



# Covid-19 and heuristic biases: evidence from India

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## Abstract

Stock markets worldwide have witnessed high volatility during the year 2020 owing to the eruption of Covid-19. Due to the world's unprecedented economic challenges, this study could potentially guide financial advisors and individual investors in dealing with pandemics. An association between investors' perception toward the intensity of Covid-19 and heuristic biases is analyzed using the responses of 290 stock investors of National Capital Region (NCR), India. The data are validated through Cronbach's alpha, and the model fit is analyzed using EFA. Confirmatory factor analysis (CFA) is employed to investigate the relationship between Covid-19 and heuristic biases. Covid-19 does not have any influence on the overconfidence of investors. A significant positive relationship is found between Covid-19 and the remaining three heuristics, i.e., availability, anchoring, and representativeness. The present study analyzes the association between Covid-19 and specific investors' bias only and should not be interpreted for causality. The study has the potential to guide investors in understanding the errors they are making while investing during the pandemic and the ways to deal with them. The study could provide insights to the financial advisors in understanding their customers. The implications of the study may include inputs of the errors committed by them during the pandemic. Despite the fact that an enormous amount of literature exists in the field of investors' sentiment, a scarcity of literature is available that measures the relationship between heuristic biases and the perceived impact of the pandemic. The current study attempts to fill this gap in the literature.

**Keywords** Availability · Anchoring · Representativeness · Overconfidence · Covid-19

## Introduction

The outburst of Covid-19 has severely impaired financial activities around the world. This pandemic gave rise to volatility in business and investment. This volatility in business and economy has caught the attention of many researchers, due to which a considerable amount of research has been conducted to investigate the role of Covid-19 in influencing the pattern of investment and expenditure (Baker et al. 2020a, b; Ramelli and Wagner 2020; Zhang et al. 2020). Literature suggests multidimensional effects of volatility on the different facets of investment. Volatility and unpredictability often lead to the sale of a high volume of stocks (Luo et al. 2020). Volatility in the market often clouds the judgment of the investors. Since traditional finance assumes investors' rationality based upon the efficient market hypothesis, investors' erroneous judgments could be analyzed using behavioral finance (Shiller 2003; Kathpal and Siddiquei 2021). The investors' irrationality due to markets' volatility and inefficiency supports the assumptions of investors' bias in behavioral finance. The basic assumption of behavioral

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finance claims the investors' tendency to diverge from the rational decision-making procedure (Daniel et al. 1998; Yoong and Ferreira 2013). This irrationality could be classified into two broad ways, i.e., heuristic biases and cognitive illusions. Heuristics are the shortcuts of mind used by people to decide volatile and uncertain environments. Irrationality about decision making is based on how the problem is presented to people (Shefrin 2002). This framing of the situation was first explained in prospect theory (Kahneman and Tversky 1979). Investors' inclinations toward psychological biases while making investment decisions (Daniel et al. 1998) and the difficulty of eradicating these psychological biases of investors (Kahneman and Riepe 1998) emphasize the importance of comprehending their role in investment-related decisions.

Since the pandemic has brought high volatility and uncertainty in the environment, a study that could explain the possible impact of this uncertainty and volatility on investors' decision making could provide valuable insights into the growing literature of investors' bias. This study analyzes the prevalence of heuristic biases in the Bombay Stock Exchange (BSE) during the pandemic outbreak. The target population is the Indian individual stock investors, nine times greater than mutual funds investors (Ramadorai 2013).

Literature reflects a vast amount of studies focusing on secondary information of investors across the world (Barber and Odean 2000; Dhar and Zhu 2006; Frazzini 2006), including India (Kumar and Goyal 2015); a paucity of research exists that uses primary data to evaluate heuristic bias in India (Kumar and Goyal 2015). This study employs primary data to capture investors' behavioral aspects (Lin 2011; Baker et al. 2019). The study was conducted aiming at the following objectives:

- To investigate the presence of heuristic biases during Covid-19.
- To investigate the relationship between propensity toward Covid-19 and heuristic biases.

The other sections of the study include a literature review that reflects the current theory on different heuristic biases and their relation with Covid-19, followed by the research methodology section, which explains the statistical techniques used in this paper to reach the stated objectives. After this, a section on the data analysis and findings is included, followed by the discussion and conclusion.

