THE EFFECT OF PERSONALITY TRAITS ON COGNITIVE INVESTMENT BIASES

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Abstract

The purpose of this research is to assess the impact of personality factors on an investor's financial decision-making particularly those related to cognitive biases. The understanding of behavioral biases among investors holds the key to identifying an investors' propensity to making irrational and illogical decisions. Our research examined an investors' behavioral orientation and their propensity towards cognitive biases in financial decision-making. Our research took place in two stages. In the first stage, we identified predominant cognitive biases among investors using an extensive review of existing research. We further prepared instruments to measure the cognitive biases for which we conducted exploratory factor analysis followed by confirmatory factor analysis. In the second stage, we used the 16p instrument developed by Cattell to identify whether there exists a relationship between the personality of an investor and his propensity to have an inclination towards a particular cognitive behavioral bias and we identified some key relationships. Our research showed some interesting trends. We observed that most of the cognitive biases were related to particular personality traits namely, abstractedness, reasoning, emotional, stability, dominance and openness to change. Thus, for investment advisors and policy makers, if an investor demonstrates these personality traits, one can conclude that the investor may be more likely to have an inclination to have cognitive biases in investment decision making.

Keywords: Behavioral Finance, Cognitive biases, Cattell's 1 6 pf, investor decision making

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INTRODUCTION

Investor behavior is crucial in determining market movements (Cornell, Goldreich and Ujanggqvist, 2006) especially since the basic tenets of traditional finance such as rationality have been proven incorrect (Yakun, 2010). Tradional finance assumes that an investor will evaluate all possible outcomes of his decision by weighing the costs and benefits and derive the best risk benefit trade off (Markowitz, 1952). However, recent research has proved that is an unrealistic scenario (Schwarz, 1990; Forgas, 1995; Loewenstein et al., 2001) and markets demonstrate systematic errors in investor judgment.

Behavioral finance as a subject attempts to examine and explore the mechanism behind investor decision making by understanding psychology at the micro level along with the role of financial markets at the macro level (Shiller, 2000). Further, investors may make judgments and decisions that are based on past event, personal beliefs and preferences (Choi, Laibson and Metrick, 2000) and establish short cuts or use heuristics (Kahneman, 2003) as a part of their decision making process. Lather et al, 2020 has identified a strong correlation on locus of control and behavioral biases in investment decision making. This therefore has become an extremely interesting research area to examine these systematic deviations in investor decision-making also called biases in financial decision-making (Chatterjee & Goetz, 2015).

Baker and Nofsinger (2002) examined and further studied behavioral biases and identified two types of biases, namely emotional and cognitive biases. Lucey and Dowling, 2005 examined emotional behavioral biases and identified that emotional biases are the result of reasoning which is influenced by feelings/ emotions and is based on the intuition of an investor. In contrast, Tversky and Kahneman, 1973, observed that cognitive biases are based on errors in basic statistical processing, information processing or memory processing. However, one key difference between cognitive and emotional behavioral bias is that cognitive biases can be corrected (Anderson, 2002) since they stem from faulty reasoning rather than emotional predisposition (Ricciardi, 2008).

Our present study aims to examine the impact of personality traits on behavioral biases and preferences to identify patterns in investor decision making. For this research, we have focused on a subset of behavioral biases, which comprise of cognitive behavioral biases.

LITERATURE REVIEW

Cognitive Behavioral Biases

Cognitive behavioral biases are further classified as belief perseverance biases such as representativeness, illusion of control, confirmation and conservatism bias in which investors tend to classify new information based on past experiences and classifications (Pompan, 2012) and the information processing biases such as anchoring and adjustment, mental accounting, framing, and availability caused to errors in information processing. An extensive literature review was conducted to identify predominant cognitive biases. Based on the existing literature review, our research the below predominant cognitive behavioral biases exist in investor decision, which are summarized below:

1. Mental Accounting Bias – Thaler, 1990 identified mental according as the tendency for investors to separate their accounts and classify them based on subjective criteria causing them to set points of reference for their gains and losses, which causes them to “put things in boxes” and track them individually.
2. Illusion of Control Bias – Investors prone to the Illusion of control bias tend to believe that they can control or influence outcomes of events and choices when they in facto cannot. This often causes investors to inflate confidence and generate illusions leading to inadequately diversified portfolios (Felthor, 2009)
3. Representativeness Bias – Representativeness Bias is a belief perseverance bias wherein investors tend to classify new information based on their experiences. Investors tend to rely on a best-fit approximation based on their existing frame of reference leading to biased decision making (Kahneman & Tversky, 1974)
4. Availability Bias – Investors prone to the availability bias tend to overestimate the probabilities associated with
events causing them to give excessive weightage on the information available leading them to err in financial decision-making (Odean, Barber 2002).

