
Does behavioural risk explain the value premium? A study of Indian equity market

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Abstract: This paper, in light of irrational behavioural sentiments, examined value premium anomaly across price to earnings ratio-based portfolios over a period from 2004 to 2016 in the Indian equity market. The study observed excess premium in value stocks with high statistical significance along with higher market portfolio risk in the growth stock portfolios. It refuted the argument of value premium as a compensation for recession related fundamental risk. Sensitivity to behavioural risk found to be negative across both portfolios with lesser impact on the value stocks' excess returns. It observed positive overreaction of trading in the growth stock portfolios and negative overreaction of trading in the value stocks portfolios and also found mispricing both in information day and non information day trading. Erroneous contrarian trading strategies and extent of noise in the prices of stocks of each portfolio cause differences in their behavioural risk exposure, thereby, results in value effect.

Keywords: asset pricing; value premium; market risk; behavioural risk; behavioural error; overreaction; under-reaction; information day trading.

JEL codes: G11, G12, G40.

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1 Introduction

Founded upon the frame of expected utility theory (Von Neumann and Morgenstern, 1945) and on the assumptions of rational expectation and information efficient markets, Samuelson (1965), Fama (1965, 1970) and Fama and French (1991) postulated that the stock price formation process would absorb all the information available in the stock market immediately and, therefore, it would have randomness in movements, making prediction of the prices on any available information impossible. Hence, they stated that the individual stock prices varied with respect to its sensitivity to market portfolio risk or systematic risk alone. Opposing to these postulates, Marshal (1974), Aumann (1976), Milgrom and Stokey (1982) and Glosten and Milgrom (1985) argued about the theoretical impossibility of trade in such information-efficient-markets with the rational investors and also about the possibility of differences in expectations and investment decisions, even with equal priors, due to psychological factors, and, thereby, it results in mispricing of stocks in the markets. Corroborating to the latter propositions, Shiller et al. (1984), Black (1986), Poterba and Summers (1988), Trueman (1988), Lehman (1990), De Long et al. (1990) De Bondt and Thaler, (1995), Jegadeesh and Titman (1995), Salomonsson (2006), Ramiah and Davidson (2007), Bender et al. (2013), etc. In empirically verifying the arguments of randomness of price formation and movement of stock prices with market portfolio risk, observed predictable patterns in the price movements and variations in the prices with respect to a number of market characteristics other than market risk or systematic risk. They attributed these empirical observations to inefficiency of market mechanisms and to the investors' overreactions and underreactions to the information due to the effect of psychological factors. These findings, contradicting to the arguments based on efficient market hypothesis and related asset pricing models, were considered as anomalies in the financial market literature.

Value premium is one of such anomalies. It is the difference in the return premium earned by value stocks compared to growth stocks and has been observed across various markets and in different time periods. That is, the stocks with low ratio of equity share price to firm fundamentals, such as book value per share, earnings per share, cash flow per share, etc. earn higher expected returns compared to those stocks with higher ratio of price to firm fundamentals (Basu, 1977, 1983; Fama and French, 1992, 1998, 2012; Barber and Lyon, 1997; Aksu and Onder, 2003; Petkova and Zhang, 2005; Athanassakos, 2009; Aziz and Ansari, 2014, etc.). The former group of stocks is termed as value stocks and the latter as growth stocks or glamour stocks in the market parlance. In general, growth stocks are expected to be riskier than value stocks as their cash flows depend highly on future economic conditions and performance of their investment activities while value stocks are considered to be less risky as they often represent a stable or mature company. Therefore, in a rational pricing frame of the market, the growth stocks

should be yielding higher returns than the value stocks considering the positive risk-return trade off. This contradicting empirical regularity in the cross section of stock returns is termed as value effect or value premium and has motivated investment managers to frame trading strategies in this line and to profit above the market premium.

Value effect has remained as an unsettled issue, in terms of attributing a conclusive theoretical explanation to it, in the finance literature. There are broadly two perspectives of explanations, based on rational expectation and competitive equilibrium frame of analysis and also on the basis of sub-optimal behaviour of investors. The studies in the former perspective attributed this empirical fact to the specific characteristics of the fundamentals of stock and to the market as a whole while the studies in the latter perspectives explained it in terms of the impact of behavioural traits of investors in investment decision making.

Studies from the competitive equilibrium and rational expectation perspective explained the excess premium earned by value stocks as the reflection of: systematic risk not captured by market portfolio (Fama and French, 1992); distress risk factor with respect to earnings differences (Fama and French, 1995); positive earnings surprises of value stocks (Poterba et al., 1997); higher recession risk of value stocks (Cochrane, 1999); premium for cash flow risk and its variation over time (Campbell and Voultenahu, 2004; Lettau and Watcher, 2007); risk premium due to the movement of conditional variance of stocks with business cycles (Guo et al., 2009; Cochrane, 1999); a premium for the costly irreversibility of investment and counter cyclical behaviour of value stocks (Zhang, 2005; Xing and Zhang, 2005; Guan, 2013); differences in the loadings of capital gain to price and stock fundamentals across stocks over time (Fama and French, 2007); a premium for the financial inflexibility of value stocks (Clark and Qio, 2020), etc.