## Literature review

The year 2020 astonished and frightened the world with Covid-19. Its outbreak caused a high level of uncertainty in economies around the world. During the pandemic, a change

in the spending habits and demand patterns of the people was observed. Most of the industries witnessed a change in the demand patterns. Some industries saw a sharp rise in demand, while others faced a sharp decline (Levy and Galili 2006; Luo et al. 2020; Wang and Young 2020). The propensity of its severity could be compared with terrorist aggression in multiple aspects, as people's behavior pattern changes after every act of terrorism (Goodell 2020).

## Covid-19 and investment pattern

Literature also documented that a change in behavior pattern often leads to a change in investment pattern (Luo et al. 2020; Wang and Young 2020). The change in investment pattern was visible in stock markets during Covid-19. Stock markets across the globe experienced high volatility during the pandemic (Zhang et al. 2020; Kathpal and Siddiquei 2021). A tendency to avoid the risk has been observed during uncertain and volatile situations. People avoid long-term gains and sell the riskier stocks in a shorter period during uncertainty and volatility (Burch et al. 2016; Bu et al. 2020; Luo et al. 2020; Wang and Young 2020). This risk aversion has produced a negative return on investment due to the stocks' short-term sales (Kelley and Tetlock 2016). Multiple agencies such as governments and central banks have taken many policy measures to curb the uncertainty caused by the pandemic to build confidence among investors. Despite the generous efforts of these agencies, the precise impact of Covid-19 could not be established. A variety of research has examined the impact of Covid-19, and their results reflect different outcomes of the pandemic for different demography. The USA's economic recovery is expected to be quicker than the previous economic crisis (Hanspal et al. 2020). Despite the expected fast recovery of the world economies, complete market recovery after Covid-19 could take years (Lee 2020).

## Covid-19 and cognitive biases

Covid-19 has made the financial systems highly unpredictable (Baker et al. 2020a). The unpredictability has caused elevated volatility in the stock market (Altig et al. 2020). This volatility in the stock market has also influenced the investment patterns and investors' rationality (Ortmann et al. 2020). Rationality is a prerequisite to achieving the required level of gain. Traditionally, efficient market hypothesis (EMH) is used to dominate finance literature. EMH assumes rationality in investors. However, a vast amount of literature suggests that investors do not always make rational decisions while investing (Barnes 1984; Waweru et al. 2008; Shah et al. 2018). The cause of this irrational decision making could be found in behavioral finance (Ritter 2003; Al-Tamimi 2006; Ikram 2016). Behavioral finance is



the branch of finance that examines an investor's psychological hindrances while making rational decisions (Waweru et al. 2008; Ikram 2016; Khan 2020). These psychological biases can be classified into two categories: first heuristic biases and second mental structures or frame dependence (Waweru et al. 2008; Zindel et al. 2014). Heuristic biases are the rule of thumb used by investors in uncertain and complex situations often resulting in poor decision making (Abarbanell and Bernard 1992; Shah et al. 2018). The heuristic biases include availability bias, overconfidence, representativeness, gambler's fallacy, and anchoring bias (Waweru et al. 2008; Shah et al. 2018). Irrationality in frame dependence occurs due to presenting a problem in a specific structure (Waweru et al. 2008; Shah et al. 2018). One of the well-known examples promoting frame dependence is prospect theory (Kahneman and Tversky 1979). Major biases in frame dependence include loss aversion, disposition effect, mental accounting, and sunk cost fallacy (Pompian and Wood 2006; Shah et al. 2018).

Since Covid-19 has brought high uncertainty in the economic environment (Baker et al. 2020a; Kathpal and Siddiquei 2021), examining the biases that could cloud the investors' rational judgment becomes imperative. This study attempts to examine the relationship between Covid-19 and heuristic biases.