5. Anchoring and Adjustment Bias – Investors prone to anchoring and adjustment bias tend to start from incorrect reference points and end up making incorrect offsets causing them to err in their decision making (Slovic & Lichtenstein, 1971).

6. Ambiguity Aversion - Investors prone to ambiguity aversion tend to place higher values on bets with known probabilities (risk) than bets with unknown probabilities (uncertainty) (Elsberg, 1961).

7. Self-Attribution Bias - Investors prone to self-attribution bias tend to relate their successes to their foresight or talents and often blame others for their failures (Dunn, 1989, Odean, Barber, 2001).

8. Overconfidence bias – Overconfidence bias can be defined as an unwarranted faith in ones reasoning, judgments and abilities leading to systematic errors in decision-making. This bias is further classified into prediction overconfidence, wherein investors assign incorrect probabilities to their predictions and certainly overconfidence, when they are too certain of their judgements leading to errors in financial decision making (Statman, 1999)

9. Cognitive Dissonance – Investors prone to the cognitive dissonance bias tend to experience mental discomfort when acquiring new information in decision-making. The often leads to investors holding their losing positions too long (Razek, 2011).

10. Confirmation Bias – Investors prone to the confirmation bias tend to misinterpret new information to support their prior beliefs (Rabin and Schrag, 1999)

These biases sit deep within our psyche and as fundamental parts of human nature. For our present study, we studied the relationship of these cognitive behavioral biases with personality traits.

Cattell's Sixteen Personality Factors

The sixteen-personality factors questionnaire is a psychometric self-report personality questionnaire developed by Cattell, 1956 and has been used thoroughly tested and highly utilized by clinicians and translated in several languages (Mead & Cattell, 2008). It has been widely used by psychologists for diagnosing mental disorders as well as planning for therapies for individuals. The underlying basis for the 16PF questionnaire are the innate differences in cognitive abilities, the transitory emotional states, the normal and abnormal personality traits, and the dynamic motivational traits.

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Because of this, the 16PF questionnaire asks routine, concrete questions instead of asking the respondents to self-assess their personality, therefore removing the subjectivity and self-awareness of the subject. Filling in the 16PF questionnaire usually takes between 25 and 50 min and is designed for adults at least 16 years of age (Boyle et al., 2012). The 16PF traits evaluated using this questionnaire are the following:

- Warmth (A), reserved/warm
- Reasoning (B), concrete thinking/abstract thinking
- Emotional stability (C), reactive/emotionally stable
- Dominance (E), submissive/dominant
- Liveliness (F), serious/lively
- Openness to change (Q1), traditional/conservative
- Social boldness (H), shy/bold
- Sensitivity (I), unsentimental/sensitive
- Vigilance (L), trusting/vigilant
- Abstemiousness (M), practical/abstracted
- Privateness (N), forthright/shrewd
- Apprehension (O), self-assured/apprehensive
- Tension (Q4), relaxed/tense

All these traits are evaluated using a score from 1 to 10 (e.g., for trait warmth, 1 means “reserved,” 10 means “warm,” and any score in between is a manance within the two extreme values).

RESEARCH METHODOLOGY

Review Of Existing Research

In the first part of the research, we reviewed the existing literature in the area of behavioral finance to identify various cognitive behavioral investing decision making. We further segregated cognitive behavioral biases, which is our area of interest. For each of these biases, an extensive literature review was conducted and constructs defined followed by questionnaire design on a likert scale from one to five. A consolidated instrument with all biases was prepared and exploratory factor analysis was applied followed by confirmatory factor analysis. The initial questionnaire was prepared with 97 questions under the pilot study based on the recommendation from Bryman and Bell, 2007 which reduced to 50 questions after confirmatory factor analysis.

