 43*(3), 27-41. doi:https://doi.org/10.54063/ojc.2021.v42i03.03

Gupta, L., Mohapatra, A. K. and Maurya, S. (2020). Long-run Operating Performance of Firms and IPO Underpricing: Evidences from India, *The Empirical Economics Letters*, 19(8), 871-882.

Haq, A. U. (2019). Role of FDI in Stock Returns: A Case of Pakistan. *Asian Journal of Economics, Finance and Management, 1*(3), 99-104. Retrieved December 7, 2020, from https://globalpresshub.com/index.php/AJEFM/article/view/769

Hassan, M. K., Rashid, M., & Castro, E. (2016). Foreign Direct Investment and Investor Sentiment: A Causal Relationship. (J. Pelzman, Ed.) *Global Economy Journal, 16*(4), 697-719. doi:10.1515/gej-2016-0006

Huang, D., Jiang, F., Tu, J., & Zhou, G. (2015). Investor Sentiment Aligned: A Powerful Predictor of Stock Returns. (I. Goldstein, Ed.) *The Review of Financial Studies, 28*(3), 791-837. doi:10.1093/rfs/hhu080

Hui, B., & Li, P. (2014). Does Investor Sentiment Predict Stock Returns? The Evidence from Chinese Stock Market. (X.-S. G. Jie Chen, Ed.) *Journal of Systems Science and Complexity (J SYST SCI COMPLEX), 27*, 130–143.

Jitmaneeroj, B. (2017). Does Investor Sentiment Affect Price-Earnings Ratios? *Studies in Economics and Finance, 34*(2), 1-16. doi:10.1108/SEF-09-2015-0229

Kumar, A., & Lee, C. M. (2006). Retail Investor Sentiment and Return Comovements. (C. R. Harvey, & J. Graham, Eds.) *Journal of Finance, LXI*(5), 2451-2486. doi:10.1111/j.1540-6261.2006.01063.x

Kumari, J., & Mahakud, J. (2016). Investor Sentiment and Stock Market Volatility: Evidence from India. (R. A. Ajami, Ed.) *Journal of Asia-Pacific Business, 17*(2), 173-202. doi:10.1080/10599231.2016.1166024

Lee, C. M., Shleifer, A., & Thaler, R. H. (1991). Investor Sentiment and the Closed-End Fund Puzzle. *The Journal of Finance, XLVI*(1), 75-109.

Lee, W. Y., Jiang, C. X., & Indro, D. C. (2002). Stock Market Volatility, Excess Returns, and the Role of Investor Sentiment. *Journal of Banking and Finance, 26*(12), 2277-2299. doi:10.1016/S0378-4266(01)00202-3

Loughran, T., & Ritter, J. R. (1995). The New Issues Puzzle. (S. Nagel, Ed.) *The Journal of Finance, L*(1), 23-51. doi:10.1111/j.1540-6261.1995.tb05166.x

Ludvigson, M., & Sydney, L. (2001). Consumption, Aggregate Wealth, and Expected Stock Returns. (S. Nagel, Ed.) *The Journal of Finance, 56*(3), 815-849. doi:10.1111/0022-1082.00347

Malkiel, B. G. (1973). *A Random Walk Down Wall Street*. New York: W. W. Norton & Company, Inc.

McClure, B. (2020). *Using Price-to-Book Ratio to Evaluate Companies*. Retrieved November 13, 2020, from Investopedia: https://www.investopedia.com/investing/using-price-to-book-ratio-evaluate-companies/

Naik, P. K., & Padhi, P. (2016). Investor Sentiment, Stock Market Returns and Volatility: Evidence from National Stock Exchange India. *International Journal of Management Practice, 9*(3), 213-237. doi:0.1504/IJMP.2016.077816

Pandey, P., & Sehgal, S. (2019). Investor Sentiment and its Role in Asset Pricing: An Empirical Study for India. (D. Thampy, Ed.) *IIMB Management Review, 31*(2), 127-144. doi:10.1016/j.iimb.2019.03.009

Persaud, A. (1996). *Investors Shifting Appetite for Risk*. FX Research Note. New York: Morgan Guaranty Trust Company.

Qadan, M., & Nama, H. (2018). Investor Sentiment and the Price of Oil. (B. W. Ang, U. Soytas, R. J. Tol, & J. P. Weyant, Eds.) *Energy Economics, 69*, 42-58. doi:10.1016/j.eneco.2017.10.035

Rawlings, J. O., Pantula, S. G., & Dickey, D. A. (1998). *Applied Regression Analysis : A Research Tool* (2nd ed.). (G. Casella, S. Fienberg, & I. Olkin, Eds.) Raleigh, North Carolina, USA: Wadsorth Inc., Springer-Verlag Newyork. Retrieved March 3, 2021

Ray, S. (2012). Foreign Exchange Reserve and its Impact on Stock Market Capitalization: Evidence from India. *Research on Humanities and Social Sciences, 2*(2), 46-60. doi:10.7176/RHSS

Raza, A., Iqbal, N., Ahmed, Z., Ahmed, M., & Ahmed, T. (2012). The Role of FDI on Stock Market Development: The Case of Pakistan. (M. Muric, Ed.) *Journal of Economics and Behavioral Studies, 4*(1), 26-33. doi:10.22610/jebs.v4i1

Sehgal, S., Sood, G. S., & Rajput, N. (2009). Investor Sentiment in India: A Survey. *VISION-The Journal of Business Perspective, 13*(2), 13-23. doi:10.1177/097226290901300202

Sehgal, S., Sood, G. S., & Rajput, N. (2010, January-June and July December). Developing Investor Sentiment for India. *Osmania Journal of International Business Studies, 5*(1 and 2), 49-55. Retrieved May 30, 2019, from http://www.indianjournals.com/ijor.aspx?target=ijor:ojibs&volume=5&issue=1and2&article=005&type=pdf

Sharma, P. C. (2021). Impact of Investors' Sentiments on Selected Sectoral Indices Return Volatility: Special Reference to NSE. *Orissa Journal of Commerce, 42*(1), 44-58. doi:10.54063/ojc.2021.v42i01.04

Shefrin, H., & Statman, M. (1993, November). Ethics, Fairness, Efficiency and Financial Markets. *Financial Analysts Journal, 49*(6), 21-29.

Shiller, R. J. (1981). Do stock prices move too much to be justified by subsequent changes in dividends? *American Economic Review, 71*(3), 421-436.

Shing So, S. M., & Lei, V. U. (2015). On the Relationship between Investor Sentiment, VIX and Trading Volume. *Risk Governance & Control: Financial Markets & Institutions, 5*(4 (Continued 1)), 115-122. doi:10.22495/rgcv5i4c1art1

Thaler, R., & H., S. (1981). An Economic Theory of Self-Control,. *Journal of Political Economy, 89*, 392-410.

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science, 211*(4481), 453-458.

Wang, Y.-H., Keswani, A., & Taylor, J. S. (2006). The Relationships between Sentiment, Returns and Volatility. *International Journal of Forecasting, 22*, 109-123.

Welch, I., & Goyal, A. (2008). A Comprehensive Look at The Empirical Performance of Equity Premium Prediction. (I. Goldstein, Ed.) *The Review of Financial Studies, 21*(4), 1455-1508. doi:10.1093/rfs/hhm014

Yoshinaga, C. E., & Castro Junior, F. H. (2012). The relationship between market sentiment index and stock rates of return: A panel data analysis. (C. G. Bellini, Ed.) *Brazilian Administration Review, 9*(2), 189-210. doi:10.1590/S1807-76922012000200005