### Heuristics' Bias

For a high level of rationality, a superior level of cognitive and intellectual capabilities is required. It enables people to handle complex problems rationally. To solve such complex problems, people tend to take shortcuts. These mental shortcuts discourage people from making an entirely rational decision (Bazerman 1998; Baron 1998). The phenomenon of taking mental shortcuts for dealing with complex problems is termed heuristics. Investors use heuristics to ease the decision-making process in complex situations (Barnes 1984; Ritter 2003). The heuristics and biases are the prime reason for an adverse outcome (Barnes 1984). These heuristics could influence investment and other finance-related decisions (Debondt and Thaler 1990; Abarbanell and Bernard 1992). This paper examines the four most prominent heuristic biases: availability, anchoring, representation, and overconfidence (Waweru et al. 2008; Shah et al. 2018). These four biases are used to reduce the intensity of risk in uncertain times (Debondt and Thaler 1990; Abarbanell and Bernard 1992). Some of the most prominent studies indicating these biases are:

#### Overconfidence

In the overconfidence heuristic, a person has superfluous trust in his/her judgments and abilities (Pompian and Wood

2006). In this bias, people highly value their reasoning and cognitive capabilities (Debondt and Thaler 1995; Hvide 2002). Overconfidence often leads to over-precision of skills and decisions (Statman et al. 2006; Moore and Healy 2008). The people with overconfidence heuristic bias overestimate their abilities and undermine others' abilities (Odean 1998; Larrick et al. 2007; Duttie 2015).

Overconfidence and investment behavior: The Overconfidence heuristic significantly impacts investors' rational decision making (Bakar and Yi 2016). An investor with overconfidence bias often forecasts high profits and ignores its risk (Shefrin 2000; Baker and Nofsinger 2002). Their trading frequency is higher while returns are lower than the average market returns (Barber and Odean 2002; Park et al. 2010; Trinugroho and Sembel 2011). Literature associates overconfidence with poor investment choices (Chen et al. 2007; Park et al. 2010; Bashir et al. 2013; Kengatharan and Kengatharan 2014) and impaired rationality among investors (Debondt 1998; Seppälä 2009; Waweru et al. 2008; Kafayat 2014).

#### Representativeness

The cognitive heuristic is where a person takes mental shortcuts based on the stereotypes (Shefrin 2005), i.e., matching the similarity of an event with the extent to which it characterizes the people (Kahneman and Tversky 1979; DeBondt and Thaler 1995). People with representativeness bias give importance to their recent experience over their long-term experience (Ritter 2003). The problem with judgments of people with representativeness bias is similar to the judgment-related problem that arises from stereotyping. Just like stereotyping, the ground knowledge of the situation often remains neglected (Shefrin 2008). This neglect of ground reality could take two forms, i.e., sample size neglect and base rate neglect. In sample size neglect, the decision is taken by generalizing either the little information available or assuming the small illustrations representative of the population (Barberis and Thaler 2003; Pompian and Wood 2006). The rationale behind using representativeness could range from little comprehension of the forecasting concept to overshadowing any particular recent event over the long-term events (Kahneman and Tversky 1979).

Representativeness and investment behavior: Literature suggests a mixed relationship between representativeness and positive investment behavior. An improved decision making and better returns on investment have been documented in some studies due to representativeness (Toma 2015; Irshad et al. 2016; Ikram 2016). Contrary to this, poor decision making and low returns due to representativeness bias in individual investors have also been documented (Chen et al. 2007). The impact of representativeness bias



could also be seen among institutional investors (Lakonishok et al. 1994; Waweru et al. 2008).

### Availability

The availability heuristic is the mental shortcut where a person tends to rely on the conveniently available information (Ngoc 2014). An event's likelihood is assessed by its ease coming to one's mind (Kahneman and Tversky 1979). Since the importance is given to the recurrence rate of an outcome that comes to mind, the analysis is highly influenced by information availability rather than scientific temperament (Brahmana et al. 2012).

**Availability and investment behavior:** The relationship between availability and investment behavior remained inconclusive in the existing literature. The literature has reflected a positive relationship between availability heuristics and investment behavior, i.e., an improvement in decision making due to availability bias (Ikram 2016; Khan 2020). In contrast, other studies have indicated a negative effect of availability heuristics on decision making (Massa and Simonov 2005; Waweru et al. 2008).

### Anchoring

This heuristic emphasizes the people's disposition to rely upon initial information (anchor). After establishing the anchor, the decisions taken give excess weight to it (Slovic and Lichtenstein 1971). Kahneman and Tversky (1979) explain anchoring by arguing that similar phenomena also vary if the initial references are different. In conclusion, an anchor could be an irrelevant base for decision making (Pompian and Wood 2006).