Final Questionnaire

The final questionnaire comprised of 50 questions to measure eleven behavioral biases, 170 questions of Cattell’s sixteen personality factors and some demographic questions such as gender, region of the country, age group, income level, level of education, financial literacy and years of trading experience making 230 questions, which was administered on 750 investors. 618 complete responses were received and analyzed for this study.

Research Design

This study followed an empirical research design to establish a relationship between Cattell’s sixteen personality factors and cognitive behavioral biases. For the study a 4 X 4 X 2 X 3 X 4 factorial design was used. The regional differences amongst individual investors, namely north, south, east and west, along with age, educational background with special emphasis on a financial background was considered. Under each unit, the years in trading from 0-1, 1-3, 3- 5 and above 5 years of experience were used for the study.

Sample Size

Based on a 4 X 4 X 2 X 3 X 4 factorial design, a minimum of 480 individual investors sample size was required. For the present study our sample size is 618 investors.

RESULTS AND FINDINGS

The results were analyzed based on each of the behavioral biases and some interesting trends were observed. Table 1 below shows that 69.7% of the deviations in mental accounting could be explained by personality traits such as abstractedness, reasoning, emotional stability, dominance, rule consciousness and open to change. Therefore, an investor scoring high in abstractedness, typically investors who are imaginative, self-motivated often absorbed in their own thoughts would demonstrate a higher inclination towards the mental accounting bias. Similarly, investors with high scores on reasoning, who are typically bright, abstract thinking and more intelligent having a quick grasp on ideas, would also show a high propensity to demonstrate the mental accounting bias. Further, investors, who scored low on emotional stability i.e investors who get easily annoyed, are affected by feelings and emotionally less stable demonstrated a higher propensity towards the mental accounting bias. In addition, investors scoring high on dominance, typically those that can be described as expressive, heedless, expressive, cheerful, enthusiastic and cheerful would demonstrate a higher inclination towards the mental accounting bias.

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The table below depicts the analysis of the illusion of control bias wherein 68.9% of the deviation can be explained by personality traits like reasoning, abstractedness, dominance, emotional stability, sensitivity and rule consciousness. Investors scoring high on reasoning who are more intelligent, bright having a quick grasp on idea and a fast learner tend to have a higher inclination towards the illusion of control bias. Similarly, individuals having a high score on abstractedness, who can be described as self-motivated, imaginative and absorbed in their own thoughts to demonstrate a higher inclination towards the illusion of control bias. Investors with high scores on dominance, who are described as dominant, aggressive, bossy and competitive, tend to have a stronger inclination to demonstrate the illusion of control bias. Further, investors with low scores on emotional stability, typically those who can be described as emotionally less stable, easily annoyed and affected by feelings to demonstrate a higher propensity towards the illusion of control bias.

Table 1

|                          | F(Single) | R | R Square | Adj R Square | Std. Err | Unstandardized Coefficients | Std Coeff | Beta | t | Sig. |
|--------------------------|-----------|---|----------|--------------|----------|-------------------------------|------------|------|---|------|
| Mental accounting        |           |   |          |              |          |                               |            |      |   |      |
| M-Abstractedness         | 234.2     | .69 | .697     | .694         | .67398   | .157                         | .021       | .313 | 7.58 | .000 |
| B-Reasoning              | .108      | .017 | .266     |              |          |                               |            |      | 6.26 | .000 |
| C-Emotional Stability    | -.077     | .018 | -.160    |              |          |                               |            |      | 4.30 | .000 |
| E-Dominance              | .064      | .018 | .120     |              |          |                               |            |      | 3.54 | .000 |
| G-Rule Consciousness     | -.056     | .024 | -.056    |              |          |                               |            |      | 2.33 | .020 |
| Q1-Open to Change        | .030      | .015 | .057     |              |          |                               |            |      | 2.00 | .045 |
| Illusion of Control      | 225.1     | .8 | .689     | .685         | .62638   |                               |            |      |      |      |
| B-Reasoning              | .103      | .016 | .276     |              |          |                               |            |      | 6.36 | .000 |
| M-Abstractedness         | .123      | .020 | .268     |              |          |                               |            |      | 6.26 | .000 |
| E-Dominance              | .075      | .017 | .155     |              |          |                               |            |      | 4.53 | .000 |
| C-Emotional Stability    | -.060     | .017 | -.135    |              |          |                               |            |      | 3.56 | .000 |
| I-Sensitivity            | .054      | .024 | .077     |              |          |                               |            |      | 2.27 | .023 |
| G-Rule Consciousness     | -.047     | .022 | -.051    |              |          |                               |            |      | 2.09 | .037 |
| Representativeness       |           |   |          |              |          |                               |            |      |     |      |
| M-Abstractedness         | 272.6     | .8 | .758     | .755         | .60134   | .160                         | .019       | .319 | 8.59 | .000 |
| B-Reasoning              | .111      | .016 | .275     |              |          |                               |            |      | 6.96 | .000 |
| E-Dominance              | .060      | .016 | .114     |              |          |                               |            |      | 3.73 | .000 |
| C-Emotional Stability    | -.060     | .016 | -.126    |              |          |                               |            |      | 3.76 | .000 |
| Q1-Open to Change        | .035      | .013 | .068     |              |          |                               |            |      | 2.65 | .008 |
## The Effect of Personality Traits on Cognitive Investment Biases

