6. LINKAGE OF SIZE EFFECT AND BEHAVIORAL RISK IN INDIAN EQUITY MARKET

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Abstract

This paper examined size effect and its linkages to behavioral risk. It also studied the market under reaction and over reaction to information events across size wise portfolios in Indian market over the period spanning from 2004 to 2016. Statistical techniques such as correlation analysis, Regression analysis and Principle Component Analysis were applied in this study. The study observed significant presence of size effect in the portfolio returns which is not in line with the movement of market beta factor. The analysis revealed that behavioral risk factor of the portfolios being inversely related to market size, indicating that the size effect observed as the price for behavioral risk prevailing in the market. In the presence of high optimistic irrational sentiment, the correction in excess returns are higher in large cap portfolios compared to that in small and medium size portfolios and vice versa in case of high pessimistic irrational sentiment in the market even though the sensitivity is not linear across the portfolios. It was observed that behavioral error increases across all the portfolio's returns in the trading on information events with small size portfolios assuming larger behavioral error compared to medium and larger size portfolios. But trading on non-information days leads to reduction in behavioral error across all the portfolios with small size portfolios experiencing larger percentage of correction compared to medium and large size portfolios. Broadly, the results showed that small and medium size portfolios experiencing positive over reaction while larger size portfolios experiencing negative under reaction to information events in Indian equity market. Overall, the study reveals the relevance of considering exposure to behavioral risk factors while constructing portfolios and in pricing of assets. The results also caution about entry and exit timing into the market.

Keywords: equity market, size anomaly, investor psychology, irrational market sentiment, behavioral bias, under-reaction and over-reaction

JEL Classification: G1, G11, G12, G41

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1. Introduction:

The efforts to identify risk factors that explain the return formation of financial assets have been on its way, especially in the context of stock markets, among the academia as well as market practitioners, for decades. The basis of these investigations centered on Efficient Market Hypothesis and pricing models derived from its postulates. Capital Asset Pricing Models (CAPM), (such as Sharpe,1964; Lintner, 1965; Black, 1972 and others), proposed in line with the Markowitz' (1952) portfolio selection framework based on mean-variance maxim, argued that given the rational behavior of investors, the market determined prices of assets would instantaneously incorporate all new information. Therefore, the variations in the expected return of a security would be fully explained by its level of responsiveness (systematic risk) to the variations in market portfolio returns. The proponents of these models also argued that each realization of price would be independent and the variations in them would be a sequence of random variables with no way of making abnormal profit by forecasting based on past information or by any other means of prediction, as the present market price would discount all humanly possible expectations of future contingencies (Markowitz, 1952; Sharpe, 1964; Samuelson, 1965; Fama, 1965a; 1965b; 1970; Fama and MacBeth, 1973). Therefore, any other observations contradicting to these arguments were portrayed as anomalies.

The empirical observation that common stocks of firms with low total market value earning higher risk adjusted returns than that are earned by the stocks of firms with larger total market value has been termed size effect in the market parlance. The observation of size effect questioned the validity of these pricing models which lead to plethora of investigations and evidences corroborating the pervasiveness of size effect from across various markets and time periods. Similarly, these studies have also endeavored to explain the size effect from various grounds broadly from the multidimensional and temporal characteristics of systematic risk in the market and also from the inefficiency of markets evolving from market microstructure factors and lately from the angle of market psychology. In this context, this research paper examined the linkages of size effect and behavioral risk factors in the Indian equity market and responsiveness of behavioral errors in explaining market overreaction and under-reaction to information events across size wise portfolios. The motivation for the investigation emanates from the behavioral finance literature about the high probability of naïve trading decision of investors dealing in small, young, unprofitable and less liquid stocks.

2. Empirical Evidences on Size Effect and its Justifications

There were concerted efforts to explain the empirically observed size effect as a component of systematic risk, not captured by conventional risk factor (beta) in the rational expectation-based frame of analysis, by attributing the same to; the reflection of the market risk factors; firm characteristics; time varying behavior of market risk. Banz (1981), upon observing the size effect in NYSE stocks as reported by Klein and Bawa (1977) and Banz and Miller (1978) stated that the negative relationship between market size and returns as the outcome of the risk difference between high and low market size of securities evolving from the **availability of information** about the stocks since information availability depend on the size of the firms and insufficient information leads to uncertainties in the return distribution, small cap firms would assume higher risk adjusted returns in the market. Likewise, Basu (1983) reported

that the size effect observed in NYSE common stock returns in the period spanning from 1962 to 1978 disappearing once controlled for market risk and value effect in terms of earnings price ratio giving an indication that the size effect is reflection of value premium inherent in such stocks while Chan *et al.* (1985) and Chan and Chen (1991) attributed it to the **default spread** and to the **market performance** of the firms respectively.

In the same way, Fama and French (1992; 1993) reported significant size effect in the data of non-financial firms' returns of NYSE, AMEX and NASDAQ and incorporated in market size as a risk factor along with value factor into their three-factor pricing model. They opined that the size effect as the reflection of common **distress factor** of firms in the market and temporal variations in the market risk. But, Daniel and Titman (1997) examined this argument in NYSE, AMEX and NASDAQ data and found no evidence for distress factor. They stated that it is the **firm characteristic** rather than risk-factor loading that determines the expected return and also observed that in case of market beta once controlled for size and book to market ratios loses its explanatory power of returns.

Size effect has also been attributed to the **errors emanating from investors judgement of the stock return movements and behavioral bias** in investment decision making (Chan and Chen, 1991; Gompers and Metric, 2001; Daniel *et al*., 2001). Liu (2006) reported that size effect disappearing once the CAPM based price model augmented with a **liquidity** factor, attributing it as the reflection of illiquidity of small cap stocks contradicting to the observations of Eleswarapu and Reinganum (1993) and Amihud (2002) that size effect not being fully explained by bid-ask spread and illiquidity measures respectively in their studies. In line with Horowitz *et al.* (2000), Fama and French (2008), based on data drawn respective variable from 1963 to 2005 from the markets of NYSE, AMEX and NASDAQ, observed that the size effect owing much of its power to **microcap stocks** and is marginal among small and big cap stocks. Moor and Sercu (2013) in their study of 39 countries on the data, spanning from 1980 to 2009, reported that none of the factors such as, market risk, infrequent trading, financial distress risk, missing book values, momentum, liquidity risk, changing business conditions, seasonality effect, exchange rate risk, time varying risk loadings and dividend yield effect are convincingly explaining the size effect observed in the markets either separately or jointly.