**Anchoring and investment behavior:** A significant relationship is documented between anchoring and investment decision (Waweru et al. 2008; Lowies et al. 2016). The impact of anchoring varies with situations. The situations for decision making could range from judicial decisions (Englich et al. 2006) to job performance (Latham et al. 2008). In riskier decisions, anchoring has positively affected decision making (Ishfaq and Anjum 2015). In a nutshell, anchoring bias significantly impacts investors' decision making (Abraham et al. 2014).

**Hypothesis:** Hypothesis 1(H1): No relationship exists between the perceived impact of Covid-19 and overconfidence bias.

Hypothesis 2(H2): No relationship exists between the perceived impact of Covid-19 and representativeness bias.

Hypothesis 3(H3): No relationship exists between the perceived impact of Covid-19 and availability bias.

Hypothesis 4(H4): No relationship exists between the perceived impact of Covid-19 and anchoring bias.

## Gap analysis

- a. The authors could not find any literature that examines the relationship between Covid-19 and heuristic biases.
- b. A limited research exists which examines the investor's bias in developing countries during unprecedented challenges.
- c. The existing literature demonstrates some contradictory findings such as: (i) on the relationship between availability biases and decision-making capacity (Massa and Simonov 2005; Waweru et al. 2008; Ikram 2016; Khan 2020); and (ii) on the relationship between availability bias and rational decision making (Chen et al. 2007; Toma 2015; Irshad et al. 2016).

## Methodology

### Questionnaire

A self-administered questionnaire was developed containing demography, Covid-19 perception, and heuristic biases concerning India's individual investors. Academic as well as industry experts reviewed the questionnaire. The questionnaire on Covid-19 was developed with the help of experts. Every construct and item of the study has been identified with extensive literature review and validated by experts from academics (Bohnstedt 1983; Caro and Garcia 2007). The basis for the questionnaire on heuristic biases was taken from existing literature (Wood and Zaichkowsky 2004; Lin 2011). The questionnaire consists of two sections, where section A deals with respondents' demographic profile and section B focuses on questions related to Covid-19 and heuristic biases using a five-point Likert scale. The details of the items used for each construct are as follows:

- a. **Overconfidence Bias:** To measure the overconfidence bias, a four-item scale was used, which was developed referring to Prosad et al. (2015).
- b. **Representative Bias:** This bias was measured using four items. The first two items were taken from Waweru et al. (2008), whereas the last two items were taken from Sarwar et al. (2014).
- c. **Availability Bias:** To measure this bias, we used four items. The first two items were taken from Luong and Thi Thu Ha (2011), whereas the last two items were taken from Kudryavtsev et al. (2013).
- d. **Anchoring Bias:** This bias was measured using five items. The first two items were taken from Baker et al. (2019), the third item is taken from Pandey and Jessica



- (2019), and the last two items were taken from Waweru et al. (2008).
- e. Covid-19: A four-item scale was used to measure the perceived impact of Covid-19, which was developed referring to Kathpal and Siddiquei (2021).

## Sample

### Area of sample

This study's target population was the individual investors of the Bombay Stock Exchange (BSE). The sample area from which the data are collected is Delhi-NCR. Investors' details were taken from some of the brokerage firms of Delhi-NCR. The rationale behind selecting Delhi region is due to its highest per capita income in the country, which is approximately three times the average per capita income of India (Nanda 2021). More than half of the trading amount of India happens in Delhi (Prosad et al. 2015), making it a big prospect for stock market investment. Sample size.

An adequate sample size is necessary for the data adequacy to control systematic variance (Hoogland and Boomsma 1998), but a large sample size does not need to categorically remove systematic variance (Worthington and Whittaker 2006). To ensure sampling adequacy, this studied determined the sample size using four criteria:

- i. Using Rule of Thumbs: Many rule of thumb exists to determine the sample size. One of which states that any sample size greater than 200 is sufficient (Boomsma and Hoogland 2001; Hoe 2008; Singh et al. 2016). Another important thumb rule to determine sample size is the equation " $5w \leq n \leq 15w$ " (here, the  $w$  reflects the number of items taken in the survey, and  $n$  represents the ideal amount of responses). Since the number of items used in the instrument was 21, the ideal amount should lie between 105 and 315.
- ii. Using the number of items/indicators: Another rule state that has a sample size 10 times the items makes the data significant (Nunnally and Bernstein 1967; Wang and Wang 2019).
- iii. Using Factor Loading: The ideal sample size is inversely proportional to the value of factor loading. If the factor loading value is 0.5 and 0.8, the sample size should be 460 and 120, respectively (Wolf et al. 2013; Kyriazos 2018). Since the minimum factor loading for each item of the sample is 0.73, a sample size of more than 250 is adequate for the study.
- iv. Verification from existing literature: We examined the sample size used in the literature which measures the investors' bias using a self-administered questionnaire and found that a sample size of more than 200 respondents is sufficient to perform the analysis