### Table: Correlation Matrix

| Trait                          | G-Rule Consciousness | Q4-Tension | Availability | B-Reasoning | M-Abstractness | E-Dominance | C-Emotional Stability | Q4-Tension | Q1-Open to Change | I-Sensitivity | EXTRAVERSION | Ambiguity | Self-Attribution |
|--------------------------------|----------------------|------------|--------------|-------------|----------------|-------------|-----------------------|-------------|-------------------|--------------|--------------|-----------|------------------|
| G-Rule Consciousness          |                      |            |              |             |                |             |                       |             |                   |              |              |           |                  |
| Q4-Tension                    |                      | -0.054     | 0.022        | -0.055      | 2.527          | 0.012       |                       |             |                   |              |              |           |                  |
| Availability                  |                      | 0.042      | 0.017        | 0.069       | 2.495          | 0.013       |                       |             |                   |              |              |           |                  |
| B-Reasoning                   | 234.207              | 0.35       | 0.697        | 0.694       | 0.73246        | 0.128       | 0.019                 | 0.289       | 6.662             | 0.000        |             |           |                  |
| M-Abstractness                | 0.135                | 0.023      | 0.247        | 5.865       | 0.000          |             |                       |             |                   |              |              |           |                  |
| E-Dominance                   | 0.073                | 0.020      | 0.126        | 3.716       | 0.000          |             |                       |             |                   |              |              |           |                  |
| C-Emotional Stability         | -0.065               | 0.020      | -0.124       | -3.314      | 0.001          |             |                       |             |                   |              |              |           |                  |
| Q1-Open to Change             | 0.047                | 0.016      | 0.085        | 2.947       | 0.003          |             |                       |             |                   |              |              |           |                  |
| I-Sensitivity                 | 0.075                | 0.028      | 0.090        | 2.689       | 0.007          |             |                       |             |                   |              |              |           |                  |
| EXTRAVERSION                  | 367.598              | 0.105      | 0.828        | 0.826       | 0.55386        | 0.129       | 0.015                 | 0.291       | 8.625             | 0.000        |             |           |                  |
| M-Abstractness                | 0.140                | 0.017      | 0.255        | 8.049       | 0.000          |             |                       |             |                   |              |              |           |                  |
| E-Dominance                   | 0.088                | 0.015      | 0.151        | 5.803       | 0.000          |             |                       |             |                   |              |              |           |                  |
| C-Emotional Stability         | -0.073               | 0.015      | -0.138       | -4.911      | 0.000          |             |                       |             |                   |              |              |           |                  |
| Q4-Tension                    | 0.073                | 0.015      | 0.109        | 4.694       | 0.000          |             |                       |             |                   |              |              |           |                  |
| Q1-Open to Change             | 0.033                | 0.012      | 0.058        | 2.697       | 0.007          |             |                       |             |                   |              |              |           |                  |
| O-Apprehension                | 0.048                | 0.021      | 0.052        | 2.279       | 0.023          |             |                       |             |                   |              |              |           |                  |
| EXTRAVERSION                  | 0.075                | 0.037      | 0.035        | 2.034       | 0.042          |             |                       |             |                   |              |              |           |                  |
| Ambiguity                     | 259.472              | 0.139      | 0.749        | 0.746       | 0.65754        | 0.130       | 0.018                 | 0.299       | 7.442             | 0.000        |             |           |                  |
| M-Abstractness                | 0.165                | 0.020      | 0.308        | 8.128       | 0.000          |             |                       |             |                   |              |              |           |                  |
| C-Emotional Stability         | -0.060               | 0.018      | -0.116       | -3.402      | 0.001          |             |                       |             |                   |              |              |           |                  |
| E-Dominance                   | 0.057                | 0.018      | 0.099        | 3.199       | 0.001          |             |                       |             |                   |              |              |           |                  |
| Q1-Open to Change             | 0.047                | 0.014      | 0.085        | 3.259       | 0.001          |             |                       |             |                   |              |              |           |                  |
| G-Rule Consciousness          | -0.053               | 0.024      | -0.050       | -2.259      | 0.024          |             |                       |             |                   |              |              |           |                  |
| Q4-Tension                    | -0.039               | 0.018      | 0.060        | 2.137       | 0.033          |             |                       |             |                   |              |              |           |                  |
| Self-Attribution              | 176.944              | 0.159      | 0.699        | 0.695       | 0.63601        | 0.152       | 0.019                 | 0.321       | 7.918             | 0.000        |             |           |                  |
| M-Abstractness                | 0.102                | 0.017      | 0.265        | 6.074       | 0.000          |             |                       |             |                   |              |              |           |                  |
| B-Reasoning                   | 0.069                | 0.017      | 0.137        | 4.022       | 0.000          |             |                       |             |                   |              |              |           |                  |