There is large volume of research reports that found size effect in various markets in different time periods. Herrera and Lockwood (1994) in Mexican market between 1987 and 1992; Jensen *et al.* (1997) in US market; Sehgal and Tripathi (2005) in Indian equity market between 1990 and 2003; Aksu and Onder (2000) in Istanbul stock market; Hong *et al.* (2000); Perez-Quiros and Timmermann (2000) in US market; Mohanty (2002) in Indian market; Barry *et al.* (2002) in 35 emerging markets; Glezakos and Mylonas (2004) in Athens market; Cheong and Steinert (2007) in Australian market; Fama and French (2012) in North America, Europe, Japan and Asia Pacific; Lischewski and Voronkova (2012) in Central Eastern Europe and Poland; Hwang *et al.* (2014) in UK market; Zaremba (2015); Hilliard and Zhang (2015) in Chinese market; Chordia *et al*. (2015); Pandey and Sehgal (2016) in Indian equity market. Thus, there is a wide range of justifications to the size effect from different perspectives. Dijk (2011) and Pandey and Sehgal (2016) give detailed review on various explanations attributed to it in the literature.

All these studies confirm the prevalence of size effect across various markets and time even though they varied in interpreting it. Thus, it was observed from the literature that, even though size effect is examined from various angles, there is absence of convergence of arguments in explaining size effect in stock markets.

But endeavors to examine the size effect from angle of behavioral bias of investors in the market is rather scarce even though there are hints in the behavioral finance literature about the high noise risk or irrational trading risk in small cap stocks. Baker and Wurgler, 2006 and Kumar, 2009 etc. have pointed out that stocks like; younger stocks, small stocks, unprofitable stocks, non-dividend paying stocks, high volatility stocks, extreme dividend paying stocks and distressed stocks, are attractive to optimists and speculators and are affected by behavioral bias in investor trading activities. Adding to this, research studies in Indian equity market have also pointed out the prevalence of behavioral biases in investment decision making. Trend chasing and positive feedback trading (Batra, 2003); herding behavior (Lao and Singh, 2011); higher disposition effect (De *et al*., 2011); noise trading (Maheswaran *et al*., 2012) etc. have been reported from the market. Zygaldo *et al.* (2014) also observed high sensitivity of excess returns to changes in the investor moods during periods of negative sentiment in Indian market in their examination based on Thomson Reuters Marketpsych index.

The foregoing discussion reveals the uniqueness of size effect and justifies the necessity and the possibility of linkages between size effect and behavioral bias of investors especially in the Indian equity market as both are prevalent in the market.

3. Data and Methodology

The analysis is carried out broadly in the following steps; examination of the size effect in the Indian equity market for the time period spanning from 2004 -2016 and also between pre and post Global Financial Crisis of 2007-2008; nature of CAPM based risk (beta) movements across portfolios constructed based on market capitalization (market size) for the same time periods; nature of behavioral risk movements across the size wise portfolios based on the irrational market sentiment index constructed; behavioral error in the market responses to information events (dividend announcements) across these portfolios.

The constituent stocks of BSE 500 and NSE 500 indices were considered as the sample frame. The sorting methods adopted for the construction of size wise portfolios were partially in line with Fama and French (2008). The stocks of financial firms and stocks with missing data or suspended from trading during 2004 to 2016 time period were eliminated. Furthermore, only those firms which announced the annual report in the month of March of the year were considered in the analysis for more uniformity in the data set. The selected lists of firms were categorized into ten portfolios based on their market size (current market price multiplied by number of common shares outstanding) reported in the annual report. That is, one to tenth percentile of stocks based on market capitalization constituted the lowest size wise portfolio and so on the ninety-one to hundredth percentile of stocks constituted the largest size wise portfolio and all these portfolios were updated on annual basis. Risk-free rate adjusted monthly returns of each portfolio was calculated from July of the current year to June of the next year. A three-month delay from reporting month to portfolio return calculation was considered to avoid the possible errors in the price movement around the result announcements. Average risk-free rate adjusted returns of each portfolio were calculated for the entire period as well as for pre and post global crisis period of 2008 to examine the variations in returns across size-based portfolios.

Similarly, market risk (CAPM beta) of each of the portfolio was estimated by regressing their returns on market risk premium (market portfolio returns adjusted for risk free returns). In this analysis, BSE 500 was taken as market portfolio as it covered around stocks from all major 20 industries of the economy and 93 percentage of total market capitalization of the

BSE. It was carried out for pre and post financial crisis of 2008 as well which help to understand the pattern of market risk movement across these portfolios.

In order to examine the behavioral risk movements across the size wise portfolios, an irrational market sentiment index was constructed. It was carried out by extracting relevant information from the market sentiment proxy variables in line with Baker and Wurgler (2007) and Dash and Mahakud (2012). The proxy variables considered were; Equity Trade Volume BSE, Odd Lot Trade Volume, Equity Issues, PE Ratio of Sensex, Advance Decline Ratio BSE, Sensex High Low difference, Clients Net Equity Trading, NRI Net Equity Trading, Proprietary Net Equity Trading, IFIs Net Equity Trading, Banks Net Equity Trading, Insurance Net Equity Trading, DII Net Equity Trading. A detailed discussion on the construction of the index is given in the following section.

The marginal irrational behavioral risk (behavioral beta) was estimated by regressing the risk-free rate adjusted portfolio returns on the irrational market sentiment index. Further, in the examination of behavioral overreaction and under-reaction to information events across the portfolios, the Information Adjusted Noise Model (Ramiah and Davidson, 2007) was considered. In that study, they replicated the MDI ('Mum and Dad' index) in order to estimate the behavioral risk (behavioral beta) and behavioral error was calculated as the difference between CAPM beta and Behavioral beta. But in the present study, since rational sentiment is already eliminated and the index constructed is irrational market sentiment index, instead of calculating behavioral error as the difference between CAPM beta and Behavioral beta, we have taken the slope coefficient of the irrational market sentiment index (IMSI) estimated from the regression of size-wise risk free rate adjusted returns on IMSI as the behavior error in the market and the monthly changes in the behavioral errors were then regressed on the dividend announcement events. Even though they considered different announcements such as activities report, employee share options, progress reports, asset acquisition, dividend rate, change in management, changes in substantial shareholding etc., this study considered only dividend announcements. There are numerous research reports that have observed that dividend announcement significantly influencing the return movements in the market (Michaely *et al.*, 1995; Benartzi *et al.*, 1997; Sharma, 2011). Moreover, since the research intention is to examine the impact of information event on aggregate market behavioral error, it is more objective to cull out the impact of firm-specific announcements as the market is always flooded with various types of events. Therefore, following the method of analysis in the Information Adjusted Pricing Model (IANM) of Ramiah and Davidson (2007), change in BE (behavioral error) of the *i* stock at time *t* is estimated by;

$$\Delta \boldsymbol{BE_{it}} = \boldsymbol{\alpha} + \boldsymbol{\beta} \boldsymbol{IE_{it}} + \boldsymbol{\varepsilon_{it}} ,$$

