

# **Impact of Investors' Behavioral Biases on the Indian Equity Market and Implications on Stock Selection Decisions: An Empirical Analysis**

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By

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## ACRONYMS AND ABBREVIATIONS

CMIE	Centre for Monitoring Indian Economy
CSAD	Cross-sectional Absolute Deviation
CSSD	Cross-sectional Standard Deviation
(GJR) GARCH	(Glosten, Jagannathan, and Runkle) Generalized Autoregressive Conditional Heteroscedasticity
NSE	National Stock Exchange
PDF	Probability Density Function
PGR	Proportion of Gain Realized
PLR	Proportion of Loss Realized
SDF	Stochastic Discount Factor
VAR	Vector Autoregression

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# SYNOPSIS

## 1. INTRODUCTION

*“People in standard finance are rational. People in behavioral finance are normal.”*

- Meir Statman

Investors’ irrationality is an inevitable reality that has been time and again pointed out by researchers like Statman [1]. These researchers throw light on the fact that an actual investor cannot conform to the “rational” assumptions of the standard finance theories. They argue that investors are not the calculative utility maximizing machines as the traditional theories believe them to be. Rather, they are led by their sentiments and are prone to make cognitive errors. They may lack self control, be overconfident about their abilities, miscalibrate information, overreact or follow the crowd without thinking [2]. These errors can get projected in the form of market anomalies like speculative bubbles, for instance, the dot-com bubble of 1990’s [3] and real estate bubble of 2006 [4]. These events prove to be very costly in the stock market and they warrant the understanding of investor behavior, which has become important as ever. Thus, the need for comprehending such anomalies and shortcomings of human judgment involved with them became the precursor of behavioral finance.

Behavioral finance deals with the influence of psychology on the behavior of financial practitioners and its subsequent impact on stock markets [5]. It provides the explanation for market anomalies that could not be adequately justified by traditional financial theories. In recent times, the researchers have recognized the presence of behavioral biases that offer a more realistic insight into the functioning of stock markets and its participants. These biases are broadly categorized into heuristic driven and frame dependent biases [6]. The knowledge of these biases facilitates the financial practitioners in recognizing their own mistakes along with those of others and avoiding them. Therefore, as the market environment becomes ever challenging, investors can benefit from the insights of behavioral finance in beating the market [7].

Following the present introduction, the research work features a review of the relevant literature in section 2. Research objectives are expounded in section 3. Subsequently, the data and methodology of the study are explained, followed by results. Next the findings and conclusions are presented in section 6. Finally, section 7 discusses the future area of research.

## 2. LITERATURE REVIEW

The behavioral biases are broadly categorized into heuristic driven and frame dependent biases [6]. Heuristics are the rules of thumb which market participants use to simplify complex decision making process, while frame denotes the current frame of mind of the financial practitioner. Examples of *heuristic driven biases* are availability bias, representativeness, gamblers fallacy, anchoring and adjustment, and aversion to ambiguity. The *frame dependent biases* include loss aversion, mental accounting, and hedonic editing and money illusion to name a few. The major researches on this bias have been summarized in the table (2.1).

Table 2.1: Summary of literature on various behavioral biases

<b>Bias name</b>	<b>Author (Year)</b>
Representativeness	Tversky and Kahneman (1974), Dhar and Kumar (2001), Kaestner (2005)
Availability	Tversky and Kahneman (1973, 1974), Kliger and Kudryavtsev (2010)
Anchoring	Tversky and Kahneman (1974), Campbell and Sharpe (2009)
Overconfidence	Odean (1998a), Daniel, Hirshleifer and Subrahmanyam (1998), Barber and Odean (2000), Gervais and Odean (2001)
Optimism (Pessimism)	Heifetz and Spiegel (2001), Toshino and Suto (2004), Shefrin and Statman (2011), Hoffman and Post (2011)
Loss aversion	Kahneman and Tversky (1979), Coval and Shumway (2003), Berkelaar and Kouwenberg (2008), Hwang and Satchell (2010)
Narrow Framing	Shefrin (2000), Barberis and Huang (2005), Liu and Wang (2010)
Mental accounting	Thaler (1999), Barberis and Huang (2001)
Disposition Effect	Shefrin and Statman (1985), Odean (1998b), Grinblatt and Keloharju (2001), Shumway and Wu (2006), Kumar (2009)
Herding behavior	Lakonishok <i>et al.</i> (1991), Scharfstein and Stein (1990), Christie and Huang (1995)
Status quo Bias	Samuelson and Zeckhauser (1988), Brown and Kagel (2009), Li (2009)

This review is a representative account of behavioral biases and there are many other important biases along with those mentioned above. However, the detailed analysis of every bias is beyond the scope of any meaningful research. Therefore the present study focuses on four behavioral biases namely, overconfidence, optimism (pessimism), the disposition effect and herding. Out of these overconfidence and optimism (pessimism) fall under *heuristic driven biases* and the disposition effect and herding lie under *frame dependent biases* (Table 2.2).

Table 2.2: Behavioral biases of interest in the study

<b>Heuristic Driven</b>	<b>Frame Dependent</b>
Overconfidence Optimism (pessimism)	Herding Disposition effect

These biases are particularly relevant because their impact has been studied on market indicators using secondary market data in foreign countries. In India, the research on behavioral biases is mostly survey based. However, the analysis of biases using secondary data is still under-researched. The present research tries to contribute in this area by investigating these biases using historical data. Additionally, the study also captures the current scenario of the biases with the help of a survey.

## **2.1 LITERATURE REVIEW OF SELECT BEHAVIORAL BIASES**

### **2.1.1 OVERCONFIDENCE**

It is defined as the investors' tendency to overestimate the precision of their knowledge about the value of security [8]. Some of the noteworthy work on this bias has been contributed by [9] who relate this bias with price reversals. Overconfidence has been related to trading volume by [10], [11], [12], [13] and [14]. [15] investigate the behavior of overconfident investors while, [16] determine the impact of this bias on the lead-lag relation between past returns and trading volume.

### **2.1.2 OPTIMISM (PESSIMISM)**

The literature on optimism (pessimism) is far in its nature. However, it can be majorly classified into four strands. The first strand deals with drivers of optimism [17], [18]. The second strand of literature focuses on optimism of analysts in forecasting expected returns and projecting target prices [19]. Third strand deals with identification of this bias in investors. The fourth strand explores the presence and impact of this bias on financial markets [20], [21], [22], and [23].

### **2.1.3 HERD BEHAVIOR**

It is the tendency of investors to follow the crowd. Researchers examine the factors that could lead to herd behavior in the investment decisions of money managers [24], [25]. Some of the experts provide a measure to estimate herding in financial markets [26], [27]. Literature also provides the evidence of this bias in developing and developed countries [28], [29] as well as in India [30].

### **2.1.4 THE DISPOSITION EFFECT**

The concept of the disposition effect is introduced by [31]. The presence of this bias has been documented in U.S. [32], Finland [33] and China [34]. [35] identifies the situations that can lead to the disposition effect. [14] study the impact of this bias on trading volume and [36] compare this bias between individual and institutional investors.

## **2.2 LITERATURE REVIEW ON SURVEY OF BEHAVIORAL BIASES**

This section explores various noteworthy survey based studies in the field of behavioral finance. These are divided into three themes. The first theme deals with factors behind the individual investor behavior [37], [38], [39] and [40]. They find that along with behavioral biases, factors like corporate earnings, diversification needs and expert recommendations also contribute to investor behavior. The second theme analyses the effect of demographics on investor behavior [13], [41], [42], and [43]. These studies highlight the role of gender, investor size (small or large) and investor sophistication in influencing behavioral anomalies. The final strand investigates the role of psychological biases on investor behavior [44], [45], [46], [47] and [48]. They detect the presence and impact of biases like, overconfidence, herding, representativeness and home bias.

## **3. RESEARCH OBJECTIVES:**

Based on the existing literature, this study seeks to examine the following objectives in the context of the Indian financial market using Indian data sets.

1. To investigate the presence and analyze the impact of Heuristic Driven biases on different stock market indicators.
  - 1.1. To investigate the presence and impact of overconfidence in the Indian Equity Market
  - 1.2. To investigate the presence and impact of excessive optimism (pessimism) in the Indian Equity Market
2. To determine the presence and analyze the impact of Frame Dependent biases on different stock market indicators.
  - 2.1. To determine the presence and impact of Herding in the Indian Equity Market
  - 2.2. To determine the presence and impact of the disposition effect in the Indian Equity Market
3. To find out which bias is most pronounced in the Indian context.

## **4. DATA AND METHODOLOGY**

In the present study the first two objectives are investigated secondary data and the final objective is determined by primary data.

### **4.1 SECONDARY DATA SAMPLE**

The study uses a sample of different market indicators of Nifty 50 stocks. These indicators include

- Daily total returns of the index and securities,
- Daily transaction volume of the index and securities,
- Daily high and low values of the index
- Daily closing prices of Nifty 50 index options

Along with this the daily risk-free rate of return of the T-bill index is also used. The data set has been taken for a period 2006-2013. Further, the study makes use of both cross sectional and time-series data.

#### 4.1.1 COLLECTION OF SECONDARY DATA

The data on Nifty 50 stocks is procured from Prowess database of Centre for Monitoring Indian Economy (CMIE). The dataset of Nifty50 options and Treasury-bill index is obtained from the official NSE website.<sup>1</sup>

#### 4.1.2 STATISTICAL TECHNIQUES USED FOR SECONDARY DATA ANALYSIS:

The presence and impact of each bias are investigated with the help of specific techniques as suggested in the literature.

