A Cluster-Based Analysis of Investor Behaviour: Evidence from Personality Traits and Behavioural Biases

Swati Mehta
Assistant Professor,
Prof. V.B. Shah Institute of Management Amroli, Surat, Gujarat
(Affiliated to Veer Narmad South Gujarat University)

Abstract

Investor behaviour in financial markets is often influenced by psychological traits and behavioural biases rather than purely rational considerations. Recognising the heterogeneity among investors is therefore essential for understanding investment decision-making. The present study aims to classify equity market investors into homogeneous groups based on personality traits, behavioural biases, investment performance, and repurchase intention using cluster analysis. Primary data were collected from 727 individual investors through a structured questionnaire. Hierarchical cluster analysis using Ward's method was first employed to determine the optimal number of clusters, followed by non-hierarchical K-means cluster analysis to form final clusters. The results reveal five distinct investor clusters, each exhibiting unique combinations of personality characteristics and behavioural biases. The clusters were validated using ANOVA, confirming significant differences across all clustering variables. The study develops meaningful investor typologies—Vulnerable Investors, Gregarious Investors, Achievement-Striven Investors, Adventurous Investors, and Modesty Investors—which provide valuable insights for financial advisors, policymakers, and investors in designing customised investment strategies and behavioural interventions.

Keywords: Behavioural finance, investor typology, personality traits, behavioural biases, cluster analysis

1. Introduction

Traditional financial theories are built on the assumption that investors are rational decision-makers who process information efficiently and act to maximise expected returns. However, empirical observations of financial markets frequently contradict this assumption, revealing systematic deviations from rational behaviour. These deviations arise due to psychological, emotional, and cognitive factors that influence investment decisions. Behavioural finance seeks to explain such phenomena by incorporating insights from psychology into financial decision-making.

Investors differ widely in terms of their personality traits, emotional stability, risk tolerance, and susceptibility to behavioural biases. Consequently, treating investors as a homogeneous group may oversimplify the complex nature of investment behaviour. Investor segmentation through empirical techniques such as cluster analysis allows researchers to identify distinct investor profiles based on shared behavioural and psychological characteristics.

In the context of emerging markets like India, where retail investor participation has increased significantly, understanding investor heterogeneity becomes particularly important. The present study applies cluster

analysis to classify investors into homogeneous groups based on personality traits, behavioural biases, investment performance, and repurchase intention, thereby contributing to a deeper understanding of investor behaviour.

2. Review of Literature

Behavioural finance literature highlights that investors are influenced by a variety of cognitive biases and personality-driven tendencies.

Barberis et al (2001) included prospect theory in a model of asset prices. Barberis & Huang (2001) compared two forms of mental accounting by incorporating loss aversion

and narrow framing into two asset-pricing frameworks: individual stock accounting and portfolio accounting. The former was the more successful one.

Gigerenzer & Selten (2001) edited "Bounded Rationality: The Adaptive Toolbox", a collection of research papers which promoted bounded rationality as the key to understanding how individual investors made decisions.

Shapira & Venezia (2001) analyzed the investment behavior of the clients in a major brokerage firm in Israel. The behavior of the clients who made independent investment decisions were compared to those clients whose account was managed by the brokerage

professionals. The results showed that the disposition effect was higher for individual investors and the professionally managed accounts were more diversified in investment and had earned slightly higher returns compared to the independent investors.

Shefrin (2002) identified three main themes in behavioural finance explained as follows:

a. Heuristics – People often make decisions based on approximate rules of thumb, not strictly rational analyses.

b. Framing – The way a problem or decision is presented to the decision maker will affect his reaction.

c. Market inefficiencies – There are explanations for observed market outcomes that are contrary to rational expectations and market efficiency. These include mispricing, non-rational decision making, and return anomalies.

Gilovich et al (2002) edited "Heuristics and Biases: The Psychology of Intuitive Judgment", a book that compiled the most influential research studies on heuristics and

biases tradition since the initial collection in 1982 (Kahneman et al 1982).

Gilovich and Griffin (2002) identified six general purpose heuristics (affect, availability, causality, fluency, similarity and surprise) and six special purpose heuristics (attribution substitution, outrage, prototype, recognition, choosing by liking and choosing by default), whilst two heuristics have been superseded: representativeness,(replaced by attribution-substitution) (prototype heuristic and similarity heuristic) and anchoring and adjustment (replaced by the affect heuristic). Slovic et al (2002) described and discussed the 'affect heuristic': the specific quality of 'goodness' or 'badness'.