where: IE_{it} is the information event (dividend announcements), taken as a dummy variable, α is the mean change in behavior error attributable to trading on non-information days and β the proportion of mean change in behavior error attributable to trading on information days. On non-information days behavioral error change is , $\Delta \boldsymbol{BE_{it}} = \boldsymbol{\alpha} + \boldsymbol{\varepsilon_{it}}$, and on information days it is $\Delta \boldsymbol{BE_{it}} = \boldsymbol{\alpha} + \boldsymbol{\beta} \boldsymbol{IE_{it}} + \boldsymbol{\varepsilon_{it}}$. According to EMH, the mean change in BE caused by both information and non-information trading is μ; $\boldsymbol{\mu} = \boldsymbol{\alpha} + \boldsymbol{\beta} = \boldsymbol{0}$ by CIS (contrarian investment strategy of information trading $\alpha = -\beta$) whereas under behavioral market hypothesis $\boldsymbol{\mu} = \boldsymbol{\alpha} + \boldsymbol{\beta} \neq \boldsymbol{0}$. Positive under-reaction to information is represented as, $\alpha + \beta = \mu > 0$ with $\beta < 0$ and $\alpha > 0$, and Negative under-reaction is represented as, $\alpha + \beta = \mu < 0$ where $\alpha < 0$ and $\beta > 0$. Positive Overreaction is represented as, $\alpha + \beta = \mu > 0$, $\alpha < 0$ and $\beta > 0$ and Negative overreaction is represented by $\alpha + \beta = \mu < 0$ with $\beta < 0$ and $\alpha > 0$.

3.1 A Brief Account of Construction of Sentiment Index

The irrational market sentiment index was constructed following the method proposed by Baker and Wurglur (2007) and of Dash and Mahakud (2012) as well. Baker and Wurglur (2007) constructed a composite sentiment index applying principle component analysis on the standardized values of the selected proxies of investor sentiment after adjusting for the impact of economic fundamentals such as Industrial production index, growth in consumer durables, nondurables, and services and NBER recession information. The first principle component was used for Index construction. On the similar lines, Dash and Mahakud (2012) also used data on turnover volatility ratio, share turnover velocity, advance decline ratio, change in margin borrowing, buy-sell imbalance ratio, put-call ratio, number of IPOs, equity issue in total issue, dividend premium, fund flow and cash to total assets in the mutual fund market, and price-to-earnings high-low difference etc. to construct the sentiment index.

The sentiment proxy variables considered in the present study are; Equity Trade Volume BSE, Odd Lot Trade Volume, Equity Issues, PE Ratio of Sensex, Advance Decline Ratio BSE, Sensex High Low difference, Clients Net Equity Trading, NRI Net Equity Trading, Proprietary Net Equity Trading, IFIs Net Equity Trading, Banks Net Equity Trading, Insurance Net Equity Trading, DII Net Equity Trading. Since it is through the trading activities both the information and noise creep into the price discovery process, the study considered net trading position of all the investor categories, (Clients Net Equity Trading, NRI Net Equity Trading, Proprietary Net Equity Trading, IFIs Net Equity Trading, Banks Net Equity Trading, Insurance Net Equity Trading, DII Net Equity Trading), trading in the Indian equity market as a relevant sentiment proxy variable. It is also observed in the literature that both retail as well as institutional investors brings in noise into the prices in order to create trading space especially in the markets of emerging economies wherein investor categories have wide disparity in the level of sophistication in processing information. Odd-lot trade volume is considered in this analysis as a sentiment proxy variable since it specifically carries the trading behavior of marginal retail investors who are more prone to trade in odd-lots and are generally expected to bring in noise into the price. Equity trade volume is considered as a sentiment proxy variable as it is a measure of market liquidity and an indicator of investor sentiment. Baker and Stein (2004) in their model presented the possibility of overconfident investors trading exceeding their information when their beliefs and return movements are in same line, influencing the stock prices in the market. Ultimately, when over confident investors dominate the market, especially in the presence of arbitrage constraints, the investor sentiment become very high and market would experience high liquidity and high trade volume. Both existing as well as new firms enter the market with public issue to take advantage of the price discovered in the market or when investor sentiment is high in the market determined prices. Therefore, it is considered as a proxy variable in the study. Stocks are expected to be overpriced when market is optimistic and underpriced when market is pessimistic. Therefore, price earnings ratio of Sensex can reflect information about level of market sentiment prevailing in the market and can be considered as a sentiment proxy variable. The level of advance-decline ratio is a measure of market breadth. It reflects the ratio of number of upward moving stocks to that of downward moving stocks regardless of trade volume in the market, therefore, it is also expected to carry specific information on market sentiment that are not in other variables.

Since all these variables also possessed the information related to investors' expectation with respect to economic fundamental movements or rational sentiments prevailing in the market, the influence of these economic fundamentals needs to be removed to derive an irrational sentiment index for the market. Therefore, Index of Industrial Production, Money Supply,

Exchange Rate High Low Difference, International Trade Balance, Gold Price Spread, Gross Fiscal Deficit, Secondary Market Transaction in Government Securities, Call Money Rate and Inflation Rate were taken to represent the economic fundamentals in the analysis. Data considered about all these variables are of monthly frequency from 2004 to 2016. All these variables were z- standardized before further analysis for proper comparability.

Table 1 presents the Pearson correlation coefficients of the both sentiment proxy variables as well as variables which represented economic fundamentals. It observed from the correlation coefficients of these variables that the degree of relationship among them is relatively very small and there no commonality in their direction of relationship as well. This can be construed as that each of them possesses relatively unique information about the market sentiment as well as economic scenario. It is also worth noting that, overall, the correlation between sentiment proxy variables and economic fundamentals are also relatively small in magnitude which justifies that selection of the former variables in the construction of irrational sentiment index for the market.

In order to extract the common variation in the sentiment proxy variables principle component analysis technique was applied. But before the analysis each of the sentiment proxy variables were regressed separately on the economic fundamental variables to eliminate the effect of rational sentiment factors upon these variables. These residuals drawn for each of the sentiment proxy variables were used in the extraction of principle components through this method. The economic fundamental variables were also taken in the analysis to get an understanding of the how the components loading are distributed on these variables even though their effects on sentiment proxies were removed through linear regression fitted.

The table 2 presents the Eigen-values and the proportion of variation explained by each of the components which are derived through the principle component analysis.