Table 4.1.2: Techniques used to study the aforementioned biases

Technique	Bias
Unit Root Test	All four biases
Linear regression	Herding
Time series regression	Optimism (pessimism)
Pricing kernel technique	Optimism (pessimism)
GJR GARCH	Optimism (pessimism)
Vector Autoregression	Overconfidence and disposition effect
Impulse Response Function	Overconfidence and disposition effect

#### 4.1.3 BIAS-WISE DESCRIPTION OF THE DATA SET AND METHODOLOGY

##### i. TO DETERMINE THE PRESENCE AND IMPACT OF HERDING IN THE INDIAN EQUITY MARKET

##### Data description:

The data set consists of daily returns of each constituent stock of Nifty50 index as well as the daily total returns of the index itself.

##### Methodology:

##### A. *Presence of herding on the market as a whole*

<sup>[1]</sup> Official NSE website: [nseindia.co.in](http://nseindia.co.in)

The study follows the methodology given by [35].

$$CSSD_t = \alpha + \beta^L D_t^L + \beta^U D_t^U + \varepsilon_t \quad (1)$$

This model captures the impact of market stress on return dispersion, where, CSSD (cross sectional standard deviation) is the measure of individual return dispersion.

$D_t^L=1$  if, on day t, the market return ( $R_{m,t}$ ) lies in the lower tail of return distribution and 0 otherwise.

$D_t^U=1$  if, on day t, the market return ( $R_{m,t}$ ) lies in the upper tail of return distribution and 0 otherwise.

The upper and lower tails are determined at 66% ( $R_m \pm \sigma$ ), 95% ( $R_m \pm 2\sigma$ ), 99% ( $R_m \pm 3\sigma$ ).

### **B. Nonlinearity of herding pattern**

The nonlinear relationship between dispersion and market returns is suggested by [28] represented by linear regression using a quadratic functional form.

$$CSAD_t = \alpha + \gamma_1 R_{m,t} + \gamma_2 R_{m,t}^2 \quad (2)$$

Where CSAD (cross sectional absolute deviation) is the measure of individual return dispersion and  $R_{m,t}$  is daily the market return at date t. Here, the presence of a negative and significant  $\gamma_2$  indicates herd behavior. The stationarity of CSAD series is checked by unit root tests.

### **C. Presence of herding in bull and bear phase of the market**

Considering that the stock behavior may be asymmetric in up and down market phases, the generalized relationship mentioned above (equation 2) can be bifurcated into following;

$$CSAD_t^U = \alpha + \gamma_1^{UP} |R_{m,t}^{UP}| + \gamma_2^{UP} (R_{m,t}^{UP})^2 + \varepsilon_t \quad (3)$$

$$CSAD_t^{DOWN} = \alpha + \gamma_1^{DOWN} |R_{m,t}^{DOWN}| + \gamma_2^{DOWN} (R_{m,t}^{DOWN})^2 + \varepsilon_t \quad (4)$$

Where:

$|R_{m,t}^{UP}|$  and  $|R_{m,t}^{DOWN}|$  = the absolute values of the average overall sample return when the market is up (or down).

Similar to the previous case, here also negative and significant  $\gamma_2^{UP}$  and  $\gamma_2^{DOWN}$  captures herd behavior.

## **ii. TO INVESTIGATE THE PRESENCE AND IMPACT OF EXCESSIVE OPTIMISM (PESSIMISM) IN THE INDIAN EQUITY MARKET**

## Data description

The sample consists of daily total returns of the index, closing prices of Nifty 50 index option and daily risk-free rate of return of the T-bill index.

## Methodology

The first section deals with capturing the presence of optimism (pessimism) bias. In the second section, the relationship of this bias with stock market indicators is considered using time series regression.

### A. Capturing optimism (pessimism)

Optimism (pessimism) is measured as the difference between rational (or objective) and biased (or representative) investor's return expectation. These return expectations are calculated using probability density function (PDF). Additionally, a sentiment function is required to capture return expectation of biased investor. This measure is calculated using the pricing kernel approach as suggested by [23]. The detailed methodology of each step is discussed below:

**Step 1: Empirical pricing kernel:** It is a stochastic discount factor (SDF) which is the inter-temporal marginal rate of substitution defined as the discounted ratio of marginal utilities in two successive periods [49]. It is denoted by  $M_{t,T}$ , where  $(T-t)$  is fixed and equal to three months and it is the expiration period of Nifty fifty index options.

$$M_{t,T} = e^{-rf(T-t)} \frac{q(S_T / S_t)}{p(S_T / S_t)} \quad (5)$$

Where:

$rf$ : daily risk free rate of return taken as daily T-bill index value

$q$ : risk neutral density

$p$ : objective density

$S$ : Nifty 50 index

i. Calculation of the objective (rational) density ( $p$ ) and the risk neutral density ( $q$ ): Call and put option prices of the Nifty50 index are used to estimate risk neutral density ( $q$ ) and daily

returns of the Nifty 50 index are used for calculating the objective price density (p). The GJR GARCH model is used to capture the index dynamics of the Nifty 50.<sup>2</sup>

$$\begin{aligned} S_T / S_t &= \mu_t + \varepsilon_t \\ \sigma_t^2 &= \varpi + \beta\sigma_{t-1}^2 + \alpha\varepsilon_{t-1}^2 + \gamma I_{t-1}\varepsilon_{t-1}^2 \end{aligned} \quad (6)$$

Where,  $\varepsilon_t = \sigma_t z_t$ ,  $z_t$  is the standardized historical innovation and  $I_{t-1}$  is a dummy variable which takes the value 1 when there is a bad news ( $\varepsilon_{t-1} < 0$ ) and 0 otherwise. In the presence of bad news, the model accounts for the leverage effect if  $\gamma > 0$ . Similarly the GJR GARCH model is applied to Nifty50 options.

The estimates of these two GJR-GARCH models are simulated to 20000 trajectories using Monte Carlo simulation. The PDF's (p and q) are subsequently obtained from these trajectories by using the kernel density function.<sup>3</sup>

**Step 2: Theoretical pricing kernel:** Here the stochastic discount factor (SDF) incorporates a sentiment measure giving it a behavioral attribute [50].

$$M_{t,T}(\theta) = \theta_0 (S_T / S_t)^{-\theta_1} \quad (7)$$

Where M is the pricing kernel,  $\theta_0$  is the discount factor measuring degree of impatience or the time discount factor,  $\theta_1$  is the degree of risk aversion, and S is the proxy value of the market portfolio, taken as the daily returns of Nifty50 index.

Here  $\theta_0$  and  $\theta_1$  are calculated with the help of asset pricing equation given by [49]:

$$rf_t = -\log \theta_0 + \theta_1^2 \text{var}_t^p [\log(S_T / S_t)] / 2 + \theta_1 E_t^p [\log(S_T / S_t)] \quad (8)$$

Where  $rf$  is log gross risk free rate,  $E_t^p [\log(S_T / S_t)]$  is the objective time t conditional mean and  $\text{var}_t^p [\log(S_T / S_t)]$  is the objective time t conditional variance.

**Step 3: Calculation of sentiment ( $\Lambda_t$ ):** The sentiment measure is then taken as the difference between the empirical pricing kernel and the theoretical pricing kernel.

$$\Lambda_t = \text{Log}(M_{t,T}) - \text{Log}(M_{t,T}(\theta)) \quad (9)$$

Where,  $\Lambda_t$  provides an estimate of the sentiment function. This function transforms the objective return pdf  $p$  into a representative investors' return pdf,  $pr$ .

**Step 4:** [32] provide the relationship between  $pr$ ,  $p$  and  $\Lambda_t$ .

<sup>[2]</sup> GJR GARCH is an asymmetric GARCH model and it is preferred over other GARCH models as it captures the leverage effect. The asymmetry term is based on Glosten, Jagannathan, and Runkle (GJR) [51].

<sup>[3]</sup> GJR GARCH model, Monte Carlo Simulation and Kernel density function have been applied with the help of MATLAB software.

$$pr = pe^{\Lambda_t} \theta_{0,t,p} / \theta_{0,t} \quad (10)$$

Where,  $\theta_{0,t,p}$  is the scaling factor of  $\theta_{0,t}$  such that the representative investors' pdf ( $pr$ ) integrates to unity.

**Step 5: Calculation of optimism bias:** Optimism bias occurs when a representative investor overestimates mean returns. [23] give a measure to capture optimism

$$E_t^{pr}(S_T / S_t) - E_t^p(S_T / S_t) \quad (11)$$

Where,

$E_t^{pr}$  is conditional expectation at date  $t$  under the representative investors' pdf ( $pr$ ).  $E_t^p$  is the conditional expectation at date  $t$  under the objective pdf ( $p$ ).  $S_t$  is the Nifty 50 index returns at date  $t$ . In case of optimism this measure will be positive while, for pessimism, it will be negative.

**B. Impact of optimism (pessimism) on risk premium and volatility.**

This section deals with time series properties of optimism (pessimism) and related market indicators (risk premium and volatility).

*i. Risk premium:* In the present study, there are two risk premiums: the objective risk premium and the representative investors' risk premium.

$$\text{Objective risk premium: } E_t^p(S_T / S_t) - E_t^q(S_T / S_t) \quad (12)$$

$$\text{Representative investors' risk premium: } E_t^{pr}(S_T / S_t) - E_t^q(S_T / S_t) \quad (13)$$

Time series regression is used to check the impact of optimism on risk premium.

$$RP_t = \alpha + \sum_{j=1}^2 \beta_j RP_{t-j} + \lambda(\text{optimism})_t + \varepsilon_t \quad (14)$$

Where,

$RP_t$  is the risk premium (objective or representative investor) at date  $t$ ;  $j$  is the number of lags of risk premium;  $\beta_j$  measures the impact of ' $j$ ' lags on the risk premium;  $\text{Optimism}_t$  is the measure of optimism or pessimism in a day is calculated by equation and  $\lambda$  measures the impact of optimism or pessimism on risk premium. Here the appropriate number of lags ( $j$ ) are determined with the help of Akaike information criteria (i.e.  $j=2$ ).