*Note: Values in the table represent correlation coefficients.*

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|                          | B-Reasoning | M-Abstractedness | E-Dominance | C-Emotional Stability | Q4-Tension | Q1-Open to Change | Anxiety | Q4-Tension | Overconfidence | Prediction Overconfidence | Certainty Overconfidence | Cognitive Dissonance |
|--------------------------|-------------|------------------|-------------|----------------------|------------|-------------------|---------|-------------|-----------------|--------------------------|--------------------------|-----------------------|
| G-Rule Consciousness    | -0.57       | .023             | -0.061      | -2.53                | .012       | .029              | .014    | .059        | 2.08            | 0.37                     | 2.40                     | 0.14                  |
| Q1-Open to Change       | .029        | .014             | .059        | 2.08                 | .037       | .058              | .024    | .073        | 2.40            | 0.16                     | 2.22                     | 0.27                  |
| O-Apprehension          | .058        | .024             | .073        | 2.40                 | .016       | .094              | .042    | .051        | 2.22            | 0.27                     | 2.16                     | 0.31                  |
| ANXIETY                 | .094        | .042             | .051        | 2.22                 | .027       | .038              | .018    | .067        | 2.16            | 0.31                     | 2.46                     | 0.14                  |
| Q4-Tension              | .038        | .018             | .067        | 2.16                 | .031       | .114              | .042    | .057        | 2.72            | 0.07                     | 1.97                     | 0.49                  |
| Prediction Overconfidence| 254.1       | 25               | .745        | .74                  | .62858     | .113              | .017    | .274        | 6.77            | .000                     | 5.66                     | .000                  |
| M-Abstractedness        | .141        | .020             | .276        | 7.19                 | .000       | .077              | .17     | .157        | -4.62           | 0.00                     | 3.34                     | 0.01                  |
| E-Dominance             | -0.077      | .017             | -.157       | -4.62                | 0.000      | .059              | .018    | .095        | 3.34            | 0.01                     | 3.02                     | 0.03                  |
| C-Emotional Stability   | .051        | .017             | .095        | 3.02                 | .003       | .046              | .014    | .089        | 3.36            | 0.01                     | 2.64                     | 0.08                  |
| EXTRAVERSION            | .114        | .042             | .057        | 2.72                 | 0.07       | .084              | .043    | .040        | 1.97            | 0.04                     | 1.22                     | 0.08                  |
| Certainty Overconfidence| 238.8       | 12               | .758        | .75                  | .63762     | .165              | .020    | .310        | 8.23            | 0.00                     | 5.66                     | .000                  |
| M-Abstractedness        | .097        | .017             | .226        | 5.66                 | 0.00       | .074              | .017    | .131        | 4.23            | 0.00                     | 2.64                     | 0.08                  |
| E-Dominance             | .074        | .017             | .131        | 4.23                 | 0.00       | -.066             | .017    | -.129       | -3.86           | 0.00                     | -3.86                    | 0.00                  |
| C-Emotional Stability   | .051        | .017             | .095        | 3.02                 | 0.03       | .040              | .014    | .074        | 2.88            | 0.04                     | 2.64                     | 0.08                  |
| Q1-Open to Change       | .047        | .018             | .073        | 2.64                 | 0.08       | .058              | .024    | .065        | 2.37            | 0.18                     | 1.97                     | 0.49                  |
| Q4-Tension              | .047        | .018             | .073        | 2.64                 | 0.08       | .058              | .024    | .065        | 2.37            | 0.18                     | 1.97                     | 0.49                  |
| O-Apprehension          | .058        | .024             | .065        | 2.37                 | 0.18       | .084              | .043    | .040        | 1.97            | 0.04                     | 1.22                     | 0.08                  |
| EXTRAVERSION            | -0.045      | .018             | -.070       | -2.46                | 0.14       | .046              | .023    | .063        | 2.82            | 0.05                     | 2.71                     | 0.07                  |
| Cognitive Dissonance    | -0.117      | .017             | -.273       | -6.75                | 0.00       | .058              | .024    | .073        | 2.40            | 0.00                     | 3.34                     | 0.01                  |
| B-Reasoning             | .157        | .020             | -.297       | -7.79                | 0.00       | -.071             | .019    | -.127       | -4.07           | 0.00                     | -3.86                    | 0.00                  |
| M-Abstractedness        | .063        | .017             | .123        | 3.60                 | 0.00       | .066              | .023    | .063        | 2.82            | 0.05                     | 2.71                     | 0.07                  |
| E-Dominance             | .063        | .017             | .123        | 3.60                 | 0.00       | -.039             | .014    | -.071       | -2.71           | 0.07                     | 2.64                     | 0.08                  |
| C-Emotional Stability   | .066        | .023             | .063        | 2.82                 | 0.05       | -.045             | .018    | -.070       | -2.46           | 0.14                     | 1.97                     | 0.49                  |