Table 2

Principle Component Analysis Results: Eigen Values and Proportion of Variation Explained from the Variables

Eigen Values					
	Value	Difference	Proportion	Cum. Value	Cum. Proportion
Comp. 1	3.995	0.897	0.181	3.995	0.181
Comp. 2	3.097	1.388	0.140	7.093	0.322
Comp. 3	1.709	0.111	0.077	8.802	0.400
Comp. 4	1.597	0.331	0.072	10.400	0.472
Comp. 5	1.266	0.078	0.057	11.666	0.530
Comp. 6	1.187	0.160	0.054	12.853	0.584
Comp. 7	1.026	0.061	0.046	13.880	0.630

Note: Standardize economic fundamental variables and the regression residuals of standardized values of all the following sentiment variables were used in the analysis; Equity Issues, PE Ratio of Sensex, Advance Decline Ratio BSE, Sensex High Low difference, Clients Net Equity Trading, NRI Net Equity Trading, Proprietary Net Equity Trading, IFIs Net Equity Trading, Banks Net Equity Trading, Insurance Net Equity Trading, DII Net Equity Trading, Odd Lot Trade Volume, Equity Trade Volume BSE. The economic fundamental variables are Money Supply, Index of Industrial Production, Exchange Rate High Low Difference, International Trade Balance, Gold Price Spread, Gross Fiscal Deficit, Secondary Market Trans. in Govt. Securities, Call Money Rate, Inflation Rate. All these variables were of monthly frequency spanning from 2004 to 2016.
Source: Author Calculations. Data Source: BSE and NSE Data base, RBI data base and CMIE Prowess and Capital Line Plus.

Table 1

Pearsonian Correlation Between Variables# Considered in Irrational Market Sentiment Index

	Eq.Is.	PE.Sx.	Adv, D	Sx. HL	Cln.	NRI.	Pro.	IFIs.	Banks.	Ins.	DII.	Odd.	Eq.tr.	M3	IIP	Ex.HL.	Int.tr.	Gd. Pr.	GFD.	Govt. Sec	Cmr.	IR.
Eq.Is.	1.000																					
PE.Sx.	0.356	1.000																				
Adv, D	-0.034	0.055	1.000																			
Sx. HL	0.106	0.147	-0.236	1.000																		
Cln.	0.088	-0.048	-0.280	0.162	1.000																	
NRI.	-0.046	-0.126	-0.099	-0.091	-0.03	1.000																
Pro.	-0.140	-0.040	0.474	-0.242	-0.44	0.073	1.000															
IFIs.	0.215	0.071	-0.309	0.368	0.396	0.083	-0.45	1.000														
Banks.	-0.034	-0.061	-0.110	-0.012	0.186	0.027	-0.10	0.132	1.000													
Ins.	0.203	0.111	-0.225	0.280	0.035	0.051	-0.28	0.459	0.064	1.000												
DII.	0.167	0.143	-0.222	0.352	0.385	-0.12	-0.47	0.493	0.188	0.489	1.000											
Odd.	0.098	0.024	0.055	0.050	-0.03	0.039	0.108	-0.079	-0.070	-0.01	-0.08	1.000										
Eq.tr.	0.157	0.500	0.164	0.316	-0.22	-0.04	0.188	0.021	-0.045	0.192	0.102	0.049	1.000									
M3	-0.088	0.094	0.098	0.163	-0.01	-0.22	-0.01	-0.196	-0.102	-0.22	-0.02	-0.02	-0.00	1.000								
IIP	0.030	0.238	-0.100	0.362	-0.01	-0.04	0.067	0.070	-0.104	0.042	-0.04	0.036	0.256	0.658	1.000							
Ex.HL.	-0.148	-0.203	-0.020	0.183	0.047	0.059	0.057	0.047	0.065	-0.09	-0.15	0.075	-0.07	0.147	0.199	1.000						
Int.tr.	0.115	0.005	0.012	-0.135	-0.09	0.091	-0.10	0.157	-0.102	0.147	0.119	-0.02	0.010	-0.713	-0.63	-0.251	1.000					
Gd. Pr.	-0.126	-0.034	0.177	0.030	-0.16	-0.22	-0.01	-0.205	-0.063	-0.31	-0.14	-0.06	-0.16	0.810	0.422	0.084	-0.508	1.000				
GFD.	-0.128	-0.118	0.051	-0.020	0.091	0.077	-0.04	0.036	0.289	-0.12	0.035	-0.24	-0.08	0.300	0.248	0.088	-0.309	0.218	1.000			
Govt. Sec.	-0.038	0.096	0.125	0.120	0.036	-0.31	-0.02	-0.167	-0.072	-0.29	0.000	-0.04	-0.00	0.891	0.498	0.111	-0.575	0.731	0.234	1.000		
Cmr.	-0.164	-0.056	-0.157	0.241	0.132	0.038	-0.05	-0.050	-0.005	-0.14	-0.13	0.006	-0.28	0.369	0.412	0.202	-0.463	0.390	0.079	0.197	1.000	
IR.	0.006	0.011	-0.236	0.072	0.098	0.129	0.098	0.177	0.116	0.043	-0.22	0.140	-0.02	-0.221	0.235	0.147	-0.169	-0.268	0.023	-0.296	0.267	1.000

Note: Sentiment proxy variables are Eq.Is.= Equity Issues, PE. Sx. =PE Ratio of Sensex, Adv. Dec. = Advance Decline Ratio BSE, Sx. HL dif. = Sensex High Low difference, Cln. = Clients Net Equity Trading, NRI. = NRI Net Equity Trading, Pro. = Proprietary Net Equity Trading, IFI. = IFIs Net Equity Trading, Banks. =Banks Net Equity Trading, Ins. = Insurance Net Equity Trading, DII. = DII Net Equity Trading, Odd. = Odd Lot Trade Volume, Eq.tr. = Equity Trade Volume BSE. Economic fundamental variables are M3 = Money Supply, IIP. = Index of Industrial Production, Ex.HL. = Exchange Rate High Low Difference, Int. tr.= International Trade Balance, Gd. Pr. = Gold Price Spread, GFD. = Gross Fiscal Deficit, Govt Sec. = Secondary Market Trans. in Govt. Securities, Cmr.= Call Money Rate, IR. = Inflation Rate. All these variables were of monthly frequency spanning from 2004 to 2016. Source: Author Calculations. Data Source: BSE and NSE Data base, RBI data base and CMIE Prowess and Capital Line Plus.

The components were calculated on the basis of ordinary correlations, that is, Pearsonian linear correlations. It is also observed that the component one and two are the ones which represent major common variation in the variables. Both these components together explained 32 percentage of total variation in the variables while those by other components are relatively small. The other five components whose eigen values are below two together explains only 31 percentage of the total variation. Altogether, all these seven components together explained 63 percentage of the total variation in the system.

We noticed in Table 2 the eigen-values of each of the principle components and the proportion of total variation explained by each of them. We further moved on to the examination of each of these components loadings on the variable considered in the analysis and the results are presented in Table 3.