*ii. Volatility:* The impact of volatility on optimism is investigated using time series regression.

$$\text{optimism}_t = \alpha' + \beta'(\text{optimism})_{t-1} + \delta(S_{t-1}) + \gamma(\text{lagvol})_t + \varepsilon_t \quad (15)$$

Where,

$Optimism_{t-1}$  is one day lagged value of optimism (pessimism) measure.  $S_{t-1}$  is the previous day lagged value of the Nifty50 index return.  $Lagvol_t$  is the *past* volatility is measured using high and low values of the previous day.  $\beta'$  measures the impact of the most recent lag on  $optimism_t$ .  $\delta$  measures the impact of the previous day lag of Nifty50 index return on  $optimism_t$ .  $\gamma$  measures the impact of  $Lagvol$  on  $optimism_t$ .

### iii. TO INVESTIGATE THE PRESENCE AND IMPACT OF OVERCONFIDENCE AND THE DISPOSITION EFFECT IN THE INDIAN EQUITY MARKET

#### Data description

The sample consists of total returns & transaction volume for each constituent stock, and the index (i.e. Nifty 50). The returns and trading volume are taken on a daily basis.

#### Methodology

To investigate the presence of overconfidence and the disposition effect in the Indian equity market, a vector autoregression (VAR) is applied and its validity is verified the help of impulse response functions (IRF's). Here the investor overconfidence is detected with the help of VAR on market-wide transaction volume and market returns. Further, VAR is also applied to security wide transaction volume, security returns and market return to investigate and segregate the impact of the disposition effect and overconfidence as suggested by [14].

#### A. Market-wide VAR to investigate investor overconfidence

Here the endogenous variables are log market turnover and daily market return of Nifty50 index, and the exogenous variable is the daily index volatility.

$$\begin{aligned} LogT_t &= \alpha + \sum_{j=1}^k \beta_j LogT_{t-j} + \sum_{j=1}^k \gamma_j Rm_{t-j} + vVol_t + \varepsilon_t \\ Rm_t &= \alpha' + \sum_{j=1}^k \beta'_j LogT_{t-j} + \sum_{j=1}^k \gamma'_j Rm_{t-j} + v'Vol_t + \varepsilon_{2t} \end{aligned} \quad (16)$$

Where:

$LogT$  is the log value of the trading volume of market index;  $Rm$  is the daily return of market index;  $Vol$  is the daily volatility of market calculated using daily high and low values of the index. Here,  $k$  is the number of lags (equal to 10) decided on the basis of Akaike Information Criteria

#### B. Security-wide VAR to investigate and segregate the impact of the disposition effect and overconfidence.

The existing literature suggests that the transaction volume of individual stocks is positively related to past returns of that particular stock which captures the disposition effect, and past return of the overall market that captures the overconfidence. This asymmetry in the mechanism makes it possible for the researchers to measure the effect of these biases by applying security-wide VAR.

$$\begin{aligned}
 \text{Log}T_t &= \alpha + \sum_{j=1}^k \beta_j \text{Log}T_{t-j} + \sum_{j=1}^k \gamma_j \text{Ri}_{t-j} + \sum_{j=1}^k \lambda_j \text{Rm}_{t-j} + \nu \text{Ivol}_t + \varepsilon_{1t} \\
 \text{Ri}_t &= \alpha' + \sum_{j=1}^k \beta'_j \text{Log}T_{t-j} + \sum_{j=1}^k \gamma'_j \text{Ri}_{t-j} + \sum_{j=1}^k \lambda'_j \text{Rm}_{t-j} + \nu' \text{Ivol}_t + \varepsilon_{2t} \\
 \text{Rm}_t &= \alpha'' + \sum_{j=1}^k \beta''_j \text{Log}T_{t-j} + \sum_{j=1}^k \gamma''_j \text{Ri}_{t-j} + \sum_{j=1}^k \lambda''_j \text{Rm}_{t-j} + \nu'' \text{Ivol}_t + \varepsilon_{3t}
 \end{aligned} \tag{17}$$

Where:

LogT = log value of number of shares traded for security i. Rm = daily return of market index.

Ri = daily return security i. Ivol = Idiosyncratic volatility of firm 'i' on day t, calculated using CAPM and k = 10 based on Akaike Information Criteria. Here the positive value of  $\gamma_j$  captures the impact of the disposition effect and positive value of  $\lambda_j$  captures the impact of overconfidence.

### ***B. Impulse Response Function (IRF)***

IRF is applied to illustrate how the endogenous variables relate to each other over time. It traces the effect of one standard deviation shock in one residual to current and future values of the endogenous variables through the dynamic structure of VAR. For instance, in market wide VAR (refer equation 16) the IRF captures the impact of changes in one residual say  $\varepsilon_t$ , on current and future values of LogT and Rm. Similar case happens for security wide VAR, which has three endogenous variables individual security trading volume, security return and market return. In the present study, the IRF is applied for 7 periods.

## **4.2 PRIMARY DATA: SURVEY DESIGN AND SAMPLE COMPOSITION**

### **To determine which bias is most pronounced in Indian context**

The target respondents for the study are the people from investing class i.e. the people having financial savings and the capacity to invest in various financial segments [46]. Further, the respondents of the Delhi-NCR region are selected for the study. This region is selected for the

reason that per-capita income of Delhi is three times the national average making it the highest in the country<sup>4</sup>. It also accounts for 60% of the trading volume in the country<sup>5</sup>. This makes the average individual in this region financially eligible to invest in stock markets. For the purpose of sampling the study follows the approach given by previous researchers like [54], [55] and [46]. The sample composition is decided on the basis of combination of judgment and snowball sampling [55]. The criteria for selecting the respondents of the survey are as follows.

- i. The respondent should be a resident of Delhi-NCR region.
- ii. The respondent must invest in the Indian equity market
- iii. The respondent should belong to middle income level or higher (i.e. annual income equal to 2 lakhs or above)<sup>6</sup> to ensure that she is financially capable of investing in the stock market.

Around 500 people were approached for participating in the survey. The survey was administered online as well as on one-to-one basis. 410 responses were received out of which 9 responses were incomplete in some way or the other making the final number of responses to be 401.

#### **4.2.1 RESPONDENT PROFILE:** (Refer figure 4.2.1)

The respondents have been categorized on the basis of demographics and investor sophistication variables. The demographics include age, gender, education, profession and income, while the investor sophistication includes trading experience and trading frequency. The percentage of respondents under each category of these variables is mentioned in table 4.2.1.

#### **4.2.2 SURVEY INSTRUMENT**

Descriptive research was undertaken to investigate behavioral biases in the investors with the help of a structured questionnaire. This questionnaire consisted of thirty six items that are divided into three sections. The first section consists of ten items that provide personal information about the respondents. The second section is Part A with 10 items containing a mix of open ended and close ended questions. The final section is part B, a five point Likert with 16 items. The questionnaire is finalized after judges' validity that includes academic as well as an

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<sup>4</sup> Source: The Economic Times Survey 2012-2013. Available at: [http://articles.economictimes.indiatimes.com/2013-09-12/news/42011594\\_1\\_capita-income-2-28-lakh-sound-economic-situation](http://articles.economictimes.indiatimes.com/2013-09-12/news/42011594_1_capita-income-2-28-lakh-sound-economic-situation)

<sup>5</sup> Source: Business Standard. Available at: [http://www.business-standard.com/article/markets/indian-equity-mkt-provides-tremendous-opportunities-survey-110100700252\\_1.html](http://www.business-standard.com/article/markets/indian-equity-mkt-provides-tremendous-opportunities-survey-110100700252_1.html)

<sup>6</sup> According to National Council of Applied Economic Research (year 2007-08) the middle income category lies anywhere between 3830 and 22,970 U.S. dollars annually which is equal to 2.8-14.3lakhs in I.N.R [56].

industry expert. A pilot study on 50 respondents has also been conducted. Further, the reliability of the questionnaire is verified with the help of Cronbach’s alpha. The summary of items in each category of biases and their corresponding reference in mentioned in table 4.2.2

Table 4.2.2: Summary of items in each bias category

<b>Bias</b>	<b>Item</b>	<b>Reference</b>
Overconfidence	A3, A5, B1, B2, B3, B5	[48], [57]
Optimism (pessimism)	A1, A2, A4, B7, B16	[58], [59], [57]
Herd Behavior	A7, A8, A9, A10, B4, B15, B16	[60], [47], [41]
Disposition Effect	A7, A8, B6, B9, B12	[31], [61], [34], [14]

### 4.2.3 STATISTICAL TESTS

#### i. CHI SQUARE TEST:

It has been conducted to check whether the responses to scenarios in Part A and B vary with each demographic and investor sophistication variable. It signifies whether investor’s decision making process is independent of these variables.

#### ii. INDEPENDENT SAMPLE T-TEST:

This test is conducted to check if the underlying bias of respondents varies by demographic and sophistication subgroups. This test is employed to give an idea about the specific characteristics of respondents that are associated with a particular bias

#### iii. ONE SAMPLE T-TEST:

It is applied to each item in Part-A and Part-B separately so as to analyze if the mean response significantly varies from neutral responses.