The studies in the behavioural finance perspective are founded upon the prospect theory of Kahneman and Tversky (1979) and observations from experimental psychological studies on individual behavioural biases in decision making under uncertain situations, like investment decision in stocks. They brought to light the possibility of the investors resorting to heuristics like; representativeness, availability, anchoring and framing, being obsessed by conservatism, endowment effect, confirmation bias, overconfidence, etc. In contradiction to the postulates of expected utility analysis, this theory argued that the individual behavioural traits tended to give emphasis on subjective probability weighing than objective ones and ultimately results in biased investment decisions making. Accordingly, all these factors were expected to contribute to defective price discovery and dynamic inconsistency in the market. On the basis of this postulates the studies explained value premium as a consequence of: over reaction of investors to information in the market (De Bondt and Thaler, 1995); erroneous expectation of investors (Lakonishok et al., 1994; Daniel and Titman, 1997); difficulties in arbitrage due to noise risk in the market (Black, 1986; De Long et al., 1990); sophistication and socio-economic characteristic of the investor category who own the value stocks (Phalippou, 2008; Betermier et al., 2017); reflection of higher impact of investor sentiment on stocks that are subjective in valuation and difficult to arbitrage (Baker and Wurgler, 2007; Yerbanga, 2017); investor behaviour bias and uncertainty at stock and at market level (Kumar, 2009); noise trading fostered by lower earnings quality (Athanasakos, 2017), etc.

Broadly, the rational expectation based investigations confined value effect as an outcome of risk differences in fundamentals of both value stocks and growth stocks especially in times of recession. Xing and Zhang (2005) based on their detailed analysis of fundamentals of both value firms and growth firms, using CRSP and compustat database over a period spanning from 1963 to 2002, concluded value premium as a recession risk premium. But there are studies which showed prevalence of value premium regardless of phase of the business cycles. Fama and French (2012) have shown the pervasiveness of value premium across 23 markets across different regions of globe in their study of the combined data set from all these markets over the period 1989 to 2011 which covers complete trade cycles. This inconclusiveness of rational expectation frame of analysis urges to consider the observations on the value effect from the behavioural perspective. Baker and Wurgler (2007) argued that the prices of stocks that were young, unprofitable but with potential for growth, with no earnings history and uncertain future, etc. were more prone to be affected by irrational investor sentiments than those of stocks with long earnings history and tangible asset base, etc. which ultimately would foster noise risk in the former category amidst of arbitrage constraints. Moreover, its relevance increases when read together with observations of Betermier et al. (2017) and Phalippou (2008) on the differences in sophistication and socio-economic characteristics of holders of both value stocks and growth stocks.

Based on the foregone discussions, it can be presumed that if value premium is related to fundamental risk in recession period, its significance on trading strategies would be limited, as value effect cannot be pervasive over business cycles. All the more, in this context, the impact of expansionary stimulus from monetary and fiscal policies on the firms also needs to be considered in the rational expectation frames of analysis. On the other hand, if it is due to erroneous expectations of investors due to behavioural traits, in line with prospect theory, mispricing effect could be pervasive regardless of business phases and also can have more pronounced effect upon the growth stocks during recessionary phase.

This scenario reveals the lacuna of investigations on the pervasiveness of value effect over different phases of business cycles and on the nature of distribution and impact of market risk and behavioural risk on value stocks and growth stocks during these times, which would shed light upon what in essence the value effect reflects.

Considering the significance and drawing insights from the potential impact of behavioural factors, it is presumed that the behavioural traits of individuals can have profound impact on valuation of both value stocks and growth stocks. As individual investors are affected by different types of psychological factors, it would be of practical as well as of theoretical relevance to look into the aggregate impact of these behavioural bias rather than that of the specific individual behavioural biases, which is scarcely attempted in the literature. The aggregate of all these biased decision making, which can be measured in terms of irrational market sentiment, could reflect predictable pattern formations and cross sectional variations in the overall market including value premium.