Table 3

Component Loadings from the Variables#

Variable	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5	Comp. 6	Comp. 7
Equity Issues	0.011	0.150	0.211	0.150	0.249	0.409	-0.034
PE Ratio of Sensex	0.034	0.000	0.519	0.2347	-0.028	0.411	-0.161
Advance Decline Ratio BSE	0.003	-0.332	0.154	0.1288	0.250	-0.014	-0.008
Sensex High Low difference	0.001	0.276	0.203	0.1417	0.199	-0.484	-0.037
Clients Net Equity Trading	0.007	0.377	-0.092	-0.0559	-0.027	0.180	-0.015
NRI Net Equity Trading	0.000	-0.045	-0.170	-0.095	0.154	0.320	0.489
Proprietary Net Equity Trading	-0.006	-0.458	0.024	0.0252	0.047	-0.075	0.121
IFIs Net Equity Trading	0.007	0.439	-0.025	-0.0037	0.123	0.026	-0.032
Banks Net Equity Trading	0.001	0.180	0.164	0.0823	-0.173	-0.092	0.654
Insurance Net Equity Trading	0.007	0.029	-0.222	-0.0435	0.624	0.026	-0.220
DII Net Equity Trading	0.003	0.439	0.095	0.0585	0.082	-0.10	0.076
Odd Lot Trade Volume	0.001	-0.061	-0.019	0.0246	0.496	0.134	0.405
Equity Trade Volume BSE	-0.003	-0.108	0.475	0.2877	0.162	-0.332	0.078
Call Money Rate	0.259	-0.002	-0.19	0.3212	-0.130	-0.008	0.094
Exchange Rate High Low Difference	0.127	-0.000	-0.291	0.2212	0.056	-0.260	0.136
Gold Price Spread	0.407	-0.006	0.073	-0.2274	-0.009	-0.059	0.058
Secondary Market Trans. in Govt. Securities	0.421	-0.006	0.144	-0.2474	0.018	0.004	-0.000
Gross Fiscal Deficit	0.193	-0.001	-0.142	-0.0082	0.247	-0.158	-0.149
Index of Industrial Production	0.375	-0.002	-0.012	0.2666	-0.061	0.174	-0.079
Inflation Rate	-0.038	0.003	-0.285	0.6249	-0.073	0.103	-0.057
Money Supply	0.475	-0.006	0.090	-0.1436	-0.000	0.014	-0.001
International Trade Balance	-0.407	0.004	0.107	-0.173	0.032	0.004	0.001

Note: Standardize economic fundamental variables and the regression residuals of standardized values of all the following sentiment variables were used in the analysis; Equity Issues, PE Ratio of Sensex, Advance Decline Ratio BSE, Sensex High Low difference, Clients Net Equity Trading, NRI Net Equity Trading, Proprietary Net Equity Trading, IFIs Net Equity Trading, Banks Net Equity Trading, Insurance Net Equity Trading, DII Net Equity Trading, Odd Lot Trade Volume, Equity Trade Volume BSE. The economic fundamental variables are Money Supply, Index of Industrial Production, Exchange Rate High Low Difference, International Trade Balance, Gold Price Spread, Gross Fiscal Deficit, Secondary Market Trans. in Govt. Securities, Call Money Rate, Inflation Rate. All these variables were of monthly frequency spanning from 2004 to 2016.

Source: Author Calculations. Data Source: BSE and NSE Data base, RBI data base and CMIE Prowess and Capital Line Plus.

It is observed that the principle component one and two are distinct from that of other components. Unlike the first two components, principle components 3, 4, 5, and 6 have relatively higher loading from both residual of sentiment proxy variables as well as economic fundamental variables. But the principle component one has relatively heavy loadings on the economic fundamental variables whereas that of from residual of sentiment proxy variables is negligible indicating that the first component is the representation of variation caused by fundamental economic phenomenon. In case of principle component two the case is reverse, that is, it has heavy loadings from residual of sentiment proxy variables while that from economic fundamental variables are negligibly small which indicate that it represents the portion of market sentiment unrelated to rational sentiments motivated by economic fundamental factors. Therefore, this component is regarded as the representation of irrational behavior of investors in the market. The principle component 7 also evinced similar type of loadings but we discard it as loading from economic policy related variables are comparatively higher than that in principle component two. It is also found in table 2 that the proportion of total variation explained by the component 7 is only 4.6 percentage while that by principle component two is 14.08 percentage.On the basis of the above-mentioned observations, the loading of the principle component two on the residual sentiment proxy variables are taken as the weights in the construction of irrational sentiment index in this study. Hence, the linear equation for the calculation of Irrational Market Sentiment Index (henceforth - IMSI) is;

$$IMSI = Eq.Is.* 0.150 + PE.Sx.* 0.002 - Adv,D * 0.332 + Sx.HL * 0.276 + Cln. * 0.377 - NRI * 0.045 - Pro.* 0.458 + IFIs.* 0.439 + Banks. * 0.180 + Ins.* 0.029 + DII.* 0.439 - Odd.* 0.061 - Eq.tr.* 0.108$$

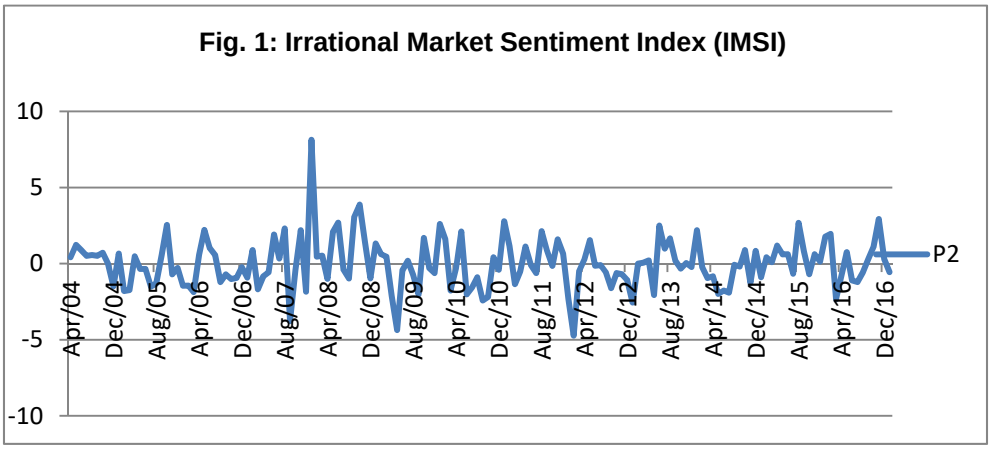
From the equation, it is observed that the magnitude of loadings and direction of proxy sentiment variables are different from one another. Equity issues variable shows positive loadings on the IMSI. Equity issues variable considered here is the monthly values of the new equity issues of companies in the market. Firms often time the floatation of equity issues, both initial public offering and seasoned equity offering, to take advantage of the asymmetry in the information possessed by the firm insiders and less informed outside investors whose valuations are affected by behavioral bias prevailing in the market apart from the other factors affecting the decision to go public. Therefore, IMSI captures this portion of the information on behavioral bias from the positive loading of the variable. Price earnings ratio of Sensex is average value of Sensex index to the weighted average of earnings per share of Sensex constituent companies. It indicates whether market is over-valued or undervalued or rightly valued. Though the loading of price earnings ratio of Sensex in IMSI relatively very low, it is positive. Advance decline ratio is the widely used measure used in technical analysis and it indicates the nature of overall movement of the market unlike the market indices. IMSI is loaded negatively with ratio of number of advancing stocks to declining stocks. Similarly, Sensex high low difference also loads positively to IMSI. In case of net trade position of investor categories, the client trading and institutional investor groups in the market load positively to the index while net trading of non-resident Indian investors and that of proprietary trading load negatively to the index. Odd lot trade volume and overall trade volume in BSE load negatively to the index.