(Jhandir and Elahi 2014; Kansal and Singh 2015; Chhapra et al. 2018; Rasheed et al. 2018; Ahmad 2020).

### Sampling technique

Investors were contacted via phone or personal visits from June 2020 to November 2020. A total of 500 investors were contacted to fill the questionnaire. Out of the 500, 340 people filled the questionnaire, out of which 50 were found incomplete. Hence, 290 answers were considered for the investigation.

### Data analysis

The data collected was analyzed using SPSS 21 and AMOS 18. Since the data are cross-sectional in nature, we used structural equation modeling (SEM) to perform path analysis and confirmatory factor analysis (CFA) to examine the relationship between the given constructs (Hox and Bechger 1998).

## Results

### Demography

The demography of the 290 respondents is presented in Table 1. This sample consists of 73% males, indicating the high participation of male investors in BSE. This gender disparity could be explained by Central Depository Services Ltd (CSDL), stating that 75% of Indian investors are male. The existing literature on stock exchanges of India reflects similar figures in their research (Kalra Sahi and Pratap Arora 2012; Jhandir and Elahi 2014; Akhtar and Das 2019; Ahmad 2020). More than 85% of investors are graduates, out of which 55% of the population are postgraduates, which reflects that the investors are majorly educated. Less than 33% of investors are either self-employed or working in the private sector. The results also reflect that majority of the investors earn at least 10,00,000/-rupees per annum.

### Common method bias (CMB)

For studies using cross-sectional data, the possibility of CMB might arise. This CMB could significantly affect the results (Podsakoff and Organ 1986). Since the current study employs cross-sectional data, the variance in eigenvalue was calculated using principal component analysis. Table 2 reflects 37.876% of the first-factor variance, which is considerably less than 50%. Hence, we can conclude that CMB does not influence the results.





**Table 1** Demography

Description	Frequency (in numbers)	Frequency (in percentage)
<i>Gender</i>		
Male	212	73.10
Female	78	26.90
<i>Education</i>		
Up to graduation	38	13.10
Graduate	89	30.69
Postgraduate	107	36.90
Doctorate	56	19.31
<i>Occupation</i>		
Private employment	38	13.10
Government employment	89	30.69
Self-employed	56	19.31
Others	107	36.90
<i>Experience of investment</i>		
Less than 1 year	51	17.59
Between 1 and 5 years	63	21.72
Between 5 and 9 years	102	35.17
More than 9 years	74	25.52
<i>Yearly income (in Rs.)</i>		
Less than 3,00,000	49	16.90
3,00,000–6,00,000	58	20.00
6,00,000–10,00,000	69	23.79
More than 10,00,000	114	39.31

## Reliability

The method employed to test reliability is Cronbach's alpha. It analyzes the reliability of any given scale. A value above 0.7 represents the excellent acceptability of the scale (Sekaran 2000). Table 3 reflects the excellent reliability of the items. *Multicollinearity*.

Multicollinearity refers to the linear relationship between variables. It could hamper the regression values and make the predictions difficult. If the correlation between the variables is lower than 0.8, it considerably diminishes multicollinearity concerns (Tabachnick and Fidell 2007). Table 4 signifies that the level of multicollinearity is an acceptable range, as all of the variables have a correlation value of less than 0.8

## Exploratory factor analysis (EFA)

The technique of factor analysis is used to investigate the items' structure and validation of a scale. The principal component analysis is employed to perform factor analysis. After analyzing multicollinearity, the next step is to give structure to the measured items using EFA. EFA is dependent on the results of the Kaiser–Meyer–Olkin test. Table 5 reveals the

value of KMO as 0.913, which satisfies the assumptions of EFA (Norman 2010). The acceptable value of factor loading in EFA should be greater than 0.63 (Comrey and Lee 1992). Table 6 reflects that factor loading of all the given items is greater than 0.73, indicating a robust relationship between factors and variables.