Behavioural finance builds itself upon two blocks: (i) limit to arbitrage and (ii) psychology (Barberies and Thaler,2003). The Psychologists list number of possible deviations from rationality, whereas, limits to arbitrage argue that rational investors may not be able to exploit opportunities created by irrational investors. If irrational investors create dislocations in assets prices, rational investors should be able to correct this mispricing through the process of arbitrage. However, arbitrage can be too costly as well as too risky, or can also be impossible due to various constraints, so the inefficiencies may persists for longer period. Behavioural finance finds its implications on various levels of financial markets: on the aggregate market level, on the cross section of average returns, on individual investor behaviour and on corporate finance(Barberis and Thaler,2003).

Mercer Consulting (2006) identified the following behavioural finance 'biases' affecting the actions of market participants on a daily basis.

a. Overconfidence – People continually overrate their own skills in a range of activities. This trait has been shown to exist in business and finance, with decision makers overconfident of their abilities.

b. Loss aversion – People appear to realize gains too quickly in the fear that their unrealized profit will disappear. In addition, they have trouble cutting their losses and tend to hold onto loss-making stocks too long in the hope of recovering their shortfalls.

c. Confirmation bias – As an extension of overconfidence, people tend to see positive outcomes as confirmation that an earlier decision was soundly biased. When a favourable outcome occurs, they are less likely to reassess the underlying reasons for that outcome and the probability that gains will be repeated.

d. Framing – Many people vary their responses to questions depending on how such question is presented or framed.

e. Anchoring – People naturally tend to focus on specific values as bases for which to compare or estimate future possible outcomes.

f. Status quo bias – People would prefer to maintain their current positions rather than move to new positions.

g. Myopic loss-aversion – People are more influenced by recent short-term fluctuations in the value of their investments than by the long-term implications.

Personality traits such as neuroticism, extraversion, conscientiousness, openness to experience, and agreeableness have been linked to differences in risk-taking behaviour and investment decision-making. Behavioural biases such as mental accounting, loss aversion, herding, overconfidence, anchoring, recency, and representativeness further shape how investors perceive information and respond to market movements. Several studies have attempted to classify investors into behavioural categories using cluster analysis. Such studies suggest that investors can be segmented into groups ranging from conservative and risk-averse investors to aggressive and risk-seeking investors. However, most prior research focuses either on behavioural biases or personality traits in isolation. Limited studies integrate both dimensions along with outcome variables such as investment performance and repurchase intention.

The present study extends existing literature by employing a comprehensive clustering approach that incorporates personality traits, multiple behavioural biases, and investment-related outcomes to develop meaningful investor typologies.

3. Objectives of the Study

The study is undertaken with the following objectives:

1. To classify equity market investors into homogeneous groups using cluster analysis.
2. To examine the behavioural and personality characteristics of each investor cluster.
3. To develop investor typologies based on psychological traits, behavioural biases, and investment outcomes.

4. Research Methodology

4.1 Research Design and Sample

The study adopts a descriptive and analytical research design based on primary data. A total of 727 equity market investors participated in the survey, and all responses were found to be valid with no missing data.

4.2 Variables Used for Clustering

The cluster analysis was conducted using the following variables:

- Personality Traits:

Neuroticism, Extraversion, Conscientiousness, Openness to Experience, Agreeableness

- Behavioural Biases:

Mental accounting and loss aversion, herding bias, overconfidence and self-attribution bias, recency bias, anchoring bias, representative bias, disposition effect, ostrich effect, and status quo effect

- Outcome Variables:

Investment performance and repurchase intention

4.3 Cluster Analysis Technique

A two-stage cluster analysis procedure was employed:

1. Hierarchical Cluster Analysis using Ward's method with squared Euclidean distance was first applied to determine the optimal number of clusters. Examination of the agglomeration schedule and dendrogram indicated that a five-cluster solution was most appropriate.
2. Non-Hierarchical K-Means Cluster Analysis was then performed by specifying five clusters to obtain final cluster membership and cluster centres.

To validate the clustering solution, one-way ANOVA was applied for descriptive purposes to examine differences across clusters.

5. Results of Cluster Analysis:

Classification of Sample into Homogenous Groups through Cluster Analysis

The primary objective of Cluster Analysis is to classify objects into relatively homogeneous groups based on the set of variables considered. Objects in a group (cluster) are relatively similar in terms of these variables and different from the objects in other groups (clusters). Cluster Analysis makes no difference between independent and dependent variables, rather the interdependent relationships between the whole set of variables is examined.