Figure 1 depicts the movement of the index from 2004 to 2016. The index is found to be fluctuating between positive and negative domains, which in other words can be stated as the irrational optimism and irrational pessimism prevailing in the market. The fluctuation and the magnitude of the irrationality portrayed in the index is found to be lower and mostly

pessimistic in the pre-2007 time period while that in the period between 2007 to 2010 noted to be more frequent and higher in both directions. Pre 2007 was the period of large entry of retail investors into the market and a recovery period from the scams such as Ketan Parekh Scam, IPO scam etc., while 2007 to 2010 time period experienced the brunt of global financial crisis.

From 2011 to 2014 market is found to be predominantly in the pessimistic domains except certain irregular spikes to positive domains. This period witnessed large level exit of retail investors and the market was dominated by institutional investors and market makers. This trend was observed to be shifting to positive domains from mid-2014 to early 2016 time periods mostly with the entry of new government at the union and global economic recovery. The period also observed initiatives on systematic stability building efforts by market regulators as well.

Fig. 1: Irrational Market Sentiment Index (IMSI)



Source: Author Calculations. Data Source: BSE and NSE Data base, RBI data base and CMIE Prowess and Capital Line Plus.

Table 4 presents the Pearson correlation coefficient between the IMSI and both standardized sentiment proxy variables and standardized economic fundamental variables. From the table 15, we observe that all the sentiment proxy variables except PE ratio of Sensex and NRI net equity trading are highly correlated with IMSI while that with economic fundamental variables is insignificantly low. It is obvious for this result to be so as the effect economic fundamentals were eliminated in the construction of IMSI. But at the same time, it also corroborates that the IMSI captures market sentiment to a plausible manner.

Table 4

Pearson Correlation Coefficients of Irrational Sentiment Index and Variables of Market Sentiment and Economic Fundamentals

Market Sentiment Related Variables	Irrational Sentiment Index
Equity Issues	0.252
PE Ratio of Sensex	0.005
Advance Decline Ratio BSE	-0.550
Sensex High Low difference	0.403
Clients Net Equity Trading	0.604
NRI Net Equity Trading	-0.084

Market Sentiment Related Variables	Irrational Sentiment Index
Proprietary Net Equity Trading	-0.792
IFIs Net Equity Trading	0.702
Banks Net Equity Trading	0.281
Insurance Net Equity Trading	0.391
DII Net Equity Trading	0.674
Odd Lot Trade Volume	-0.104
Equity Trade Volume BSE	-0.154
Economic Fundamentals	**Irrational Sentiment Index**
Call Money Rate	-0.003
Exchange Rate High Low Difference	0.001
Gold Price Spread	-0.000
Secondary Market Trans. in Govt. Securities	-0.000
Gross Fiscal Deficit	0.002
Index of Industrial Production	-0.000
Inflation Rate	0.000
Money Supply	0.000
International Trade Balance	0.000

Source: Author Calculations. Data Source: BSE and NSE Data base, RBI data base and CMIE Prowess and Capital Line Plus.

4. Results and Discussion

4.1 Size Effect in the Indian Equity Market

It is found in Table 5 that the excess return of portfolios grouped in terms of market capitalization shows a negative trend with respect to their size. The Smallest market cap portfolio showed on average (2004-2016) 2.76 percent monthly return over the risk-free rate while the largest portfolio showed only 0.17 percent excess above risk free rate. Even though returns fall from small cap portfolios to largest cap portfolios we observe that the decline is not in same proportion across portfolios which indicate the possible nonlinear effect of size in the Indian equity market. It is also observed that the percentage of variation is higher in medium and the largest cap returns compared to that of smaller cap portfolios.

Table 5

Average Risk-Free Rate Adjusted Returns Across Size Wise Portfolios in Indian Equity Market (2004-2016)

Portfolios	Smallest	2	3	4	Medium	6	7	8	9	Largest
Average	2.76	1.87	1.20	1.13	0.49	0.88	0.83	1.06	0.28	0.17
Stand. Dev.	8.95	8.35	8.21	7.94	7.95	7.34	7.29	6.88	6.86	6.36
Coeffi. Var.	324	445	684	701	1615	829	870	647	2400	3564

Source: Author Calculations. Data Source: BSE and NSE Data base, RBI data base and CMIE Prowess and Capital Line Plus.

Table 6 presents the variations in return across smallest cap to largest cap portfolios both for the entire period of analysis and between pre and post crisis period of 2008. The results show a statistically significant variation in excess returns across the portfolios both in the entire period analysis. But in case of pre 2008 period the difference is not very significant, but the nature and direction of decline is in line with arguments in the literature. In all the cases, smallest cap portfolio return is taken as the bench mark category, therefore, the

marginal variation of other categories is read in comparison to that of the smallest category. As we observed in table 6, the standard errors of the coefficients are also higher at medium and largest cap portfolios.

Table 6

Risk-Free Rate Adjusted Return Variations Across Size-Wise Portfolios in Indian Equity Market: Dummy Variable Regression

Portfolios	Coefficients	Standard Error	t Stat	P-value	F	Significance F
Period from 2004 to 2016						
Smallest*	2.762	0.641	4.306	0.000	4.831	0.008
Medium	-2.270	0.907	-2.502	0.012		
Largest	-2.584	0.907	-2.848	0.004		
Period from 2004 to 2007 (Pre-Crisis-2008)						
Smallest*	5.026	1.074	4.679	0.000	2.201	0.115
Medium	-2.526	1.519	-1.663	0.098		
Largest	-2.959	1.528	-1.936	0.055		
Period from 2008 to 2016 (Post Crisis-2008)						
Smallest*	1.931	0.780	2.475	0.013	3.180	0.042
Medium	-2.263	1.098	-2.061	0.040		
Largest	-2.524	1.100	-2.293	0.022		

*Note: *Smallest portfolio (portfolio 1) is taken as the bench mark category, Medium portfolio is portfolio 5 and Largest portfolio is portfolio 10.*

Source: Author Calculations. Data Source: BSE and NSE Data base, RBI data base and CMIE Prowess and Capital Line Plus.