#### iv. RANKING OF THE MEAN VALUES OF IMPORTANCE:

This technique is used to find out which bias is given the highest importance by the respondents. For this purpose, the mean level of importance of each item on the Likert scale in Part-B is calculated. Next, the significance of these values is checked using one sample t-test. Here, the items with insignificant means and control items are ignored from further analysis. The remaining items are then ranked according to their means. The ranking is done in three ways. First, an overall ranking of all the items is conducted. This method takes into account all the biases at once. However, it cannot reveal which bias is the most prominent as the items representing same bias can have different ranks. The second method involves categorization of items into four groups, each representing a particular bias. Then the ranking of items within each group is done such that each bias has a statement which is given the highest importance by the respondents. In the third method, the means of items in each bias category are consolidated to get

a single value. Then ranking is done by rank 1 given to the bias with highest mean and rank 4 given to bias with lowest mean. This method helps in identifying which bias is most prominent amongst the investor.

## **5. RESULT AND ANALYSIS**

### **5.1 SECONDARY DATA ANALYSIS**

#### **5.1.1 DETERMINING THE PRESENCE AND ANALYZING THE IMPACT OF HERDING: (Refer tables 5.1.1.1 and 5.1.1.2)**

The results of unit root tests show that both CSSD and CSAD series are stationary. The coefficients of  $D_t^L$  &  $D_t^U$  in equation (1) are both positive and significant at the 1% level (Table 5.1.1.1) which shows that CSSD increases with an increase in market return. This refutes the hypothesis of herding behavior. The value of  $\gamma_2$  in equation (4) is also positive and significant at the 1% level, this means that return dispersion are decreasing (or increasing) at an increasing rate (Table 5.1.1.1). This again highlights the fact that herding does not exist in Indian stock market, but indicates the presence of non linearity in the relationship.

Further, individual tests for bull and bear phases of market in equation (3) & (4) indicate that, herding prevailed when the market was up (as  $\gamma_2^{UP}$  was negative and significant at 5% significance interval). However, no evidence of herding has been found when the market was down (negative insignificant  $\gamma_2^{DOWN}$ ) (Refer Table 5.1.1.2).

#### **5.1.2 INVESTIGATING THE PRESENCE AND ANALYZING THE IMPACT OF OPTIMISM (PESSIMISM)**

The unit root tests reveal that all the original series i.e., daily Nifty50 index return<sup>7</sup>, closing prices of both in-the money and out-of-the-money call and put option, are stationary at level. Whereas the derived series, including Optimism (Pessimism), objective risk premium and representative risk premium are found to be stationary at first and second difference level respectively.

**A. EMPIRICAL PRICING KERNEL ( $M_T, i$ ):** It requires the objective density (p) and the risk neutral density (q) calculated using GJR GARCH estimates.

**Results of GJR GARCH: (Refer table 5.1.2.1)**

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<sup>[7]</sup> Outliers have been removed from the daily Nifty50 return series to ensure better estimation of all the variables.

Table 1 reports the GJR GARCH estimates of Nifty 50 returns, in and out of the money put and call options. It is seen that the leverage effect (measured by the interaction dummy variable ' $I_{t-1}$ ' in equation 6) accounts for all the variables and is verified by a positive  $\gamma$  parameter, except in out-of-the money call option where it is negative but insignificant. The parameter  $\gamma$  is positive and significant for in-the-money put option and in-the-money call options. It is insignificant for the Nifty 50 return series and the out-of-the money put option series although the sign is positive. The GJR GARCH estimates are used to generate the objective density (p) and risk neutral density (q) for calculating empirical pricing kernel ( $M_{T,t}$ ). Figure 1 and 2 depict the probability distribution of objective and risk neutral density functions.

(Insert Figure 5.1.2.1 about here)

(Insert Figure 5.1.2.2 about here)

**B. THEORETICAL PRICING KERNEL, SENTIMENT FUNCTION AND REPRESENTATIVE INVESTORS' PDF:** (refer figure 5.1.2.3) It is determined as per equation (8) where  $\theta_0$ ,  $\theta_1$  are estimated with the help of a regression equation given by [49].

The difference between the theoretical pricing kernel calculated with the help of  $\theta_0$  and  $\theta_1$  and the empirical pricing kernel is used to estimate the sentiment function. The sentiment function thus derived, is used to convert the objective PDF into representative investors' PDF according to equation (10). Figure 5.1.2.3 depicts the PDF of representative investors exhibiting optimism (pessimism) bias for in- the- money put option.

(Insert Figure 5.1.2.3 about here)

Finally, the difference between the mean expected return from the representative investors' PDF and the objective PDF is taken as a measure of optimism or pessimism depending on the measure being positive or negative.

**C. PRESENCE OF OPTIMISM (PESSIMISM) BIAS:** The results reveal that the measure is majorly negative, which suggests the presence of pessimism for the period 2006-2013. The mean of pessimism series is significant at the 1 percent level.

**D. TIME SERIES REGRESSION FOR ESTIMATING THE IMPACT OF OPTIMISM (PESSIMISM) ON RISK PREMIUM:**

- i. **Put options:** (Refer tables 5.1.2.1 and 5.1.2.2). This test is conducted for all option types, but for representation purpose in-the-money put options are discussed. The results reveal that the estimate of optimism (pessimism) is negatively related to objective risk premium. However, it is

positively related to the representative investors' risk premium. All the remaining values are significant at the 1 percent level. The results are similar in the case of call options. The results highlight the fact that when the investors are rational, their risk and return relationship is positive while it tends to be negative when they are irrational. This finding is in alignment with the results of [23].

**E. TIME SERIES REGRESSION FOR IDENTIFYING THE IMPACT OF VOLATILITY ON OPTIMISM (PESSIMISM):** (refer tables 5.1.2.3 and 5.1.2.4). There are again four sets of results which reveal that lagged volatility is negatively related to the estimate of optimism (pessimism). The value is significant at the 1 percent level for three out of four option types. The inverse relation between past volatility and optimism is in support of the findings of [23].

### **5.1.3 INVESTIGATING THE PRESENCE AND ANALYZING THE IMPACT OF OVERCONFIDENCE AND THE DISPOSITION EFFECT**

**A. RESULT FOR MARKET-WIDE VAR:** (refer table 5.1.3.1)

The results reveal that log transaction volume of Nifty 50 index is positively related to all the lags of market return with second lag of market return being significant. This relationship prevails even after controlling for volume-volatility relationship. This finding indicates the presence of overconfidence in the Indian equity market.

**B. RESULTS FOR SECURITY-WIDE VAR:** (refer table 5.1.3.2)

The lags with significant positive and/or negative coefficients for security return and market return are reported. The results reveal that out of 45 companies, the disposition effect and overconfidence can be detected in 20 firms with an extent of certainty. More precisely, overconfidence bias is present with 12 firms, the disposition effect is present with 5 firms and 3 firms are affected by both biases. This makes overconfidence bias to be predominant amongst the two.

**C. RESULTS FOR IMPULSE RESPONSE FUNCTION**

**Market Impulse Response Function** (refer Figure 1 and Table 5.1.3.3)

Figure 1 presents the response of market trading volume (LogT) and market return (Rm) to one standard deviation shock in their respective residuals. The results reveal that there is a positive impact of LogT-shock on LogT and it persists for all the periods. This impact is highest for the first period (31%), declines in the second and third period and thereafter remains stable ranging

between 5-6%. Further, the graph depicts the positive dependence of LogT to Rm shock which persists for all seven periods. This dependence is clearly illustrated in table 1 which shows that the Rm shock leads to a positive and significant 2% increase in LogT for third period. This finding verifies that market returns impact the investors' confidence and subsequent trading activity.

### **Security Impulse Response Function**

It investigates the response of all the three endogenous variables namely, security trading volume (LogT), security returns (Ri) and market return (Rm), to the shock in their respective residuals. In the present context, the response of LogT to Ri and Rm shock is being discussed, as it brings more clarity to the overconfidence and the disposition effect theory.

The empirical evidence for the overconfidence hypothesis can be verified for 11 firms as the trading activity is positively related to past market returns. This can be observed from the response of LogT for market return shock, which is positive and significant. Whereas, the disposition effect theory can be validated for only three firms wherein, the response of LogT to Ri shock is positive. The periods for which these results are significant are also identified.

The results of both market and security impulse response are in alignment with the findings of VAR and suggest that overconfidence is predominant of the two biases.

## **5.2 PRIMARY DATA ANALYSIS**

### **5.2.1. RESULTS OF CRONBACH'S ALPHA:**

Results reveal that reliability of items pertaining to optimism (pessimism), overconfidence, and herding is greater than the benchmark value of 0.70 which makes them a preferable scale. The reliability of items corresponding to the disposition effect is lower than the accepted benchmark (0.54).

### **5.2.2 RESULTS FOR CHI SQUARE TEST (refer table 5.2.1)**

The chi square results illustrate that there is dependence between investors' demographics and sophistication factors and their behavioral biases. The results also reveal that age of an investor creates the highest difference in the behavioral biases followed by trading frequency and profession of the investors.

### **5.2.3 RESULTS FOR INDEPENDENT SAMPLE t-TEST (refer table 5.2.2)**

Overconfidence mostly affects male investors (group 1), lying under the age group of 31-60 years (group2, 3 and 4), with an annual income, either 2-4 lakhs (class 1) or 8-11 lakhs (class 4).

These investors, mostly invest in new companies with high growth (group 1), with a trading experience of 3 years or more (group 3, 4, and 5) trade on an intraday basis (group 1). They can be employed by PSU's and Government sector (group 1) or they can be financial experts (group 4).