First perform a hierarchical method to define the number of clusters 2. Then use the k-means procedure to actually form the clusters

5.1 Agglomeration schedule by using Ward's Method for Cluster Analysis

Table 5. 1: Agglomeration schedule by using Ward's Method

Case Processing Summary[a,b]					
Cases					
Valid		Missing		Total	
N	Percent	N	Percent	N	Percent
727	100.0	0	.0	727	100.0
a. Squared Euclidean Distance used					
b. Ward Linkage					

Ward

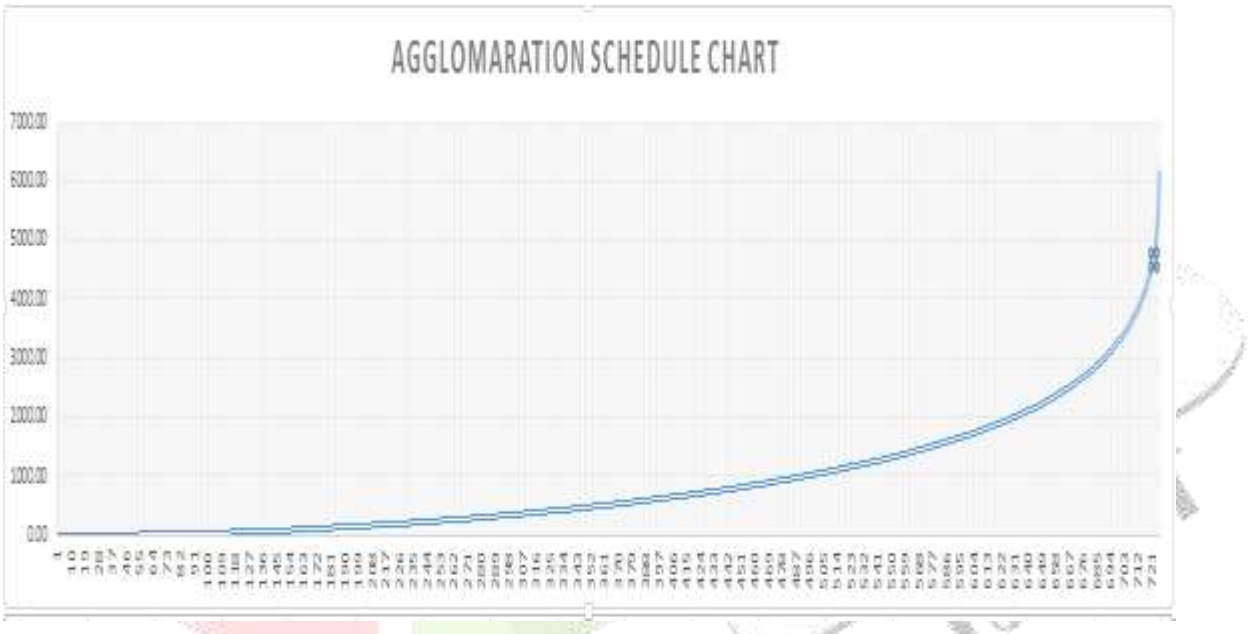
Agglomeration Schedule

Stage	Cluster Combined		Coefficients	Stage Cluster First Appears		Next Stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	713	714	.000	0	0	483
2	687	688	.000	0	0	3
3	29	687	.000	0	2	5
4	685	686	.000	0	0	5
5	29	685	.000	3	4	6
6	29	684	.000	5	0	101
7	682	683	.000	0	0	8
8	474	682	.000	0	7	9
9	474	681	.000	8	0	230
10	679	680	.000	0	0	11
11	115	679	.000	0	10	13
12	677	678	.000	0	0	13
13	115	677	.000	11	12	15
14	675	676	.000	0	0	15

Agglomeration Schedule Ward Method

703	66	77	3435.506	696	676	712
704	27	53	3474.272	99	517	721
705	59	119	3515.772	692	681	716
706	43	100	3557.461	644	658	713
707	25	57	3599.854	702	678	715
708	1	5	3642.395	697	562	717
709	9	12	3687.892	664	682	710
710	2	9	3742.408	699	709	719
711	3	17	3798.028	700	691	722
712	15	66	3863.955	698	703	720
713	29	43	3912.850	701	706	721
714	13	24	3974.681	693	689	718
715	8	25	4037.967	672	707	718
716	45	59	4101.295	686	705	720
717	1	11	4179.317	708	684	725
718	8	13	4263.433	715	714	722
719	2	28	4357.808	710	626	723
720	15	45	4452.881	712	716	724
721	27	29	4549.328	704	713	723
722	3	8	4682.985	711	718	724
723	2	27	4842.291	719	721	726
724	3	15	5019.202	722	720	725
725	1	3	5450.038	717	724	726
726	1	2	6190.968	725	723	0