## Measurement model

Multiple indicators were analyzed to examine the goodness of fit for the proposed framework, including  $X^2/df$ , RMSEA, TLI, CFI, RFI, IFI, and NFI (Hair et al. 1995; Schumacker and Lomax 1996; Byrne 2001). Table 7 demonstrates the suitable value of indicators and their actual value obtained from the analysis. All of the given indicators reveal a good fit for the proposed model (Fig. 1).

## Structural model

In order to analyze the coefficients of the proposed structure, a maximum likelihood procedure is employed. Table 8 represents the estimations of the proposed model. If the  $p$  value  $< 0.05$  and  $C.R. > 1.96$ , the estimates are considered significant. Apart from estimating regression between Covid-19 and overconfidence, all other heuristic biases significantly correlate with Covid-19.

## Hypothesis testing

The null hypothesis is rejected in the relationship between Covid-19 and overconfidence bias, whereas it is accepted for all other heuristic biases (Table 9).

## Conclusion and discussions

The paper aims at examining the existence of heuristic biases in Indian investors. It further explores the relationship between the perceived effects of Covid-19 and different heuristic biases. The study employs primary data collected through a self-administered questionnaire. The results indicate that a large section of Indian investors belongs to the upper-class segment as their income is more than 10,00,000/- rupees per annum. This finding supports the results of Baker et al. (2019). The findings suggest that investors have used mental shortcuts during the current pandemic for investment-related decisions to handle the uncertainty. This is due to the high influence of representative bias during the pandemic. The use of heuristics during uncertainty is in line with the existing literature (Bloom et al. 2007; Waweru et al. 2008; Shah et al. 2018). The study provides evidence for enhanced anchoring and availability bias during Covid-19. We could comfortably infer that people make



**Table 2** Total variance

Factor	Eigenvalues			Extraction sums of squared loadings		
	Total	Variance (%)	Cumulative (%)	Total	Variance (%)	Cumulative (%)
1	8.496	40.458	40.458	7.954	37.876	37.876
2	3.301	15.717	56.175			
3	2.221	10.576	66.751			
4	2.069	9.852	76.603			
5	1.070	5.096	81.700			
6	.415	1.976	83.676			
7	.376	1.792	85.467			
8	.349	1.663	87.130			
9	.313	1.493	88.622			
10	.277	1.320	89.943			
11	.271	1.292	91.234			
12	.266	1.266	92.500			
13	.240	1.143	93.643			
14	.214	1.019	94.662			
15	.201	.958	95.620			
16	.188	.897	96.517			
17	.178	.846	97.363			
18	.165	.786	98.149			
19	.144	.687	98.836			
20	.135	.642	99.478			
21	.110	.522	100.000			

Extraction method: principal axis factoring

**Table 3** Reliability statistics

Variable	Cronbach's alpha	No. of items
Availability	0.924	4
Anchoring	0.921	5
Representativeness	0.915	4
Overconfidence	0.931	4
Covid-19	0.855	4

their investment decisions based on the available information only, more specifically based on a particular reference point. The enhancement of the sentiments for investment and reduction in rational decision making during Covid-19 is in line with the findings of Sun et al. (2021). This study explains that barring overconfident investors, Covid-19 has influenced other types of investors in India to take different mental shortcuts while making an investment decision during an uncertain environment. The findings might not be generalized for every uncertain situation, as the Covid-19 is an event that has not occurred before (Caggiano et al. 2020). This high uncertainty and fear would have led to a high level of bias among the investors (Hoang and Syed 2021).

The current study is the first study that reflects the impact of Covid-19 on heuristic biases, and it also adds valuable insights to the plethora of literature on investors' decision

**Table 4** Correlation between variables

	OverCon	Anchor	Represent	Covid	Available
<i>OverCon</i>					
Correlation	1	.191**	.157**	.081	.239**
Significance		.001	.008	.169	.000
N	289	289	289	289	289
<i>Anchor</i>					
Correlation	.191**	1	.607**	.405**	.403**
Significance	.001		.000	.000	.000
N	289	289	289	289	289
<i>Represent</i>					
Correlation	.157**	.607**	1	.607**	.370**
Significance	.008	.000		.000	.000
N	289	289	289	289	289
<i>Covid</i>					
Correlation	.081	.405**	.607**	1	.353**
Significance	.169	.000	.000		.000
N	289	289	289	289	289
<i>Available</i>					
Correlation	.239**	.403**	.370**	.353**	1
Significance	.000	.000	.000	.000	
N	289	289	289	289	289