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Further, investors with high scores on sensitivity, typically those who can be described as intuitive, refined, temperamental and emotionally sensitive to demonstrate higher inclination to demonstrate illusion of control. In addition, individuals with low scores on rule consciousness, namely those who can be described as self-indulgent, expedient and disregards rules to have a higher propensity to demonstrate the illusion the control bias.

The table above further depicts the analysis of the representativeness bias wherein 75.8% of the deviation can be explained by personality traits like reasoning, abstractedness, dominance, emotional stability, tension, openness to change and rule consciousness. Investors scoring high on reasoning who are more intelligent, bright having a quick grasp on idea and a fast learner tend to have a higher inclination towards the representativeness bias. Similarly, individuals having a high score on abstractedness, who can be described as self-motivated, imaginative and absorbed in their own thoughts to demonstrate a higher inclination towards the representativeness bias. In addition, investors with high scores on dominance, who are described as dominant, aggressive, bossy and competitive, tend to have a stronger inclination to demonstrate the representativeness bias. Further, investors with low scores on emotional stability, typically those who can be described as emotionally less table, easily annoyed and affected by feelings to demonstrate a higher inclination to demonstrate the representativeness bias. Also, individuals with high scores on openness to change, typically those who are critical, liberal and experimenting tend to demonstrate higher inclination to demonstrate the availability bias. In addition, individuals with high scores on sensitivity, typically those described as sensitive, overprotected and refined to be more likely to demonstrate the availability bias.

The table below depicts the analysis of the anchoring and adjustment bias wherein 82.8% of the deviation can be explained by personality traits like reasoning, abstractedness, dominance, emotional stability, tension, openness to change, apprehension and extraversion. Investors scoring high on reasoning who are more intelligent, bright having a quick grasp on idea and a fast learner tend to have a higher inclination towards the anchoring and adjustment bias. Similarly, individuals having a high score on abstractedness, who can be described as self-motivated, imaginative and absorbed in their own thoughts to demonstrate a higher inclination towards the anchoring and adjustment bias. In addition, investors with high scores on dominance, who are described as dominant, aggressive, bossy and competitive, tend to have a stronger inclination to demonstrate the anchoring and adjustment bias. Further, investors with low scores on emotional stability, typically those who can be described as emotionally less table, easily annoyed and affected by feelings to demonstrate a higher inclination to demonstrate the anchoring and adjustment bias. Similarly, individuals with high scores on openness to change, typically those who are critical, liberal and experimenting tend to demonstrate higher inclination to demonstrate the anchoring and adjustment bias.