5.2 Chart of Agglomeration Schedule Ward Method



Above Table and chart show Step-2 cluster solution is identified because at this step highest percentage change in co-efficient but sample size in two clusters are getting unequal i.e. cluster -1 has sample size of 700 and cluster -2 has sample size of 27 . so, such clusters cannot represent proper solution. Step- 3 cluster solution can be also considered because there are also higher percentage change in co-efficient but same problem of unequal sample size i.e cluster 1 has sample size of 400 , cluster-2 has sample size of 287 and cluster-3 has 40.

At step 4-5 cluster solution has higher changes in co-efficient as compare to 3-4 step cluster solution. So finally, 5 clusters solution is considered for study.

By using Hierarchical cluster analysis , No. of cluster had identified . 5 clusters were identified from 727 cases. After that, Non-Hierarchical cluster analysis method i.e. K- Mean Method was applied. Finally, K-Means Method was done, using the five personality traits, Extraversion, Agreeableness, Conscientiousness, Openness and Neuroticism ,7 behavioural biases, Investment performance , Repurchase intension and the based on the review of literature and similar investor taxonomies, the number of required clusters was taken as five.

5.3 Initial Cluster Centers per K-Means Cluster Analysis Method Cluster Centers

Table 5.2: Initial Cluster Centers per K-Means Cluster Analysis Method Cluster Centers

	Cluster				
	1	2	3	4	5
Neuroticism	2	4	1	5	1
Extroversion	3	4	2	5	3
Consciousness	3	1	4	5	3
Openness	1	2	4	5	5
Agreeableness	1	3	5	5	4
Mental accounting and loss aversion bias	4	3	3	5	3
Herding bias	5	1	1	5	3
Overconfident and self attribution bias	3	3	4	5	3
Recency bias	2	1	2	4	4
Anchoring	2	4	1	4	3
Representative Bias	2	1	1	5	4
Disposition effect	2	1	1	4	5
Ostrich effect	3	1	4	5	4
status quo effect	2	3	1	5	3
Investment performance	1	3	5	5	3
Repurchase intension	1	4	5	5	3

5.4 Iteration History _ Change in cluster centers

Table 5. 1: Iteration History _ Change in cluster centers

	Change in Cluster Centers				
Iteration	1	2	3	4	5
1	3.786	3.199	3.233	3.337	3.694
2	.505	.192	.719	.973	.657
3	.196	.151	.307	.398	.442
4	.073	.148	.252	.240	.319
5	.049	.096	.211	.075	.233
6	.046	.060	.000	.083	.078
7	.051	.033	.000	.047	.063
8	.074	.031	.259	.023	.103
9	.071	.045	.302	.012	.134
10	.033	.044	.223	.012	.112

a. Iterations stopped because the maximum number of iterations was performed. Iterations failed to converge. The maximum absolute coordinate change for any center is .103. The current iteration is 10. The minimum distance between initial centers is 7.071.

5.5 Distances between Final Cluster Centers

Table 5. 3: Distances between Final Cluster Centers

Cluster	1	2	3	4	5
1		1.806	1.707	3.615	2.212
2	1.806		1.527	2.648	2.172
3	1.707	1.527		3.238	2.679
4	3.615	2.648	3.238		4.234
5	2.212	2.172	2.679	4.234	

5.6 ANOVA table for cluster analysis:

Table 5.4 : ANOVA table for cluster analysis

	Cluster		Error			
	Mean Square	df	Mean Square	df	F	Sig.
Neuroticism	77.457	4	.440	722	175.910	.000
Extroversion	19.464	4	.497	722	39.181	.000
Consciousness	12.882	4	.447	722	28.832	.000
Openness	15.679	4	.479	722	32.743	.000
Agreeableness	26.985	4	.355	722	75.950	.000
Mental accounting and loss aversion bias	28.348	4	.326	722	86.905	.000
Herding bias	46.388	4	.449	722	103.229	.000
Overconfident and self attribution bias	10.595	4	.310	722	34.212	.000
Recency bias	19.500	4	.370	722	52.661	.000
Anchoring	8.227	4	.297	722	27.672	.000
Representative Bias	25.076	4	.529	722	47.426	.000
Disposition effect	87.795	4	.487	722	180.250	.000
Ostrich effect	8.655	4	.410	722	21.101	.000
status quo effect	30.017	4	.455	722	65.918	.000
Investment performance	20.474	4	.310	722	66.018	.000
Repurchase intension	16.071	4	.378	722	42.563	.000
The F tests should be used only for descriptive purposes because the clusters have been chosen to maximize the differences among cases in different clusters. The observed significance levels are not corrected for this and thus cannot be interpreted as tests of the hypothesis that the cluster means are equal.						