\*\* Correlation is significant at the 0.01 level (2-tailed)



**Table 5** Bartlett's and KMO test

Kaiser–Meyer–Olkin and Bartlett's test		
The measure of sampling adequacy (Kaiser–Meyer–Olkin)		.913
Test of sphericity (Bartlett's)	Chi-square	5316.815
	Degrees of freedom	210
	Significance	0.000

**Table 6** Rotated component matrix

	Component				
	1	2	3	4	5
Anchor1	.866				
Anchor3	.861				
Anchor2	.851				
Anchor4	.836				
Anchor5	.824				
OverC3		.921			
OverC4		.917			
OverC2		.914			
OverC1		.884			
Availab2			.912		
Availab3			.858		
Availab1			.852		
Availab4			.835		
Covid3				.851	
Covid2				.829	
Covid4				.814	
Covid1				.739	
Repres1					.831
Repres3					.799
Repres4					.770
Repres2					.768

Extraction method: PCA

Rotation method: Varimax

**Table 7** Goodness of fit

Measures of absolute fit	Acceptable	Result
<i>Parsimonious tests</i>		
Chi-square/degrees of freedom ( $\chi^2/df$ )	1–5	2.048
RMSEA	Less than 0.08	0.06
<i>Incremental fit tests</i>		
NFI	More than 0.85	0.931
RFI	More than 0.85	0.913
CFI	More than 0.85	0.963
TLI	More than 0.85	0.954
IFI	More than 0.85	0.963

Hu and Bentler (1999)

making under uncertainty. However, its findings cannot be generalized for two reasons; one, because we are still in the pandemic, and the behavior of investors after one year of the beginning of the pandemic needs to be examined. Therefore, we encourage the academicians to investigate the influence of heuristics after one year of Covid-19. We also encourage academicians to examine the level of heuristic biases among investors in the post-Covid-19 era. The second shortcoming of our study is the sampling area which is limited to Delhi. We encourage the authors to conduct a similar pan India study to confirm the generalization of the results.

## Implications

The current study aspires to contribute to the growing literature on behavioral finance by providing insights into the heuristic biases of Indian investors. This study also attempts to extend the current literature of investors' bias by adding the influence of the pandemic on heuristics biases. The study's most important finding indicates amplification in the investors' tendency to take mental shortcuts when faced with an unprecedented situation like Covid-19. The findings are helpful for both academicians and investors. From an academic point of view, it could provide insights on investor behavior during the pandemic, especially for those interested in exploring the field of investors' bias. The study explains how the perception of Covid-19 influences investors in making errors in judgment by adopting mental shortcuts. If an academician found that investors are using mental shortcuts, they could explore any uncertainty in the market, causing this heuristic bias. The study's findings suggest that people often make quick judgments in representativeness, availability, and anchoring bias during uncertainty. Therefore, the investment advisors and consultants will find it more convenient to convince their clients, especially during volatile situations. Since the results indicate no significant effect of the pandemic on the overconfident investors, it could be inferred that even an uncertain situation like Covid-19 does not affect the investment strategy of overconfident people. This insight is beneficial for academicians exploring the behavior of overconfident investors. The study could also be proven helpful for the investment advisors