4.2 Size Effect and CAPM Beta Movements in the Indian Equity Market

Having observed significant negative relationship of excess return and market size, we further examined the nature of market risk inherent across these portfolios. Table 7 presents the pattern of sensitivity of the size wise portfolio returns to that of the market risk premium. The values given in Table 7 are the of slope coefficients of the respective portfolio returns (un-weighted average of the constituents of each portfolios) to that of the BSE 500 index return adjusted for risk-free rate of return (market risk premium). We find that the market sensitivity shows increasing patterns from small cap to large cap returns but its variability, measured in terms of coefficient of variation, is not uniform across portfolios.

Table 7

Average CAPM Risk (Beta) Across Size Wise Portfolios in Indian Equity Market (2005-2016)

Portfolios	Smallest	2	3	4	Medium	6	7	8	9	Largest
Average	0.057	0.067	0.069	0.067	0.075	0.066	0.079	0.066	0.080	0.082
Stand. Dev.	0.028	0.030	0.035	0.033	0.028	0.026	0.033	0.032	0.028	0.020
Coeffi. Var.	49.626	44.137	50.549	48.927	37.798	39.770	41.121	47.775	34.941	24.350

Source: Author Calculations. Data Source: BSE and NSE Data base, RBI data base and CMIE Prowess and Capital Line Plus.

Table 8 shows the statistical significance of the market sensitivity variations across the portfolios. In case of all time periods, the variability was found to be statistically significant and the direction of the variation was found to be positive. Both the medium cap and largest cap portfolio returns showed higher marginal increase in the market risk compared to that of

small cap portfolio which was taken as benchmark category. This observation confirms that the size effect that is observed in the Indian equity market is not a compensation for bearing higher market risk that is captured by beta coefficient of market portfolio and contradict with arguments in line with the CAPM. Another point to note is that the increase in market risk captured by beta values increase with market size though their variability moves in a zigzag pattern across lower cap to largest cap portfolios.

Table 8

Variations in CAPM Risk Across Size Wise Portfolios in Indian Equity Market: Dummy Variable Regression

Portfolios	Coefficients	Standard Error	*t Stat*	*P-value*	*F*	*Significance F*
Period from 2004 to 2016						
Lowest*	0.056	0.002	25.906	0.000	34.826	0.000
Medium	0.017	0.003	5.780	0.000		
Largest	0.025	0.003	8.103	0.000		
Period from 2004 to 2007 (Pre-Crisis-2008)						
Lowest*	0.055	0.003	15.851	0.000	27.093	0.000
Medium	0.002	0.004	0.572	0.568		
Largest	0.032	0.004	6.642	0.000		
Period from 2008 to 2016 (Post Crisis-2008)						
Lowest*	0.057	0.002	22.200	0.000	25.642	0.000
Medium	0.022	0.003	6.116	0.000		
Largest	0.022	0.003	6.284	0.000		

Source: Author Calculations. Data Source: BSE and NSE Data base, RBI data base and CMIE Prowess and Capital Line Plus.

4.3 Sensitivity of Size-based Portfolios to Irrational Sentiment in the Market

The sensitivity of size-based portfolio to irrational sentiment prevailing in the market was examined by regressing the standardized excess returns of each size-wise portfolio on the irrational sentiment in the market. Table 9 gives the values of average sensitivity of a unit standard deviation change in the irrational sentiment index upon that of the excess returns of each of the portfolios. We find that there is a negative trade-off between these variables. It indicates that one-unit change in the variability of irrational market sentiment has higher negative impact on the variability of excess returns of the larger cap portfolios compared to that of small cap portfolio excess returns. **It means that irrational sentiment in the market and market size-based returns are inversely related.** Even though both extreme portfolios show higher differences, it is not uniformly increasing across all the portfolios.

Table 9

Average Behavioral Risk Across Size-Wise Portfolios in Indian Equity Market (2005-2016)

Portfolios	Smallest	2	3	4	Medium	6	7	8	9	Largest
Average	-0.258	-0.305	-0.291	-0.298	-0.340	-0.312	-0.351	-0.299	-0.350	-0.35
Stand. Dev.	0.151	0.163	0.190	0.179	0.177	0.173	0.189	0.195	0.164	0.174
Coeffi. Var.	-58.497	-53.43	-65.20	-60.15	-51.978	-55.52	-53.81	-65.30	-46.94	-49.6

Source: Author Calculations. Data Source: BSE and NSE Data base, RBI data base and CMIE Prowess and Capital Line Plus.

Table 10 shows that these differences are statistically significant across all periods of analysis except in the case of pre-crisis period. The coefficients indicate that the behavioral

risk in the market is negatively affecting the deviations in the excess returns and this variability increases as the market size increases. The impact of behavioral risk is in the same direction to that of the size wise excess return movements that is presented in Table 6.

Table 10

Variations in Behavioral Risk Across Size Wise Portfolios in Indian Equity Market: Dummy Variable Regression

Portfolios	Coefficients	Standard Error	t Stat	P-value	F	Significance F
Period from 2004 to 2016						
Lowest*	-0.258	0.014	-18.095	0.000	12.471	0.000
Medium	-0.081	0.020	-4.039	0.000		
Largest	-0.092	0.020	-4.562	0.000		
Period from 2004 to 2007 (Pre-Crisis-2008)						
Lowest*	-0.217	0.026	-8.221	0.000	0.000	0.000
Medium	-0.014	0.037	-0.395	0.693		
Largest	-0.039	0.037	-1.046	0.298		
Period from 2008 to 2016 (Post Crisis-2008)						
Lowest*	-0.127	0.063	-2.017	0.044	5.037	0.007
Medium	-0.243	0.089	-2.707	0.007		
Largest	-0.250	0.089	-2.780	0.005		

*Note: *Smallest portfolio (portfolio 1) is taken as the bench mark category, Medium portfolio is portfolio 5 and Largest portfolio is portfolio 10.*
Source: Author Calculations. Data Source: BSE and NSE Data base, RBI data base and CMIE Prowess and Capital Line Plus.

In order to get clarity on this relationship it is better to read the observation of the study in the light of certain arguments in the literature (Aumann, 1976; Grossman and Stiglitz, 1980; Glosten and Milgrom, 1985; Black, 1986; De long *et al*., 1990). Trading happen only when the market is inefficiency and affected by factors such as; information asymmetry and psychological biases factors etc. Similarly, naive trading brings in more liquidity and thereby correction in the market. Therefore, the linkage of size effect to investor behavioral bias can be understood in the sense that when the irrational optimistic sentiment in the market is high, larger cap stocks would attract more trading and liquidity which, in turn, would result in lower excess returns compared to that of small and medium cap stocks. But, in the negative domain of irrational market sentiment or when the market is irrationally pessimistic, the larger cap stocks are expected to evince higher excess returns compared to small and medium cap stocks. The slower correction in the market due to low liquidity due to overall pessimism in the market and non-linearity observed in the relationship between behavioral risk and size-wise portfolio excess returns needs to be kept in mind while considering this interpretation.