5.7 Number of Cases in each Cluster:

Table 5.5 **:** Number of Cases in each Cluster

Number of Cases in each Cluster		
Cluster	1	148.000
	2	181.000
	3	139.000
	4	86.000
	5	173.000
Valid		727.000

5.8: Final Cluster Centers

Table 5.6: Final Cluster Centers

Final Cluster Centers					
	Cluster				
	1	**2**	**3**	**4**	**5**
Neuroticism	Very High	low	moderate	low	low
Extroversion	low	Very High	low	high	moderate
Consciousness	Moderate	Low	Very high	moderate	high
Openness	low	high	moderate	Very high	moderate
Agreeableness	moderate	high	high	moderate	Very high
Mental accounting and loss aversion bias	high	low	high	low	Low
Herding bias	Very High	Very High	low	High	Low
Overconfident and self attribution bias	low	High	Moderate	High	Moderate
Recency Bias	high	high	moderate	high	High
Anchoring	high	High	Moderate	moderate	High
Representative Bias	High	Moderate	moderate	moderate	high
Disposition effect	high	moderate	high	moderate	moderate
Ostrich effect	high	low	high	low	moderate
status quo effect	high	Moderate	moderate	low	moderate
Investment performance	Moderate satisfaction	High satisfaction	moedrate satisfaction	High satisfaction	High satisfaction
Repurchase intension	moderate	high	high	High	Moderate
Researcher's Nomenclature	**Vulnerable investors**	**Gregarious investors**	**Achievement striven investors**	**Adventurous**	**Altruistic / Modesty investors**

6. Findings

Cluster Analysis, using the K Means Method was carried out on the data. Based on only ten iterations, five final clusters were identified from the initial five groupings. The final clusters were then subjected to one way ANOVA to establish the heterogeneity between the clusters and the homogeneity within the clusters. The minimum distance between the final cluster centres is 1.527 between Cluster 2 and 3, and the maximum distance is 4.234 between Cluster 4 and 5.

The final number of cases in each cluster was calculated as 148 for Cluster 1, 181 for Cluster 2, 139 for Cluster 3, 86 for Cluster 4 and 173 for Cluster 5.

Interpretation of personality traits' score

Personality Traits	**High score**	**Low score**
Neuroticism	More prone to psychological distress-negative affectivity like anger, hostility, depression, anxiety, feel like something dangerous is about to happen, self-consciousness: sensitive about being treated fairly and feel bitter when they are being cheated, immoderation : tend to be oriented towards short term pleasures and rewards rather than long term consequences, Vulnerability: panic, confusion, helplessness under pressor, depression- lack energy and have difficult initiating activities	free from depressive feeling , not suffer from mistaken impression, calm and fearless, more confident , clear thinking when stressed
Extroversion	Tend to be sociable, active, optimistic and talkative , Friendliness- like openly demonstrate positive feeling towards others, gregariousness- excitement of crowds, positive mood and feeling and not negative emotions	Reserved, aloof, quite , negative mood and feeling and negative emotions
Consciousness	Lazy, aimless, hedonic careless, Self-efficacy i.e. confidence in one's ability to accomplish things, have common sense, intelligence, self-control for achieving success, achievement- striving I.e do hard to achieve excellence, self-discipline : high will-power, think thoroughly all possibilities before acting	Lack of self-efficacy , to be disorganised and scattered in his decision, might be seen by other as lazy, do first thing that comes in mind without thinking other alternatives
Openness	Imaginative, curious, openness to unconventional idea and value, high fantasy , have good access to and awareness of their own feelings, adventurousness : eager to try new activities, experience different things , liberalism : readiness to challenge, authority, convention and traditional value	Tend to be conventional and dogmatic in beliefs and attitudes, set in their ways and emotionally unresponsive, less awareness about their feeling and tend not to express their emotions openly, feel uncomfortable with change and prefer familiar routines ,

		feel intellectual exercises as a waste of time,
Agreeableness	Trusting, altruistic, good nature, empathic and helpful, Altruism, co-operative, Modesty people with good intension, no need for pretence when dealing with others so are frank and sincere, helping other people, not like to claim that they are better than other, sympathy.	Clinical rude, suspicious, uncooperative, irritable, Manipulative, vengeful, ruthless, not affected by pain of others but strongly by human suffering, pride themselves on making objective judgement based on reason, not helping nature, potentially dangerous