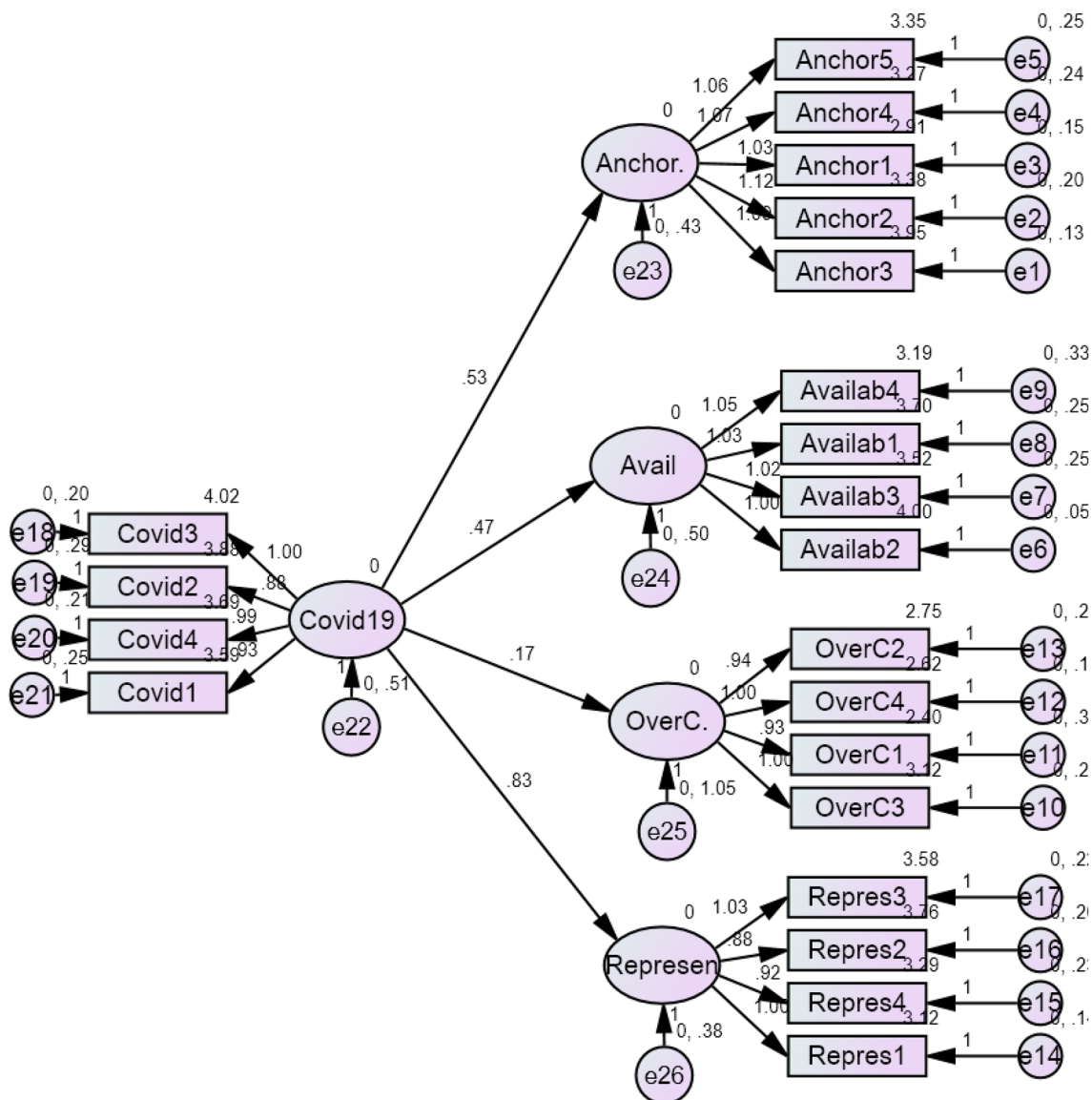


Fig. 1 Structural equation of proposed model

Table 8 Relationship between Covid-19 and heuristic biases

			Regression weight estimation	S.E	C.R	P
Anchoring	←	Covid19	0.532	0.064	8.281	0.000
Availability	←	Covid19	0.473	0.066	7.14	0.000
Overconfidence	←	Covid19	0.172	0.092	1.866	0.062
Representativeness	←	Covid19	0.833	0.069	12.055	0.000

in educating the individual investors about the possible errors they could commit due to market volatility. The study could also be proven beneficial to regulatory bodies

by providing insights into psychological biases influencing investors during the pandemic.



**Table 9** Verification of hypothesis

Hypothesis	Outcome	Relationship
H1: No relationship exists between the perceived impact of Covid-19 and overconfidence	Supported	No significant relation
H2: No relationship exists between the perceived impact of Covid-19 and representativeness bias	Not supported	Positive and significant
H3: The no relationship exists between the perceived impact of Covid-19 and availability bias	Not supported	Positive and significant
H4: No relationship exists between the perceived impact of Covid-19 and anchoring	Not supported	Positive and significant

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