The presence of value premium is well documented from Indian equity market (Tripathi and Aggarwal, 2020; Banerjee et al., 2017; Deb and Mishra, 2019; Saji and Harikumar, 2015). These studies explored the presence of the value effect in different market conditions and across different sectors except that of Deb and Mishra (2019) exploring the possibility of value effect due to stock selection criteria of investors. Indian equity market, being that of an emerging economy with the presence of investors of

varying sophistication, differences in access to information, investment constraints and behavioural traits, is one of least explored markets in the context of behavioural bias in investment decisions and anomalies in return formations, especially that of value premium. On this background, this study examines the prevalence of value premium and distribution, sensitivity and direction of market risk and behavioural risk across value stocks and growth stocks together with their responses to changes in behavioural error (BE) in trading on information day and on non-information day in Indian equity market over pre and post Great Recession of 2008. In short, this study is in the context of inefficiency of markets. Hence, it is assumed that the irrational sentiment in the market has its role on the value premium formation in the stock markets.

This research paper is arranged in such a way that, following a precise introduction, description about the topic and aims and objectives of the study in the introductory section, Section 2 discusses in detail the theoretical explanations and empirical evidences of value premium anomaly in the literature of financial markets from across globe. It is followed by a detailed discussion on data and methodology adopted in this study in the Section 3. Section 4 depicts the empirical evidences observed in the present study on value premium and its linkages to market risk and irrational sentiment prevailing in the Indian equity market. It also discusses empirical results on the distribution of changes in BE with respect to trading on both information and non-information days. Section 5 discusses implications of the findings and it is followed by brief conclusion of the report.

2 Empirical observations and explanations to value premium

Early evidences of value premiums were mostly reported from the US market. Basu (1977) examined investment performance of equities in relation to their price earnings ratios and found that the portfolio with high P/E ratio earning lower returns while portfolios with lower P/E ratio earning a higher return in the same period of analysis. But the systematic risk of the former was higher than that of the latter in terms of CAPM beta which contradicted with the conventional argument of positive risk-return relationship and questioned the efficiency of market risk factor in terms of beta coefficient. Basu (1983), further, observed that this effect remaining significant even after controlling the effect of firm size. Fama and French (1992, 1995) also confirmed that the value effect persisting and absorbing the role of market beta in explaining expected return in their multivariate regression analysis of non-financial firms and attributed the value premium to the distress factor of the firms as value stocks constantly earned low earnings. Black (1993) attributed value effect observed in US market as the result of data snooping bias. Fama and French (1998) observed the pervasiveness of value premium outside US market including 12 Europe, Australia and Far East (EAFE) countries such as; Japan, the UK, France, Germany, Italy, Netherlands, Belgium, Switzerland, Sweden, Australia, Hong Kong and Singapore and also in 16 emerging countries such as; Argentina, Brazil, Chile, Columbia, Greece, India, Jordan, South Korea, Malaysia, Mexico, Nigeria, Pakistan, the Philippines, Taiwan, Venezuela and Zimbabwe. Fama and French (2006) reported the presence of strong value premium irrespective of the size of firms across US and other 14 major markets such as; Australia, Belgium, Canada, France, Germany, Great Britain, Hong Kong, Italy, Japan, Netherlands, Singapore, Spain, Sweden and Switzerland. These findings substantiated the distinct characteristic of value premium in

the market. Systematic risk not captured in market portfolio risk (Fama and French (1992), a premium for positive earnings surprise of value stocks (Porta et al., 1997), recession risk (Cochrane, 1999); cash flow risk (Campbell and Vuolteenaho (2004), etc. were some of the early explanations of value premium in line with rational asset pricing frame of analysis.

Zhang (2005) explained the return dispersion between value and growth stocks in terms of costly reversibility of investments and counter cyclical behaviour of the price of risk under the rational expectation and competitive equilibrium frame. The study stated that in bad times, value firms would be burdened with more unproductive capital than growth firms, thereby, it affected the dividends and return of value firms. But in good times growth firms would find it easy to increase their capital stock without affecting their dividend and return while it was not necessary in case of value stocks. Thus, it resulted in higher return dispersion across these portfolios of securities in bad times compared to good times. This return difference was also found to be aggravated in bad times with the higher price of risk (discount rate) affecting the disinvestment activities of value firms. Opposing to negative risk (market beta) – return relationship raised around the value and growth stocks, Petkova and Zhang (2005) observed that the time varying risk, measured in terms of sensitivity to default spread and term spread, of value stocks co-varied positively and that of growth stocks co-varied negatively unlike in the case of realised market excess return (market beta). But the study found, even though they were correlated, that the observed magnitude of value premium was not explained fully within the conditional capital asset pricing model.

Lettau and Wachter (2007) in their dynamic risk based model distinguished firms in terms of the nature of cash flows. Growth stocks were considered as high duration stocks as their cash flows weighted more to the future endogenously and value stocks were grouped into low duration stocks as their cash flows weighted more to the present. They argued that the investors' perception about the risk of these cash flows varied with time and not perfectly linked to economic fundamentals. The model implied that growth firms returns co-varied more with the discount rate while that of value firms co-varied more with the cash flows and found to be accounting for the observed value premium with high Sharpe ratio on value firms.