Optimism is observed in men (group 1), with the age group of 51-60 years (group 4), annual income 2-4 lakhs (class1) and greater than 8 lakhs (class 4 and 5), who invest in new companies with high growth (group 1), with an experience of more than 5 years (group 4 and 5) intraday traders and financial experts. On the other hand, pessimism is observed in women, with age group 21-30 years (group 1) and 41-50 years (group 3), having annual income between 2 to 8 lakhs. It is also seen in respondents who invest in stocks of old companies (group 2), derivatives and commodities market, and high grade corporate bonds.

Herd behavior is seen in relatively old investors of age 51-60 years (group 4), those who invest in new companies with high growth (group 1), with very low experience (less than a year) or very high experience (greater than 7 years), and are intraday investors (group 1).

Finally, the disposition effect influences men and women equally. However, it is seen clearly in investors coming within the age group of 31-40 years (group 2), with annual income 6-11 lakhs (group 3 and 4), and an experience of less than one year or more than 3 years (group 3, 4 and 5). The investors prone to this bias are either public and private sector employees (excluding banks), financial experts (group 1, 2 and 4) and they trade on intraday basis (group 1). All the results are significant at the 5 percent and one percent level.

#### **5.2.4 RESULTS FOR ONE SAMPLE t-TEST (PART-A)**

It can be seen that 44.6% of respondents are slightly optimistic towards the outlook of the Indian equity market (A1). When asked about the average return of the Indian equity market in past 15 years, 54.29% respondents gave a realistic estimate (A2) and 43.9% are sure about it (A3). Their perspective was cross checked with their future estimate on gold prices (A4). As discussed in earlier sections, a highly optimistic view for gold prices indicates that investors are uncertain about the performance of the stock market. This motivates them to channelize their demand towards gold, which is considered to be a safe asset. In the present study, 33.7 % investors feel that gold prices will improve in next six months and an equal percentage of the sample feels that the prices will remain stable. 69.3% respondents are sure about their gold price estimates (A5). This result provides a mixed viewpoint of investors towards the Indian equity market. However,

greater clarity on respondents' outlook is developed from responses in subsequent items in part B.

Taking into consideration, what investors look for in an investment (A6), it is found that 32.4% give priority to security of their investment i.e. risk versus return and 31.4% take into consideration the potential gain from an investment. The remaining sample respondents either think about losses or both gains and losses.

Items A7 and A8 correspond to the disposition effect in investors. The investor responses show that 44.6% individuals would remain invested in stocks whose price falls by a certain percent, as they look for long term growth. On the other hand, 50.4% individuals would sell their winning stocks to lock in their gains. It could be inferred from the results that these individuals are prone more to the selling side of the disposition effect.

Investors were also found to be prone to herding bias as 47.1% individuals consider their peers to be an important source of information and 51.4% consider the opinions of market experts to be important.

### **5.2.5 RESULTS FOR RANK-TEST (PART B):**

#### ***Results of overall ranking:***

The highest importance is given to the statement B3 followed by B2. Both these items correspond to overconfidence. Third rank of importance is given to B7 which captures optimism. Item B4 capturing herd behavior gets the middle rank 7. The lowest rank is given to item B9 that relates to the disposition effect. The results are significant at the 5 percent and the 1 percent level.

The overall ranking provides a broad idea that which statement is given the highest importance. However, to get a clear picture of the order of prevalence, bias wise ranking of items is done, which is followed by the consolidation of means.

#### ***Bias- wise ranking:***

Item B3 gets the highest level of importance under overconfidence bias. Taking into consideration the optimism bias, the results reveal that statement B7 is given the highest importance. The highest herding tendency is suggested with item B15. Finally, the disposition effect is observed highest in item B6. The results are significant at the 1 percent level.

***Order of the prevalence of biases:*** (refer table 5.2.3)

The results reveal that overconfidence is most prevalent bias with the highest mean closely followed by optimism and herding. The disposition effect is found to be least important bias with a mean of.

## **6. CONCLUSION**

To conclude, the present study investigates the presence and impact of four behavioral biases in the Indian equity market, namely; herd behavior, optimism (pessimism), overconfidence and the disposition effect, using both primary and secondary data. The primary data provides the real time insight into investors' psychology. On the other hand, the secondary data approach provides the findings that can be generalized on the market as a whole, for a period 2006-2013. The secondary data analysis determines the presence and impact of behavioral biases on various indicators of the Indian equity market like return dispersion, risk premium, volatility and transaction volume.

The results reveal that herd behavior is not seen in the overall market, although, it persists in a bull phase. This bias can lower the security return dispersion. Moreover, in the presence of severe herding, the dispersion might become negative. Further, the Indian equity market has been predominantly pessimistic for the period 2006-2013. The study shows that past volatility is one of the factors behind pessimism. This bias is responsible for creating a negative risk-return relationship in investors. Additionally, overconfidence and the disposition effect also prevail in the Indian equity market. These biases increase the market and individual security transaction volume respectively. On segregating the impact of these biases, it is seen that overconfidence predominates the disposition effect. Finally, the survey results capture the current state of behavioral biases of Indian investors in the Delhi/ NCR area. It presents the investor characteristics specific to each bias. These characteristics include investors' demographics as well as trading sophistication. It is observed that men are more overconfident and optimistic than women, herd behavior affects the old investors and the disposition effect is present in middle aged investors. Furthermore, the intraday traders, traders with high experience and investors of new companies are prone to most of the biases. The other parameters on which these biases can be differentiated are annual income and profession. Finally, on ranking these biases in their order of prevalence, overconfidence comes out to be the most important bias in the Indian equity market.

## 7. IMPLICATIONS AND FUTURE AREA OF RESEARCH

As behavioral biases are unequivocally associated wherever human beings are involved; its implications become very wide. Hence, we narrow down our focus to implications that concern the financial practitioners. It can be suggested that a good grasp of this area will equip the practitioners not just to recognize others mistakes but their own mistakes as well. It facilitates financial advisors to become more effective by understanding their clients' psychology. It aids them in developing behaviorally modified portfolio, which best suits their clients' predisposition. It helps investment bankers in understanding the market sentiments as they make public issues for their companies. It assists the financial strategists in making better forecasts and security analysts for recommending stocks. Finally, the knowledge of behavioral biases is required for individual investors in the pursuit of making sensible and effective financial decisions.

Behavioral finance is a rapidly growing field, but it is still at a nascent stage in the developing countries, like India. Some of future areas of research in this field are mentioned as follows;

- Future research can take place in many other equally important biases like loss aversion, representativeness and mental accounting.
- In India the behavioral biases are mostly studied using survey based techniques. In contrast, the possibility of researching this area with the help of secondary data is still untapped in Indian context. Therefore, secondary data can be utilized for detecting the impact of behavioral biases on other market indicators, for e.g. P/E ratio, moving average etc.
- The study also leaves scope for various experimental researches.
- The survey based research can be extended with a larger sample, to other parts of India where trading activity is high.

### REFERENCES

- [1] Statman, M. "*What is Behavioral Finance?*" Handbook of Finance, vol. 2. New Jersey: John Wiley & Sons, Inc., 2008.
- [2] Statman, M., "*Rational is Stupid*", 2012, <http://blogs.cfainstitute.org/investor/2012/10/16/rational-is-stupid-learn-the-science-of-investing-to-be-a-normal-smart-investor-meir-statman/>. Accessed on Feb 2, 2014.
- [3] Cooper, M.J., Dimitrov, O. and Rau, P.R., "*A Rose.com by Any Other Name*", Journal of Finance, vol. 56, no. 6, pp. 2371-2388, 2001.
- [4] Zhou, W-X and Sornette, D. "*Is there a Real-Estate Bubble in the U.S.?*" Physica A, vol. 361, pp. 297-308, 2006.
- [5] Sewell, M., "*Behavioral Finance*", Working Paper, University of Cambridge, revised April, 2010.

- [6] Shefrin, H., *Beyond Greed and Fear: Understanding Behavioral Finance and Psychology of Investing*, New York: Oxford University Press, 2000.
- [7] Statman, M. “*Behavioral Finance: Past Battles and Future Engagements*”, *Financial Analysts Journal*, vol. 55, no. 6, pp. 18-27, 1999.
- [8] Odean, T. “*Volume, volatility, price and profit when all traders are above average*”, *Journal of Finance*, vol. 53, pp. 1887-1934, 1998.
- [9] Daniel, K., Hirshleifer, D. and Subrahmanyam, A. “*Investor Psychology and Security Market Under and Overreactions*”, *The Journal of Finance*, vol. 53, no. 6, pp. 1839-1886, 1998.
- [10] Gervais, S. and Odean, T., “*Learning to be Overconfident*” *Review of Financial Studies*, vol. 14, pp. 1-27, 2001.
- [11] Odean, T., “*Do investors trade too much?*” *American Economic Review*, vol. 89, pp. 1279–1298, 1999.
- [12] Barber, B. and Odean, T., “*Trading is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors*”, *Journal of Finance*, vol. 55, no. 2, pp. 773-806, 2000.
- [13] Barber, B. and Odean, T., “*Boys Will Be Boys: Gender, Overconfidence and Common Stock Investment*”, *The Quarterly Journal of Economics*, vol. 116, no. 1, pp. 261-292, 2001.
- [14] Statman, M., Thorley, S. and Vorkink, K., “*Investor Overconfidence and Trading Volume*”, *Review of Financial Studies*, vol. 19, no. 4, pp. 1531-1565, 2006.
- [15] Hirshleifer, D. and Luo, G.Y., “*On the survival of overconfident traders in a competitive securities market*”, *Journal of Financial Markets*, Vol.4, pp. 73-84, 2001.
- [16] Glaser, M. and Weber, M., “*Overconfidence and trading volume*”, *Geneva Risk and Insurance Review*, vol. 32, no. 1, pp. 1-36, 2007.
- [17] Hoffmann, A. and Post, T., “*What Makes Investors Optimistic, What makes them Afraid*”, *Netspar Working Paper Series No. 44*, 2012.
- [18] Bennet, E., Selvam, M., Vivek, N. and Shalin, E.E., “*The Impact of Investors’ Sentiment on The Equity Market: Evidence From Indian Stock Market*”, *African Journal of Buisness Management*, vol. 6, no. 32, pp. 9317-9325, 2012.
- [19] Bradshaw, M., Huang, A. and Tan, H., “*Analyst Target Price Optimism around the World*”, *Working Paper*, 2012.
- [20] Heifetz, A. and Siegel, Y., “*The Evolution of Biased Perceptions*”, *Working Paper*, 2001.
- [21] Germain, L., Rosseau, F. and Vanhems, A., “*Optimistic and Pessimistic Trading in Financial Markets*”, *Working Paper*, 2005.
- [22] Shefrin, H. and Statman, M., “*Behavioral Finance in the Financial Crisis: Market Efficiency, Minsky, and Keynes*”, *Working Paper*, Santa Clara University, 2011.
- [23] Barone-Adesi, G., Mancini, L. and Shefrin, H., “*A Tale of Two Investors: Estimating Risk Aversion, Optimism and Overconfidence*”, *Working Paper*, 2012
- [24] Lakonishok, J., Shleifer, A. and Vishny, R.W., “*Do Institutional Investors Destabilize Stock Prices- Evidence on Herding and Feedback Trading*”, *NBER Working paper*, no. 3846, 1991.
- [25] Scharfstein, D.S., and Stein, J.C., “*Herd behavior and Investment*”, *American Economic Review*, vol. 80, pp. 465-479, 1990.
- [26] Christie, W.G. and Huang, R.D., “*Following the Pied-Piper: do individual returns herd around the market?*”, *Financial Analyst Journal*, pp. 31-37, 1995.