The table below depicts the analysis of the ambiguity bias wherein 74.9% of the deviation can be explained by personality traits like reasoning, abstractedness, emotional stability, dominance, openness to change, rule consciousness and tension. Investors scoring high on reasoning who are more intelligent, bright having a quick grasp on idea and a fast learner tend to have a higher inclination towards the ambiguity bias. Similarly, individuals having a high score on abstractedness, who can be described as self-motivated, imaginative and absorbed in their own thoughts to demonstrate a higher inclination towards the ambiguity bias. Further, investors with high scores on dominance, who are described as dominant, aggressive, bossy and competitive, tend to have a stronger inclination to demonstrate the ambiguity bias. Also, investors with high scores on sensitivity, typically those who can be described as sensitive, overprotected and refined to be more likely to demonstrate the ambiguity bias.

| Confirmation | B-Rounding | M-Abstractedness | C-Emotional Stability | G-Rule Consciousness | E-Dominance | Q4-Tension | Q1-Open to Change |
|-------------|------------|------------------|----------------------|--------------------|-------------|------------|-----------------|
|             | 280.2      | .133             | -0.91                | -0.79              | .043        | .043       | .282            |
|             | 45         | .019             | .016                 | .022               | .016        | .017       | .013            |
|             | 8          | 2.63             | -1.86                | -.079              | .081        | .070       | .054            |
|             | 73         | 7.14             | 5.65                 | 3.68               | 2.67        | 2.55       | 2.12            |
|             | 60151      | 0.000            | 0.000                | 0.000              | 0.008       | 0.111      | 0.34            |
|             | .760       | 1                | 2                    | 3                  | 4           | 3          | 6               |

Further, investors with high scores on sensitivity, typically those who can be described as intuitive, refined, temperamental and emotionally sensitive to demonstrate higher inclination to demonstrate illusion of control. In addition, individuals with low scores on rule consciousness, namely those who can be described as self-indulgent, expedient and disregards rules to have a higher propensity to demonstrate the illusion the control bias.
investors with low scores on emotional stability, typically those who can be described as emotionally lesstable, easily annoyed and affected by feelings to demonstrate a higher propensity towards Ambiguity bias. In addition, investors with high scores on tension who are typically, tense, frustrated, overwrought having a high drive, tend to be more likely to demonstrate the Ambiguity bias. Also, individuals with high scores on openness to change, typically those who are critical, liberal and experimenting tend to demonstrate higher inclination to demonstrate the Ambiguity bias. Further, investors with low scores on rule consciousness who are self-indulgent, disregards rules and are expedient tend to be more likely to demonstrate the Ambiguity bias. The table below depicts the analysis of the Self Attribution bias wherein 69.9% of the deviation can be explained by personality traits like reasoning, abstractedness, dominance, rule consciousness, openness to change, apprehension, anxiety and tension. Investors scoring high on reasoning who are more intelligent, bright having a quick grasp on ideas and a fast learner tend to have a higher inclination towards the Self Attribution bias. Similarly, individuals having a high score on abstractedness, who can be described as self-motivated, imaginative and absorbed in their own thoughts to demonstrate a higher inclination towards the Self Attribution bias. Further, individuals with low scores on rule consciousness, who are self-indulgent and disregards rules are more likely to demonstrate the Self Attribution bias. Also, individuals with high scores on openness to change, typically those who are critical, liberal and experimenting tend to demonstrate higher inclination to demonstrate the Self Attribution bias. Further, investors with high scores on apprehension, who are imaginative, absent minded and absorbed in thought are more likely to demonstrate the Self Attribution bias. Also, investors with high scores on anxiety tend to be more likely to demonstrate the self-attribution bias. In addition, investors with high scores on tension who are typically, tense, frustrated, overwrought having a high drive, tend to be more likely to demonstrate the self-attribution bias.