Similarly, Guo et al. (2009) also observed significant positive relation between value premium and its conditional variance once controlled for its co-variance with market returns in the US market and in G7 countries markets. Conditional variance being strongly counter cyclical in its nature, the conditional value premium found to be high during business recessions and low in business expansions. In an in depth examination of growth and value stocks, Fama and French (2007) stated that the dividend component of the return to be similar across both growth and value stocks. In case of capital gain, it was found that capital gains of value stocks as the result of increase in price than in book equity component while that of the growth stock as the result of increase in book equity component. The study also reported that stocks keep moving from one category to another in the course of time and price to book value also moved together with changes in profitability and in expected returns as competition in the market increased. Gulen et al. (2011) observed value premium increasing during recession and becoming insignificant in times of expansion. Clark and Qio (2020) based on stochastic dominance theory attempted to test behaviour based and risk based explanations to the value premium puzzle. But the study found strong evidence to state value premium as a reward for bearing more risk associated with financial inflexibility.

The studies based on behavioural finance literature attempted to explain value premium in the context of behavioural risk factors emanating from the individual behavioural biases. Bondt and Thaler (1985) attributed this deviation of asset prices from the rational risk- return relationship to the overreaction of investors to the available information in the market and portrayed the premium earned as the reward for being contrarian to such trading activities. Lakonishok et al. (1994) also confirmed the outperformance of value stocks based on the measures of past growth and expected future growth. The examination of the nature of risk in both the growth and the value stocks in the context of extreme down markets and economic recessions showed no indication that value stocks are fundamentally riskier to earn excess premium. Further evidences suggested that the investors' erroneous expectation about the performance of the stocks contributed heavily to the return dispersions across value and growth stocks. Barber and Lyon (1997) found value effect both in financial as well as non-financial stocks in the US market and invalidated the possibility of overstatement of value premium due to data selection bias. Daniel and Titman (1997) pointed out the possibility of the influence of behavioural bias on the value premium effect. This observation finds its relevance when taken together with the observation of De Long et al. (1990) on the difficulty of arbitrage in the presence of noise risk (Black, 1986) in the market and with the argument of Baker and Wurgler (2006) that the stocks that are subjective in valuation and, therefore, difficult to arbitrage have higher impact of investor sentiment.

Lakonishok et al. (1994), La Porta (1996), Porta et al. (1997), Shiller (2000) and Daniel et al. (2002) have pointed out the significant role of expectation errors of investors, about the earnings of firms, about investors' behavioural biases and obsession on heuristics and about their irrational exuberance on prospects of stocks, in explaining the value premium observed in the market.

On the investigation of the nature of investors in value and growth stocks, Betermier et al. (2017) observed a strong relationship between household's portfolio holdings and financial and demographic characteristics. The study found a movement of investors from growth stocks to value stocks over the life cycle. Value stock investors found to possess higher wealth, lower leverage, lower income risk and lower human capital while the growth stock investors found to be younger in age, educated and risk seeking in nature and obsessed with high degree of over confidence. Phalippou (2008) pointed out the concentration of value premium to smaller portion of total stocks in the market and lower holding of it by institutional investors. They also found that the value stocks are mostly held by less sophisticated investors which make the arbitrage activities limited in the market. Kumar (2009) observed a strong bidirectional relationship between individual investors' behavioural bias and uncertainty at stock and at market level and this uncertainty leading to behavioural biases like such as familiarity, representativeness, and limited attention, etc. The study noted BEs of investors, in the form of stronger disposition effect and overconfidence, being higher among the stocks which were difficult to value. Athanassakos (2017) examined the value premium in the context of earnings quality as the latter enforces both risk factor and mispricing of value stocks in the market. The study attributed earnings quality as a driving force of value premium as lower earnings foster noise trading and financial risk.

The debate on value premium and its explanations are neither conclusive nor comprehensive. Even though the literature points out possibility of behavioural traits on mispricing in the market, the role of aggregate irrational sentiment component of the market upon value premium formation in different phases of trade cycle is scarcely

explored in the literature. How the returns of these cross sections of stocks react to changes in the sentiment movements over time is also a less explored area.

3 Data and methodology

This analysis was carried out partially in line with the sorting methods adopted in Fama and French (2008). The constituent stocks of BSE 500 and NSE 500 indices were considered as the sample frames and 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 categorised into percentile portfolios based price to earnings ratio. These portfolios were modified on an 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 given to avoid the possible errors in the price movement around the result announcements. Average monthly excess returns of each portfolio was calculated for the entire period as well as for pre and post global crisis period of 2008 to examine the variations in them across the portfolios. Similarly, market risk of each of the portfolio was calculated by the linear regression of the excess returns of each portfolio upon market portfolio's risk-free rate adjusted returns. In this analysis, BSE 500 index was taken as market portfolio as it covered around stocks from all major 20 industries of the economy and 93% of total market capitalisation of the BSE. Further, the marginal sensitivity of each of the portfolios to the irrational sentiment prevailing and the nature of behavioural overreaction and under-reaction to information day and non-information day trading across the portfolios were also examined to understand the nature of the impact of trading on BE formation in both of these stock categories.