- [27] Hwang, S. and Salmon, M., “A new measure of herding and empirical evidence for the US, UK, and South Korean stock markets,” Centre of Economic Policy Research Discussion Paper, Working Paper, 2001.
- [28] Chang, E., Cheng, E.J. and Khorana, A., “An examination of herd behavior in equity markets: an international perspective,” *Journal of Banking & Finance*, vol. 24, pp. 1651-1679, 2004.
- [29] Caparrelli, F., D’Arcangelis, A. and Cassuto, A., “Herding in the Italian stock market: a case of behavioral finance,” *Journal of Behavioral Finance*, vol. 5, pp. 222-230, 2004.
- [30] Lakshman, M.V., Basu, S. and Vaidyanathan, R., “Market wide herding and the impact of institutional investors in the Indian capital market”, Working Paper 327, Indian Institute of Management, Bangalore, 2011.
- [31] Shefrin, H. and Statman, M., “The Disposition to Sell Winners too Early and Ride Losers too Long: Theory and Evidence”, *Journal of Finance*, vol. 40, pp. 777-79, 1985.
- [32] Odean, T., “Are investors reluctant to realize losses?” *Journal of Finance*, vol. 53, no. 5, pp. 1775-1798, 1998.
- [33] Grinblatt, M. and Keloharju, M., “What makes investors trade?” *Journal of Finance*, vol. 56, pp. 589-616, 2001.
- [34] Shumway, T. and Wu, G. “Does Disposition Drive Momentum?” Working paper, 2006.
- [35] Kumar, A., “Hard-to-Value Stocks, Behavioral Biases, and Informed Trading”, *Journal of Financial and Quantitative Analysis*, vol. 44, no. 6, pp. 1375-1401, 2009.
- [36] De, S., Gondhi, N. and Sarkar, S., “Behavioral Biases, Investor Performance, and Wealth Transfers between Investor Groups”, Working Paper, Centre of Analytical Finance, Indian School of Business, Hyderabad, 2011.
- [37] Nagy, R.A. and Obenberger, R.W., “Factors Influencing Investors Behavior”, *Financial Analyst Journal*, vol. 50, pp. 63-68, 1994.
- [38] Al-Tamimi, H.A.H, “Factors Influencing Individual Investor Behaviour: An Empirical Study of the UAE Financial Markets”, *The Business Review*, vol. 5, no. 2, 2006
- [39] Kim, K.A. and Nofsinger, J.R., “The Behaviour of Japanese Individual Investors during bull and bear markets”, *The Journal of Behavioral Finance*, vol. 8, no. 3, pp. 138-153, 2007.
- [40] Chandra, A. and Kumar, R., “Factors Influencing Indian Individual Investor Behaviour: Survey Evidence”, *Decision*, vol. 39, no. 3, pp. 141-167, 2012.
- [41] Hon-Snir, S., Kudryavtsev, A. and Cohen, G., “Stock Market Investors: Who is More Rational and Who Relies on Intuition?”, *International Journal of Economics and Finance*, vol. 4, no. 5, pp. 56-72, 2012.
- [42] Malmendier, U. and Shanthikumar, D., “Are small investors naïve?”, Working Paper, Stanford University, 2003.
- [43] Feng L. and Seasholes, M.S., “Do Investor Sophistication and Trading Experience Eliminate Behavioral Biases in Financial Markets?”, *Review of Finance*, vol. 9, pp. 305-351, 2005.
- [44] Bhandari, G. and Deaves, R., “The Demographics of Overconfidence”, *The Journal of Behavioral Finance*, vol. 7, no. 1, pp. 5-11, 2006.
- [45] Hoffmann, A.O.I, Shefrin, H. and J.M.E Pennings, J.M.E, “Behavioral Portfolio Analysis of Individual Investors”, Working Paper, 2010, <http://dx.doi.org/10.2139/ssrn.1629786>. Accessed on Nov 24, 2013.

- [46] Sahi, S.K. and Arora, A.P. “Individual Investor Biases: A Segmentation Analysis”, *Qualitative Research in Financial Markets*, vol. 4, no. 1, pp. 6-25, 2011.
- [47] Lütje, T. and Menkoff, L., “*Risk Management, Rational Herding and Institutional Investors: A Macro View*”, Discussion Paper, University of Hannover, Germany, 2003.
- [48] Mangot, M., *50 Psychological experiments for Investors*, John Wiley and Sons (Asia) Pvt. Ltd. Singapore, 2009.
- [49] Campbell, J., Lo, A. and MacKinley, A.C., *The Econometrics of Financial Markets*, Princeton University Press, Princeton, U.S.A., 2007
- [50] Shefrin, H., *A Behavioral Approach to Asset Pricing*, Second Edition, Elsevier Academic Press, Boston, 2008.
- [51] Glosten, L.R., Jagannathan, R. and Runkle, D.E., “*Relationship between the expected value and the volatility of the nominal excess return on stocks*”, *The Journal of Finance*, vol. 48, no. 5, pp. 1779-1801, 1993.
- [52] Johansen, S., “*Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models*”, *Econometrica*, vol. 59, pp. 1551–1580, 1991.
- [53] Johansen, S., “*Likelihood-based Inference in Cointegrated Vector Autoregressive Models*”, Oxford: Oxford University Press, 1995.
- [54] Gupta, L.C., “*Indian Shareowners: A Survey*”, Society of Capital Market Research and Development, New Delhi, 1991.
- [55] Davar, Y.P. and Gill, S. “*Investment decision making: an exploration of the role of gender*”, *Decision*, vol. 34, no. 1, pp. 95-120, 2007.
- [56] Shukla R. and Purusothaman, R., “*The Next Urban Frontier: Twenty Cities to Watch*”, National Council of Applied Economic Research (NCAER) and Future Capital Research (FCH), New Delhi, 2008.
- [57] Awan, H.M., Bukhari, K. and Ghufuran, B. “*Understanding the Investor Behavior of Individual Investors: How they Handle Investment Decisions? Do They Act Rationally?*”, Working Paper, Institute of Management Sciences, Bahauddin Zakariya University, Multan, 2010.
- [58] Chopra, A.K. “*India’s Gold Buying Craze Affects Stock Market and its GDP*”, *The National*, 2011, <http://www.thenational.ae/business/industry-insights/economics/indias-gold-buying-craze-affects-stock-market-and-its-gdp>, accessed on Nov 30, 2013.
- [59] Business Today, “*Gold prices making a comeback: Factors that are driving its resurgence*”, pp. 1, 2013, <http://businesstoday.intoday.in/story/gold-on-the-rise-factors-driving-its-resurgence/1/198248.html>. Accessed on Dec 5, 2013.
- [60] Menkhoff, L., Schmidt, U. and Brozynski, T., “*The Impact of Experience on Risk Taking, Overconfidence, and Herding of Fund Managers: Complementary Survey Evidence*”, Working Paper, University of Hannover, Germany, 2005.
- [61] Bodie, Z., Kane, A., Marcus, A.J. and Mohanty, P. *Investments* (8<sup>th</sup> ed.). New York: Mc Graw Hill, 2009.