The table below depicts the analysis of the prediction overconfidence bias wherein 69.9% of the deviation can be explained by personality traits like reasoning, abstractedness, emotional stability, tension, openness to change, dominance and extraversion. Investors scoring high on reasoning who are more intelligent, bright having a quick grasp on ideas and a fast learner tend to have a higher inclination towards the prediction overconfidence bias. Similarly, individuals having a high score on abstractedness, who can be described as self-motivated, imaginative and absorbed in their own thoughts to demonstrate a higher inclination towards the prediction overconfidence bias. Also, individuals with high scores on openness to change, typically those who are critical, liberal and experimenting tend to demonstrate the prediction overconfidence bias. Further, investors with high scores on anxiety tend to be more likely to demonstrate the prediction overconfidence bias. Also, investors with high scores on tension who are typically, tense, frustrated, overwrought having a high drive, tend to be more likely to demonstrate the prediction overconfidence bias.

The table below depicts the analysis of the confirmation bias wherein 74.5% of the deviation can be explained by personality traits like reasoning, abstractedness, emotional stability, tension, openness to change, dominance, emotional stability, rule consciousness, openness to change and tension. Investors scoring high on reasoning who are more intelligent, bright having a quick grasp on ideas and a fast learner tend to have a higher inclination towards the confirmation bias. Similarly, Investors having a high score on abstractedness, who can be described as self-motivated, imaginative and absorbed in their own thoughts to demonstrate a higher propensity towards confirmation bias. Also, individuals with high scores on openness to change, typically those who are critical, liberal and experimenting tend to demonstrate the confirmation bias. Further, investors with low scores on rule consciousness who are self-indulgent and disregards rules are more likely to have the confirmation bias. Also, investors with low scores on dominance who tend to be dominant, self-indulgent and disregards rules are more likely to have the confirmation bias. Similarly, Investors scoring high on reasoning who are more intelligent, bright having a quick grasp on ideas and a fast learner tend to have a higher inclination towards the confirmation bias. Also, individuals with high scores on openness to change, typically those who are critical, liberal and experimenting tend to demonstrate the confirmation bias. Further, investors with low scores on rule consciousness who are self-indulgent and disregards rules are more likely to have the confirmation bias. Also, investors with low scores on dominance who tend to be dominant, self-indulgent and disregards rules are more likely to have the confirmation bias. Similarly, Investors having a high score on abstractedness, who can be described as self-motivated, imaginative and absorbed in their own thoughts to demonstrate a higher propensity towards confirmation bias. Also, individuals with high scores on openness to change, typically those who are critical, liberal and experimenting tend to demonstrate the confirmation bias. Further, investors with low scores on rule consciousness who are self-indulgent and disregards rules are more likely to have the confirmation bias. Also, investors with low scores on dominance who tend to be dominant, self-indulgent and disregards rules are more likely to have the confirmation bias. Similarly, Investors having a high score on abstractedness, who can be described as self-motivated, imaginative and absorbed in their own thoughts to demonstrate a higher propensity towards confirmation bias.
The table above shows some interesting trends between personality traits and cognitive behavioral biases. There appear to be correlations between personality factors and cognitive behavioral biases. Further, it appears personality characteristics such as abstractedness, reasoning, emotional, stability, dominance and openness to change are few prominent characteristics of investors demonstrating cognitive behavioral biases. This allows us to draw some interesting conclusions, especially since the presence of these personality characteristics shows that an investor may be highly likely to be prone to cognitive behavioral biases.

LIMITATION OF THE RESEARCH
The present research had some shortcomings since it is only examining a subset of behavioral biases namely cognitive biases and only one aspect of personality, which was measured using sixteen personality factors, was used. We can further examine the decision-making process of the investor with other behavioral tools. Further, our present research has only focused on investors in India. This is also a research gap since we can further extend this research to other countries and their investors to identify and compare the impact of personality on investment-related behavior.

CONCLUSIONS
Our research illustrates that there are some predominant personality factors that lead to a strong inclination of an investor to be impacted by cognitive behavioral biases. This implies that by measuring only a subset of an investor's personality traits, one can determine his/her inclination towards particular cognitive biases. With this knowledge, an investor can take corrective steps in his financial decision-making and safeguard against irrational decisions due to these biases. Further, investment advisors and financial planners can use this knowledge to better understand the portfolio of their clients and their clients' propensity towards particular behavioral biases. With this knowledge, we hope that an investor can protect oneself from possible losses due to irrationality introduced due to these cognitive biases.

Thus, our research hopes to arm investors, investment advisors, financial planners and policy makers with a better view of their deviation from rational decision making with a view to safeguard investors from systematic errors in investment decision making.

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