Irrational sentiment index used in this analysis was the modified version of the index constructed by Suresh and George (2016), based on the information extracted from market sentiment proxy variables in line with Baker and Wugler (2007) and Dash and Mahakud (2012). Towards this end, first, the possible sentiment proxy variables such as; equity trade volume BSE, odd lot trade volume, equity issues, PE ratio of Sensex, advance decline ratio of 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, were considered. The equity trading activities of various investor categories were that of the combined data from both BSE as well as NSE. Equity issues represented the amount of equity capital issued by non-governmental public limited companies for respective months. Similarly, 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. 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 were removed by regressing each sentiment variable upon the

economic fundamental through ordinary least square (OLS) fit and each of their residuals were used to derive an irrational sentiment index for the market. Data considered about all these variables were of monthly frequency from 2004 to 2016. All these variables were z – standardised before further analysis for proper comparability. In order to extract the common variation in the sentiment proxy variables principle component analysis technique was applied.

The nature of the impact of behavioural factors could be clear if one can understand the sensitivity of the BEs to both rational and irrational trading activities in the market. Therefore, for the examination of behavioural overreaction and under-reaction to information day trading and non-information day trading across the portfolios, the information adjusted noise model (IANM) (Ramiah and Davidson, 2007) was considered. But, instead of calculating BE as the difference between CAPM beta and behavioural beta we took the slope coefficient of the irrational market sentiment index as the BE and the monthly changes in the BEs were then regressed on the dividend announcement events. Based on IANM of Ramiah and Davidson (2007), change in BE of the i stock at time t is,

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

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

4 Linkages of value premium to behavioural risk in the market

4.1 Value premium, market risk and irrational market sentiment

This section discusses the value premium effect examined in terms of price to earnings ratio in Indian equity market. Table 1 presents the average risk free rate adjusted returns of each of the portfolios. The lowest portfolio represents value stocks and the highest portfolio represents the growth stocks. It is found that the average annual excess returns are higher in the value stock portfolios and it is continuously declining as we move to higher price to earnings ratio portfolios. The average variability of each portfolio returns are found to be similar as well as in closer ranges. Excess return earned by value stocks is $2.782 \bar{+} 8.456$ while that by growth stock is $0.414 \bar{+} 8.497$. Figure 1 also shows the nature of movement of the excess returns across these portfolios.

Table 1 Average risk-free rate adjusted returns* across P/E ratio portfolios in Indian equity

Portfolios	Lowest	2	3	4	Medium	6	7	8	9	Highest
Average	2.782	1.709	1.390	1.265	0.703	0.725	0.722	0.463	0.379	0.414
Std. dev.	8.456	7.461	7.428	7.592	7.170	7.164	7.741	7.281	7.659	8.497

Notes: *The average risk free rate adjusted returns of each of the portfolios based on P/E. The 91 day Treasury bill rate was taken as proxy for risk free rate. Therefore the average risk free rate adjusted returns are the excess returns. Lowest portfolio represents the value portfolio and the highest portfolio represents the growth stock portfolios.

Figure 1 Value premium in the Indian equity market (see online version for colours)

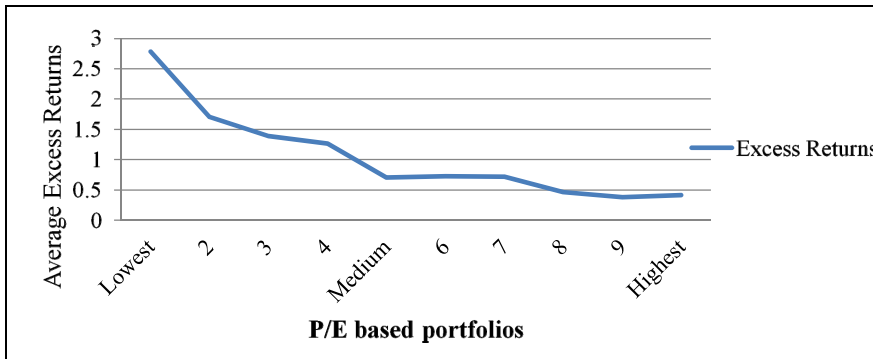


Table 2 Risk-free rate adjusted return* variations across P/E ratio portfolios in Indian equity market: dummy variable regression