4.4 Behavioral Error Response to Information across Size-wise Portfolios

In this section we examined the under-reaction and over-reaction to dividend announcement events in terms of its effect upon the behavioral error across the size wise portfolios in the market. Table 11 presents the result of this analysis in line with the approach of Ramiah and Davidson, (2007). As mentioned in the data and methodology section, the α values shows the impact of trading on behavioral error in the market on non-information days and β values shows the contribution of trading on information events, that is dividend announcement events in this study, to the behavioral error in the market. The overall effect of trading

activities on behavioral error change is measured by μ which is the sum of α and β. Therefore, on non-information days trading, it is the α value that shows the percentage of change in behavioral error while β shows specifically the percentage change in behavioral error due to informed trading. The value and signs of α, β and μ determines the nature of overreaction and under reaction of the market to information events. We observe in Table 11 that α values take negative values across all the size wise portfolios with the smallest size portfolio taking higher values and largest portfolio taking lower values which are statistically significant. It indicates that on non-information days trading leads to larger correction of behavioral error in small cap portfolio returns compared to that of medium and higher cap portfolios returns. Table 11 shows that around a 28-percentage fall in behavioral error during non-information day trading in the smallest size portfolio returns while the reduction is only 10 percentage in case of the largest size portfolio. In general, the results show an overall correction of behavioral error in the trading on non-information days.

Similarly, we find that the β values take positive values across all the portfolios indicating that on information events trading leads to increase in the behavioral risk in the Indian market. Here, we find that trading leads to higher percentage increase in the behavioral risk of small cap portfolios compared to that of medium and larger cap portfolio returns. From Table 11we find that around 30 percentage increase in behavioral error occurs in small cap portfolio returns during trading on information events while it is around 5 percentage in case of the largest portfolio. Further, to understand the nature of overall response of each of the portfolio to information events we calculated the μ values only for portfolios which have statistically significant α and β values. It is observed that the lower strata of the size-based portfolios are prone to be affected by the positive over reaction to information events while in larger cap portfolios negative under reaction to information is prevalent. This information indicates that there is an asymmetry in the reaction of size-wise portfolios to arrival of information in the market resulting in different level of behavioral errors in their returns and

Table 11

Under-Reaction and Over-Reaction to Dividend Announcements across Size-Wise Portfolios

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
α	-28.12	-11.338	-27.152	-29.949	-8.4120	-9.400	-5.366	-47.693	-11.267	-7.987
P. Val	0.000	0.065	0.021	0.036	0.396	0.160	0.368	0.004	0.855	0.066
β	30.295	5.817	14.042	37.312	19.803	0.792	1.987	42.785	-56.104	5.215
P. Val	0.019	0.534	0.411	0.082	0.178	0.936	0.817	0.049	0.493	0.377
μ	2.175			7.363				-4.908		

Source: Author Calculations. Data Source: BSE and NSE Data base, RBI data base and CMIE Prowess and Capital Line Plus.

5. Conclusions

This analysis has confirmed the presence of size effect in the Indian equity market and the relationship between excess returns variations across size wise portfolios is found to be non-linear in nature. The observation of higher market risk (CAPM beta) at larger cap stocks compared to that of smaller cap stocks indicate that inability of CAPM beta to capture the size effect in the market and also indicate the inefficiency prevailing in the pricing of stocks in the Indian equity market.

The central observation of the study is the relationship between the irrational sentiment and size effect. The study observed that the irrational sentiment variations in the market and

size-wise portfolio excess returns variations are inversely related indicating that one-unit change in the variability of irrational market sentiment has higher negative impact on the variability of excess returns of the larger cap portfolios compared to that of small cap portfolio excess returns. It means that in times of high positive or optimistic irrational sentiment in the market the large cap portfolio excess return tends to be lower than medium and small cap portfolio excess returns. On the contrary, when market is pessimistic or when negative irrational sentiment rules the market the large cap portfolio excess return tend to be higher than medium and small cap portfolio excess returns. But, in both directions the sensitivity is not linear.

The contradicting movement of CAPM beta across portfolios, rule out the possibility of tagging size effect to reflection of market risk in terms of beta coefficients and it corroborates the attempts in the literature to include the size factor as a separate explanatory variable in stock pricing. But the observations in the irrational sentiment based behavioral beta movements challenge the attempt to explain the size effect in the rational expectation-based frame of analysis

The study demands further investigations on the size effect in different regimes of irrational market sentiment.

The study observed that on non-information trading days the pressure of behavioral error reduction in the market is prevalent with its magnitude decreasing with market size. But, the trading on information increases behavioral error in small size portfolios at a higher rate compared to that in larger size portfolios. It also corroborates to the above observation of size effect and behavioral bias linkages and inability to differentiate whether trading is on noise or information especially in case small size stocks as pointed out by Black, 1986 and De Long et al., 1990 in the literature. The higher behavioral error correction or reduction in small cap portfolios during non-information days and higher addition to behavioral error during information days in small cap itself is an indication of such stocks being mispriced always in the market compared to larger cap portfolios due to irrationality in the market. Further analysis also directed to that the higher possibility of positive over reaction to information events in small size portfolios and negative under reaction to information events in large size portfolios which is an indication of inefficiency of contrarian trading strategies in correcting the market and potential for profit making opportunity in the Indian equity market. Therefore, It is an affirmation to size effect's prevalence in the market as well as the impact of behavioral factors in contributing to it.

Size effect observed calls for, broadly, further examinations of nature of the constituent stocks in each of the portfolios and extent of characteristics of investors or traders dealing with such stocks which lead to underpricing and over pricing of the stocks resulting in return variations across portfolios. It also calls for further investigation on impact of selected portfolio based concentrated trading of specific investor categories and extent of variations in the arbitrage possibilities and impact of hedging efforts of the investors across these portfolios before taking in to account the observations of the study.

It is also noteworthy that proper construction of size wise portfolios and setting trading strategies considering the movement of market sentiment in the market would pay for the short-term traders as well as investors in Indian equity market. This study was based on the irrational sentiment index constructed on monthly frequency which can be extended to construction of the index of higher frequency as advancement in technology enables in present scenario which would yield more sophistication in constructing portfolios and framing trading strategies for short traders dealing futures and derivative markets apart from cash

segment. The relevance of irrational market sentiment in pricing of other financial instruments is also a space to be investigated.

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