## ANNEXURE A

**Table-5.1.1.1: Results of Regression of Daily CSSD and CSAD using Dummy Variables**

Coefficients				Coefficients			
Model	Unstandardized Coefficients	t-statistic	Sig.	Model	Unstandardized Coefficients	t-statistic	Sig.
	Beta				Beta		
(Constant)	1.92	78.91	0.00***	(Constant)	1.51	87.16	0.00***
D1	0.72	11.03	0.00***	Rm	-0.01	-1.38	0.16
D2	0.88	12.31	0.00***	Rm square	0.02	17.18	0.00***
a Dependent Variable: CSSD				a Dependent Variable: CSAD			

\*\*\* Significant at the 1% level

**Table 5.1.1.2: Results of regression of daily CSAD during periods of market stress**

Coefficients (Bull Phase)				Coefficients (Bear Phase)			
Model	Unstandardized Coefficients	t-statistic	Sig.	Model	Unstandardized Coefficients	t-statistic	Sig.
	Beta				Beta		
(Constant)	0.86	3.99	0.00***	(Constant)	1.14	4.06	0.00***
Rm	0.42	5.37	0.00***	Rm	0.27	2.14	0.03**
Rm square	-0.01	-2.47	0.02**	Rm square	0.00	-0.03	0.97
a Dependent Variable: CSAD up				a. Dependent Variable: CSAD down			

\*\* Significant at the 5% level

\*\*\* Significant at the 1% level

**Table 5.1.2.1: GJR GARCH estimates:** The GARCH effect and leverage impact on dependent series (includes log values of daily Nifty 50 returns and closing option prices)

Parameters	Daily Nifty 50 returns	Out of the money put options	In-the-money-put options	Out-of-the money-call options	In-the-money call options
$\omega$	0	0.72	0.64***	0.10***	0.05***
$\beta$	0.98***	0.76***	0.78***	0.83***	0.56***
$\alpha$	0.01	0.17*	0.07*	0.18***	0.39***
$\gamma$	0.01	0.01	0.13***	-0.02	0.09**

\* Significant at the 10% level

\*\* Significant at the 5% level

\*\*\* Significant at the 1% level

**Table 5.1.2.2: Impact of pessimism in in the money put options on objective risk premium**

Parameter	Unstandardized coeff.	t-statistic	Sig.
(Constant)	0.01***	4.83	0.00
RP <sub>-1</sub>	0.01	0.33	0.74
RP <sub>-2</sub>	0.03	1.83	0.07
Pessimism	-0.47***	-68.35	0.00
Adjusted R square		0.93	

\*\*\* Significant at the 1% level

**Table 5.1.2.3: Impact of pessimism in in-the-money put options on representative investors' risk premium**

Parameter	Unstandardized coeff.	t-statistic	Sig.
(Constant)	0.02***	8.3	0.00
RP <sub>-1</sub>	-0.60***	-18.2	0.00
RP <sub>-2</sub>	-0.38***	-11.29	0.00
Pessimism	0.27***	17.24	0.00
Adjusted R square	0.56		

\*\*\* Significant at the 1% level

**Table 5.1.2.4: Dependent variable: pessimism in in-the-money put options:**

Parameter	Unstandardized coeff.	t-statistic	Sig.
(Constant)	0.00	0.04	0.97
<i>Optimism<sub>t-1</sub></i>	0.41***	10.29	0.00
<i>S<sub>t-1</sub></i>	0.00	-0.14	0.89
<i>Lagvol<sub>t</sub></i>	-1.53***	-5.64	0.00
Adjusted R square	0.27		

\*\*\* Significant at the 1% level

**Table 5.1.3.1: Market-wide vector autoregression. Endogenous variables: log market transaction volume (LOGT) and market return (Rm). Exogenous variable: Market volatility (Vol)**

	Rm(-1)	Rm(-2)	Rm(-3)	Rm(-4)	Rm(-5)	Rm(-6)	Rm(-7)	Rm(-8)	Rm(-9)	Rm(-10)	VOL	Adj R-sq
LOGT	0.00	0.01***	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	2.52	0.63
<i>t-stat</i>	[ 0.64]	[ 2.71]	[ 0.61]	[ 0.34]	[ 1.32]	[ 1.14]	[-0.24]	[ 1.91]	[ 1.06]	[ 0.07]	[5.29]	
											-	
Rm	0.02	-0.03	-0.04	-0.03	-0.03	-0.06***	0.01	0.05**	0.00	0.00	15.3*	0.02
<i>t-stat</i>	[ 0.96]	[-1.38]	[-1.75]	[-1.18]	[-1.37]	[-2.57]	[ 0.32]	[ 2.10]	[ 0.06]	[ 0.01]	**	
											[-	
											5.71]	

**Lagged market return (Rm)**

\*\* Significant at the 5% level

\*\*\* Significant at the 1% level

**Table 5.1.3.2: Summarized results of overconfidence and the disposition effect bias**

Bias Name	Companies	Total
<b>Firms with Overconfidence Bias</b>	Hindalco Industries Ltd.	12
	Housing Development Finance Corpn. Ltd.	
	Jaiprakash Associates Ltd.	
	Punjab National Bank	
	Ranbaxy Laboratories Ltd.	
	Reliance Capital Ltd.	
	Reliance Industries Ltd.	
	Reliance Infrastructure Ltd.	
	Siemens Ltd.	
	Sesa Goa Ltd.	
	Sterlite Industries (India) Ltd.	
Tata Steel Ltd.		

<b>Firms with the disposition effect</b>	H C L Technologies Ltd. Hero Motocorp Ltd. IDFC Reliance Communications Ltd. Kotak Mahindra Bank Ltd.	5
<b>Firms with both Overconfidence &amp; The disposition effect</b>	A C C Ltd. Bharat Petroleum Corpn. Ltd. Steel Authority Of India Ltd. (SAIL)	3
<b>Total</b>		20

**Table 5.1.3.3: Response of LogT to 1 S.D. shock of LogT an Rm residuals**

Period	1	2	3	4	5	6	7
LogT	0.31	0.09	0.06	0.06	0.07	0.07	0.06
Tstat	58.78***	11.83***	7.97***	7.33***	8.58***	9.20***	7.75***
Rm	0.00	0.00	0.02	0.01	0.01	0.01	0.02
tstat		0.46	2.59***	1.27	0.83	1.65	1.83

\*\*\* Significant at 1% interval

Here, LogT is the daily trading volume of market (i.e. Nifty 50 index) and Rm is the daily return of the index.

**Table 5.2.1: Summary of Chi square tests**

Demographic/ investor sophistication variable	No. of items with significant chi-square values
Gender	16
Age	24
Education	6
Profession	22
Income	9
Trading experience	10
Trading frequency	20

**Table 5.2.2: Investor profile corresponding to each bias**

Demographic/Investor sophistication variables	Behavioral bias				
	Overconfidence	Optimism	Pessimism	Herd behavior	Disposition effect
Gender	1	1	2	-	-
Age	2,3,4	4	1,3	4	2
Profession	1,4	4	-		1,2,4
Income	4,5	1,4,5	2,3	-	3,4
Investment type	1	1	2,3,4	1	-
Trading experience	3,4,5	4,5	-	1,5	1,3,4,5
Trading frequency	1	1	1	1	1

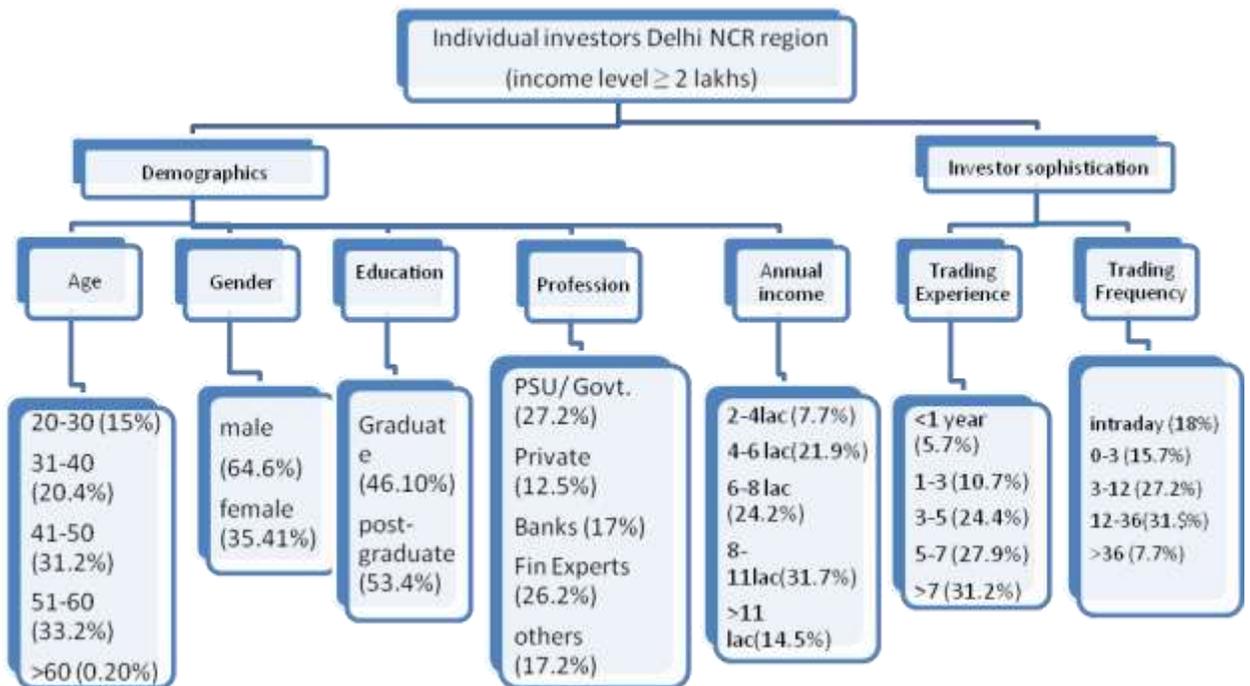
The table presents the demographic and investor sophistication characteristics representing each bias. The values in the table are codes of demographic and investor sophistication categories. (-) sign implies that the bias has an equal impact on the categories of corresponding variable.