Portfolios	Coefficients	Std. error	t stat.	P-value	F stat.	Signi. F
<i>Period from 2004–2016</i>						
Smallest*	2.781	0.672	4.139	0	3.694	0.025
Medium	-2.079	0.950	-2.187	0.029	–	–
Largest	-2.367	0.950	-2.491	0.013	–	–
<i>Period from 2004–2007 (pre crisis-2008)</i>						
Smallest*	5.892	1.055	5.581	0	2.278	0.106
Medium	-3.011	1.492	-2.017	0.045	–	–
Largest	-2.40	1.492	-1.613	0.109	–	–
<i>Period from 2008–2016 (post crisis-2008)</i>						
Smallest*	1.500	0.818	1.832	0.067	2.194	0.113
Medium	-1.695	1.158	-1.463	0.144	–	–
Largest	-2.351	1.158	-2.030	0.043	–	–

Notes: The average risk free rate adjusted returns of each of the portfolios based on P/E. The 91 day Treasury bill rate was taken as proxy for risk free rate. Therefore, the average risk free rate adjusted returns are the excess returns. Lowest portfolio represents the value portfolio and the highest portfolio represents the growth stock portfolios. *Smallest portfolio (portfolio 1 with lowest P/E ratio) is taken as the bench mark category, medium portfolio is 5th portfolio in order and largest portfolio is 10th portfolio with highest P/E ratio.

It is found from Table 2 that the average annual return differences across these portfolios are statistically significant especially in the period between 2004 and 2016. In all the cases, it is found that the higher price to earnings ratio based portfolios' adjusted returns or that of growth stock portfolio adjusted returns are significantly lower than that of the value stock portfolio or to the lowest price to earnings ratio based portfolios' adjusted returns. Therefore, price to earnings ratio based grouping shows a statistically significant cross sectional return variation and value premium in Indian equity market. It is pervasive in both pre and post financial crisis period as well.

Table 3 Average CAPM risk* (Beta) across P/E ratio portfolios in Indian equity market (2005–2016)

<i>Portfolios</i>	<i>Lowest</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>Medium</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>Highest</i>
Average	0.065	0.068	0.071	0.071	0.079	0.079	0.070	0.067	0.064	0.068
Stand. dev.	0.027	0.032	0.031	0.034	0.026	0.029	0.027	0.034	0.026	0.028

Note: Each portfolio excess returns were regressed on the risk free rate adjusted returns of BSE 500 portfolio returns to identify market risk.

Table 4 Variations in CAPM risk across price to earnings portfolios in Indian equity market: dummy variable regression

<i>Portfolios</i>	<i>Coefficients</i>	<i>Std. error</i>	<i>t stat.</i>	<i>P-value</i>	<i>F stat.</i>	<i>Signi. F</i>
<i>Period from 2004–2016</i>						
Lowest*	0.064	0.002	28.352	0	10.158	0.000
Medium	0.013	0.003	4.250	0		
Largest	0.002	0.003	0.826	0.409		
<i>Period from 2004–2007 (pre crisis-2008)</i>						
Lowest*	0.066	0.003	16.702	0	2.057	0.133
Medium	0.011	0.005	1.976	0.051		
Largest	0.007	0.005	1.385	0.169		
<i>Period from 2008–2016 (post crisis-2008)</i>						
Lowest*	0.064	0.002	23.729	0	8.805	0.000
Medium	0.014	0.003	3.780	0.000		
Largest	0.001	0.003	0.312	0.755		

Notes: Each portfolio excess returns were regressed on the risk free rate adjusted returns of BSE 500 portfolio returns to identify market risk. *Lowest portfolio (portfolio 1 with lowest P/E ratio) is taken as the bench mark category; medium portfolio is portfolio is 5th portfolio in order and largest portfolio is 10th portfolio with highest P/E ratio.

Having observed the value premium, an attempt is made to ascertain if it is the reward for bearing market risk. Therefore, the differences in the market risk (CAPM beta) across these portfolios are examined and results are presented in Table 3. In case of extreme portfolio, the evidences show a higher level of average market risk in the growth stock portfolios compared to value stock portfolio. It is also found that the risk return relationship is not linear across these portfolios. The exposure to market risk is lower in value stock portfolios and it increases as the price earnings ratio increased but declines

after a stage though not below that of the lowest portfolio. Likewise, the variability of the market risk was not in similar pattern across them but in a band of 0.26 – 0.34.

The statistical significance of the CAPM beta differences across portfolios are analysed through dummy variable regression analysis taking the lowest category as the bench mark. From Table 4, we observe statistically significant differences in market risk between lowest and medium portfolios while that of the growth stocks are not significantly different from that of the value stocks category. These findings contradict with the risk- return relationship postulated in the rational expectation and competitive equilibrium frame of analysis. It raises the question that how portfolios with similar or lower market beta earn higher adjusted returns from market.

Table 5 Average behavioural risk* across P/E ratio portfolios in Indian equity market (2005–2016)

<i>Portfolios</i>	<i>Smallest</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>Medium</i>
Average	-0.267	-0.307	-0.328	-0.321	-0.347
Stand. dev.	0.167	0.161	0.189	0.170	0.145
<i>Portfolios</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>Largest</i>
Average	-0.331	-0.312	-0.308	-0.298	-0.315
Stand. dev.	0.166	0.195	0.174	0.183	0.186

Note: Each portfolio excess returns were regressed on the irrational market sentiment index to identify behavioural risk.

Table 6 Variations in behavioural risk across P/E ratio portfolios in Indian equity market: dummy variable regression

<i>Portfolios</i>	<i>Coefficients</i>	<i>Std. error</i>	<i>t stat</i>	<i>P-value</i>	<i>F Stat.</i>	<i>Signi. F</i>
<i>Period from 2004–2016</i>						
Lowest*	-0.267	0.014	-18.767	0	7.931	0.000
Medium	-0.079	0.020	-3.960	0.000		
Largest	-0.047	0.020	-2.342	0.019		
<i>Period from 2004–2007 (pre crisis-2008)</i>						
Lowest*	-0.207	0.029	-7.112	0	2.545	0.084
Medium	-0.094	0.041	-2.238	0.027		
Largest	-0.056	0.041	-1.364	0.176		
<i>Period from 2008–2016 (post crisis-2008)</i>						
Lowest*	-0.284	0.016	-17.666	0	5.678	0.003
Medium	-0.076	0.022	-3.353	0.000		
Largest	-0.044	0.022	-1.963	0.050		

Notes: Each portfolio excess returns were regressed on the irrational market sentiment index to identify behavioural risk. *lowest portfolio (portfolio 1 with lowest P/E ratio) is taken as the bench mark category; medium portfolio is portfolio is 5th portfolio in order and largest portfolio is 10th portfolio with highest P/E ratio.

Therefore, we extended the investigation to examine the possible linkage of the portfolios returns to aggregate behavioural risk or sensitivity to irrational sentiments prevailing in the market. Table 5 presents the pattern of the behavioural risk across the portfolios. The

average annual behavioural risk affects all the portfolio returns negatively and the magnitude of its impact increases in a non-linear fashion from the value stock portfolios to growth stock portfolios as in the case of average adjusted returns found Table 1. The average behavioural risk of the lowest portfolio is -0.267 ± 0.167 while that of the highest portfolio is -0.315 ± 0.186 .

The statistical significance of the differences in behavioural risk across these portfolios was examined through dummy variable regression analysis and the results are presented in Table 6. The result shows an increase in the absolute magnitude of impact of behavioural risk as one move from value stock portfolio to growth stock portfolio especially between extreme portfolios in the analysis though it has the return suppressing effect. This observation hints to the return differences between value stocks and growth stocks or to the issue of value effect.

4.2 BE responses to trading on information and non-information events

Since it is observed that behavioural risk has negative impact across portfolio returns, further attempt is made to identify the impact of both information day trading and non-information day trading upon behavioural risk movements. It would give idea about the intricacies of the behavioural risk formation. As given in Table 7, the intercept α indicates the effect of trading activities on the fluctuations in BEs on non-information days in the market and β shows the changes in the sensitivity of information day trading on the BE in the market. BE change is the month over month rate of change in behavioural risk, calculated as the sensitivity of each of the portfolio returns on the irrational sentiment prevailing in the market. The overall change in the sensitivity of portfolio returns to the irrational sentiment in the market is measured by μ . Dividend announcement is taken here in this study as the information event.

The results showed that the trading on non-information days reducing the rate of change in BE with negative α values while trading on information days accelerating it indicated by positive β values across the portfolios. Therefore, considering the negative impact of behavioural risk on excess returns, growth stocks will have higher behavioural beta than value stocks, indicating that non-information day trading will reduce the growth stock excess returns more than that of value stock ones. In other words, as the non-information day trading increases the reduction in behavioural risk will be higher in value stocks than in growth stocks. Therefore, the growth stocks will have higher behavioural risk component in absolute terms. Since the effect of behavioural risk upon excess returns of the portfolios is negative, the growth stocks will record a higher fall in the excess returns earned. On the other hand, on information day trading, the BE changes are higher in growth stocks and in positive direction. It means that behavioural risk factor or behavioural beta of growth stock increases more on information day trading. Again considering its negative impact on excess returns, the growth stocks excess returns get suppressed below that of value stocks. In short, with positive impact of an increase in trading on information day, the behavioural risk component of the growth stocks will be higher than that of value stocks, resulting in higher fall in growth stocks' excess returns than that of value stocks. Therefore, both of these trading leads to value premium observed in the market.

Even though Table 7 shows that the coefficients are not very significant statistically, they are significant from economic point of view and also for the purpose of interpretation intricacies in behavioural risk formation and the issue of value effect. The

values of α shows no regularity in their movements across the portfolios even though the differences of it on the extreme portfolios are very visible. Likewise the β values are also different in their extreme portfolios. Broadly, we observe, negative overreaction in value stocks and positive over reaction in growth stocks.