**Table 5.2.3: Ranking of biases in the order of prominence**

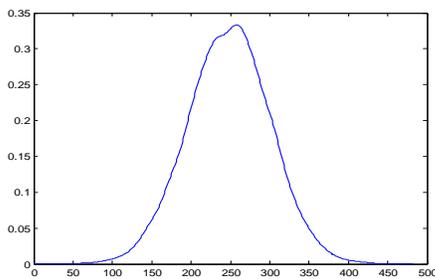
Bias name	Mean	Rank
Overconfidence	3.65	1
Optimism	3.54	2
Herding	3.10	3
Disposition effect	2.83	4

**A. FIGURES**

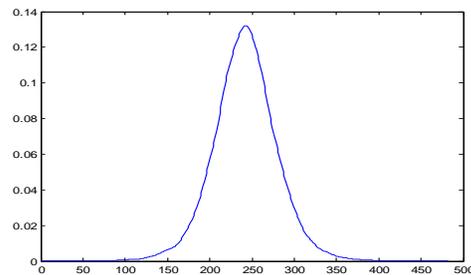
**Figure 4.2.1: Data composition of investor sample**



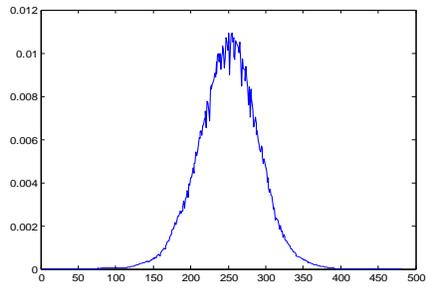
**Figure 5.1.2.1: Objective PDF**



**Figure 5.1.2.2: Risk Neutral PDF:**

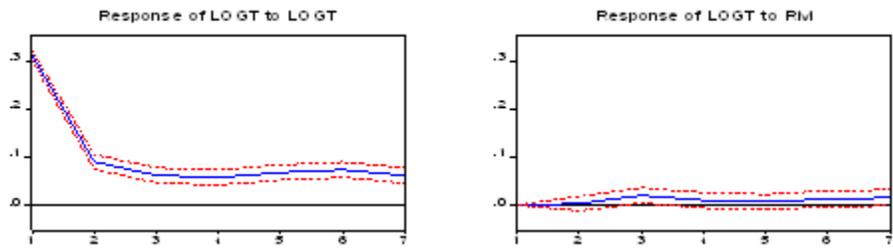


**Figure 5.1.2.3: Representative investors' pdf**



**Figure 5.1.3: Market impulse response function with two standard error bands**

Response to Cholesky One S.D. Innovations  $\pm 2$  S.E.



## ANNEXURE B

### Dear Respondent

The purpose of this survey is to learn your views on investment pattern in general. Your responses will be kept confidential and used only for academic purposes. Please provide following information about yourself.

1. Name: \_\_\_\_\_
2. Age: \_\_\_\_\_
3. Gender:
  - a. Male
  - b. Female
4. Educational qualification
  - a. Undergraduate
  - b. Graduate
  - c. Post-graduate
  - d. Doctorate
5. Current profession: \_\_\_\_\_
6. Annual income: \_\_\_\_\_
7. Have you invested stock markets before?
  - a. Yes
  - b. No
8. If yes, then please specify which type of securities are you most comfortable in investing.
  - a. Stocks or mutual funds of new companies with high growth.
  - b. Stocks or mutual funds of old companies with high growth.
  - c. Derivatives and commodities market
  - d. High grade corporate bonds.
  - e. Debt and Liquid funds from AMC's
  - f. Others (Please specify)
9. For how long have you been investing?
  - a. Less than 1 year
  - b. 1-3 years
  - c. 3-5 years
  - d. 5-7 years
  - e. more than 7 years
10. When do you decide to invest?
  - a. When surplus funds are available
  - b. On friends' advice
  - c. Market movements
  - d. Analyst forecasts in News media
11. How frequently do you invest in equity markets?
  - a. Intraday
  - b. 0-3 months
  - c. 3-12 months
  - d. 12-36 months
  - e. 36 months or more

### PART-A

Kindly tick only one relevant choice.

1. My outlook for Indian equity market in near future is:
  - a. Very optimistic
  - b. Slightly optimistic
  - c. Cannot say
  - d. Slightly pessimistic
  - e. Very pessimistic
2. What do you think is the average return of Indian stock market for last 15 years? \_\_\_\_\_
3. How sure are you to your answer to question 1?
  - a. Extremely sure
  - b. Sure
  - c. Not sure
  - d. Don't know
4. I think the prospects of gold prices in next six months will:
  - a. Improve significantly
  - b. Improve
  - c. Stable
  - d. Decline
  - e. Decline significantly
5. How sure are you to your answer to question 2?
  - a. Extremely sure
  - b. Sure
  - c. Not sure
  - d. Don't know
6. Before making an investment I think:
  - a. Mostly about the potential gain
  - b. A little about potential gain
  - c. Mostly about potential loss
  - d. A little about potential loss
  - e. Both
  - f. Security of investment (i.e. risk v/s return)
7. Consider that just within two months after you put money into an investment your stock price valued at Rs. 100 declines by 20% to Rs. 80. Assuming that none of the fundamentals have changed, how would you respond?

- a. I would remain invested and ignore temporary changes as I look for long term growth.
  - b. I would buy more as it was a good investment before now it's cheap investment too.
  - c. I would sell to avoid further worries and try something else.
  - d. I would discuss this situation with my fellow traders and do what they are doing.
8. The price of your investment jumps by 25% a month after you buy it. The fundamentals of the firms remain same, how would you respond now?
- a. I would buy more as the price could go higher.
  - b. I would sell it and lock in my gains.
  - c. I would stay put and hope for more gains
  - d. I would discuss this situation with my fellow traders and do what they are doing.
9. How important are your peers for you as a source of information?
- a. Extremely important b. Important c. Least important d. Not important at all
10. How important are other market participants (includes brokers, fund managers, institutional investors, analysts etc.) for you as a source of information?
- a. Extremely important b. Important c. Least important d. Not important at all

**PART – B**

Please answer the following questions by circling your preferred response where:

SD	D	N	A	SA
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

1.	I have sufficient knowledge of Indian stock market.	SD	D	N	A	SA
2.	I am confident of my ability to pick better stocks than others.	SD	D	N	A	SA
3.	I take full control and responsibility of my portfolio performance.	SD	D	N	A	SA
4.	Discussing my investment decisions with colleagues reduces my pressure of being successful.	SD	D	N	A	SA
5.	My past investment successes are attributed to my own skills and understanding.	SD	D	N	A	SA
6.	My past investment successes make me invest more in stocks	SD	D	N	A	SA
7.	I plan to increase my investment in stock market in next quarter	SD	D	N	A	SA
8.	I would increase my trading activity if the past trading volume of stock market was higher than usual.	SD	D	N	A	SA
9.	I prefer to sell stocks as soon as their price starts increasing.	SD	D	N	A	SA
10.	I prefer to keep holding on to stocks if their current market price is greater than their purchase price.	SD	D	N	A	SA
11.	I quickly dispose of the stocks whose price starts decreasing.	SD	D	N	A	SA
12.	I prefer to keep holding on to stocks even if their past performance is not very encouraging.	SD	D	N	A	SA
13.	I prefer to buy stocks if many "buy" orders were placed from the beginning of the trading session.	SD	D	N	A	SA
14.	My disappointment after losing money on an investment diminishes a little if others have also experienced the same loss.	SD	D	N	A	SA
15.	I feel extremely disappointed if I take a contrarian position (opposite to the general trend) and lose while my friends make profits by following the crowd.	SD	D	N	A	SA
16.	If NSE drops by 3 percent, then it would recover within few days.	SD	D	N	A	SA

***Thank You for your cooperation***

## LIST OF PUBLICATIONS

### Research Papers:

1. J.M. Prosad, S. Kapoor and J. Sengupta, “ An Examination of Herd Behavior: An Empirical Evidence from Indian Equity Market”, *International Journal of Trade, Economics and Finance*, vol. 3, no. 2, pp. 154-157, 2012  
**Journal Indexing:** Engineering and technology digital library, EBSCO, ProQuest, Crossref, Electronic Journals Library, DOAJ, Ulrich’s Periodicals Directory.
2. J.M. Prosad, S. Kapoor and J. Sengupta, “Impact of Overconfidence and the Disposition Effect on Trading Volume; An Empirical Investigation of Indian Equity Market ”, *International Journal of Research in Management and Technology*, vol. 3, no. 4, pp. 109-116, 2013  
**Journal Indexing:** DOAJ, OpenJ-Gate, .dotstoc, BASE, Citeseer, MLibrary, uOttawa Library, Google Scholar.
3. J.M. Prosad, S. Kapoor and J. Sengupta, “Exploring Optimism and Pessimism in Indian Equity Market” accepted for publication in the *Review of Behavioral Finance*, Emerald Publishing House, January, 2014.  
**Journal Indexing:** ABI/INFORM (Proquest), British Library, Cabell’s Directory of Publishing Opportunities in Economics and Financed Management, Econlit, INSPEC(IET), Proquest Central and Professional Proquest Central, Proquest Social Science Journals, RePec: Research Papers in Economics.
4. J.M. Prosad, S. Kapoor and J. Sengupta,, “ An Examination of Herd Behavior: An Empirical Study on Indian Equity Market”, *International Proceedings of Economic Development and Research*, vol. 32, pp. 11-15, 2012.  
**Journal Indexing:** EBSCO, CNKI, DOAJ, WorldCat, Google Scholar, Ulrich’s Periodicals Directory, Crossref, Engineering and technology digital library.

### Book Chapter:

1. J.M. Prosad, S. Kapoor and J. Sengupta, “Theory of Behavioral Finance” accepted for publication in *Behavioral Finance and Investment Strategies: Decision Making in the Financial Industry*, IGI Global Publications, Hershey, U.S.A.