Table 7 Changes in BE* on information and non-information day trading across P/E ratio based portfolios

<i>Coefficients and P values</i>	<i>Lowest P/E portfolio (P1)</i>	<i>P2</i>	<i>P5</i>	<i>P9</i>	<i>Highest P/E portfolio</i>
α	-13.74	-10.130	-8.778	-10.480	-10.350
<i>P. value</i>	0.102	0.044	0.126	0.140	0.026
β	-3.887	7.126	3.333	22.496	8.877
<i>P. value</i>	0.776	0.308	0.676	0.220	0.195
μ	-17.367	-3.004	-5.445	12.0 16	-1.473

Notes: Each portfolio's behavioural risk month over month variation is taken as BE change. *lowest portfolio (portfolio 1 with lowest P/E ratio), P2 P5 and P9 are the P/E based portfolios in an ascending order and the highest portfolio is 10th portfolio with highest P/E ratio. Probability of making type one error is shown by P-value. μ is the sum of α and β .

5 Results, discussion and implications of the findings

The analysis revealed the prevalence of value premium in a significant way throughout the study period. It contradicts the argument that the value effect as a recession phase phenomenon. All the more, it is found to be higher in the pre-crisis period than in the crisis and in post crisis period as against the generalisation of Gulen et al. (2011) and Zhang (2005) findings. If higher fundamental risk on value stocks due to irreversibility of investment and financial inflexibility were present, the market portfolio risk factor would have reflected it during this time period. But the study did not find any corroborating evidence in this regard. Rather, the market risk factor in terms of CAPM beta was very low in magnitude and also was comparatively higher in growth stocks than in value stocks during this study period. It was also observed to be invariant in its magnitude in pre and post crisis period. It could be due to the fact that the Indian market was relatively insulated from crisis due to its characteristics and its policies. But, when it comes to behavioural risk, measured in terms of sensitivity to irrational sentiment, its impact found to be higher in value stocks than growth stocks. That is, its negative effect will suppress the returns of growth stocks higher than that of value stocks which resulted in observing premium in value stocks. Therefore, it can be concluded that the value premium is the result of its higher behavioural risk exposure and as an outcome of asymmetric impact of behavioural risk upon both the type of stocks. It is substantiated by the positive overreaction of trading in growth stocks and negative over reaction of trading in value stocks. Positive overreaction indicates the inability of proper estimation of noise in the market and excess effort of contrarian trading to profit the noise in prices while negative overreaction shows the deficiency of contrarian trading and misinterpretation of noise in the market leading to accentuation of BEs. It means, in case of growth stocks, the contrarian traders overestimate the noise while in case of value stocks they under

estimate the noise in prices. Such behaviour of traders will have linkages to the behavioural characteristic of them, influenced by their socio-economic features, who invest in both types of stocks. So it is the noise in the prices of both types of stocks and their differences which evince as value premium in the market. So the normal question arises at this juncture is why there is positive over reaction in growth stocks and negative overreaction in value stocks. It can be explained on the arguments from both perspective of analysis. From rational expectation frame of analysis, growth stocks are relatively more risky with the uncertainty about their cash flows and with limited earnings history while value stocks will have proven record of earning history and asset bases. This can result in rational investors or traders to undermine the noise in value stocks and taking erroneous contrarian positions affected by their behavioural traits and ultimately leading to negative overreactions. This must also be read with socio-economic characteristics of holders of value stocks as discussed in the literature. In terms of behavioural perspective, as found in the literature, younger stocks, small stocks, unprofitable stocks, non-dividend paying stocks are difficult to value and are attractive to optimists and speculators. Therefore, investors or traders expect more mispricing or noise in their prices and therefore implement excess contrarian positions to profit the noise which results in positive under reaction in the market. Hence, it can be concluded that it is the erroneous expectation of traders and differences in behavioural risk exposure of both type of stocks that result in value premium. Such type of trading sustains noise in prices across all type of stocks in the market, making costly information seeking, active trading and survival of investment analysts and brokerage firms in the real world. But, why does irrational sentiment has negative impact regardless of stock, even though with significant differences in its magnitude, will have to be further investigated upon.

6 Conclusions

This study was carried out in the pretext of the observations like; value effect as a recession related fundamental risk premium or as an outcome of erroneous outcome of irrational expectation of investors. The analysis was carried out on the non-financial firms which are included in BSE 500 and NSE 500 indices over a period of 2004 to 2016 covering both pre and post Great Recession period. The study provides a significant explanation to value effect from the behavioural finance perspective. Broadly, the study also indicates the possibility for profit making by framing trading and investment strategies on value stocks taking into account the level of irrational sentiment in the market.

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