(Compiled by Researcher)

A deep study of the characteristics of the Five Clusters, revealed the following:

Cluster 1:

Consists of individuals who score Very High on Neuroticism, Moderate Agreeableness, moderate Conscientiousness, low Openness to Experience and low Extraversion. These people are More prone to psychological distress- negative affectivity like anger, hostility, depression, anxiety, feel like something dangerous is about to happen. They however score high on mental accounting and loss aversion bias, recency bias and representative bias, even very high herding bias but low overconfidence and self attribution bias have observed. Such kind of person has confusion and feel helplessness under press. This leads to them for high disposition effect. High neuroticism and low extraversion so as to avoid the less resulted from the biases of disposition effect. As such person feel nervousness, in unfavourable situation , he afraid to take any action and prefer to keep position as it as. As low openness and moderate agreeableness, he even does not like to listen negative news for his investment. So , ostrich effect is high. Such person is moderately satisficed from his investment performance and reinvestment intension. The researcher gives this individual a name, **The Vulnerable Investors**.

Cluster 2:

Consists of individuals who score very high on Extraversion, high Agreeableness and Openness to Experience, but low on Conscientiousness and neuroticism. These people are seen to be inclined to actively manage their investments in an effort to achieve good return. They however have a markedly positive and trusting attitude towards Investment Advisors. They possess positive emotions and are venturesome to accomplish their ambitions (Watson and Clark, 1997). He has a positive view of life and people as because of high Extroversion as well as agreeableness . Sometimes, on account of low neuroticism score and low conscientiousness, they have quite lack of self-efficacy. They might be disorganised and scattered in his decision, generally ready to do first thing that comes in mind and says by others without thinking other alternatives . For such personality, herding, overconfidence and self-attribution, recency and anchoring biases are highly observed. Mental accounting and loss aversion bias and representative biases are also moderately observed. So disposition effect and status quo effect are also observed moderately and very low score of ostrich effect as because of high score of extroversion and agreeableness. Result is also supported by some researches like Extravert people face with psychological biases of representativeness heuristic, overconfidence and herd behaviour. Accordingly, it was reached that about 87per cent of extravert people

have representativeness heuristic. It was seen that about 89per cent of extravert people have overconfidence. As a result of the research made by Jamshidinavid, Chavoshani, and Amiri (2012), Bashir et al. (2013a, 2013b), Zaidi and Tauni (2012) it is concluded that extravert investors are in overconfidence bias. It was determined that about 89per cent of extravert people have herd behaviour. In the research made by Lin (2011), it was reported that extravert people show both herd behaviour and overconfidence.

But such person is highly satisficed from his investment performance and highly agree for reinvestment intension. The researcher gives this individual a name, **The Gregarious investor**.

Cluster 3:

Consists of individuals who score Very High Agreeableness and high Conscientiousness, moderate Openness and neuroticism, but Low on Extroversion. These people are seen to be very Aggressive achievement striving nature , who engage in a lot of active portfolio management and have focused objectives. They however, have a moderately negative attitude towards investment advisors or advice from other as because of low herding bias . A hyper-active individual, who is very ambitious and is willing to take a lot of calculated, well-researched risk to achieve his objectives. He is a generally going with his calculation for investment. Mental accounting and loss aversion bias has been observed with high score but herding bias is scored low whereas overconfidence and self-attribution bias, anchoring, recency , representative bias are scored moderately. Disposition effect and ostrich effect are highly observed in trading while status quo effect is scored moderately as mental accounting and loss aversion biases score high and herding bias scores low. The researcher gives this individual a name, **The achievement striven investor.** This kind of investors are moderately satisfied with their investment performance as they want more achievement in it. They have high reinvestment intension also.

Cluster 4:

Consists of individuals who score Very Low on neuroticism, moderate agreeableness and Conscientiousness but very high both biases Openness to Experience and Extraversion. These people are seen to be very risk taker and also very active in their investment approach. They are very social beings and too much communicate with any friends, or family members. However, they hold a fairly positive attitude towards the investment process as a whole as they have a highly positive attitude towards investment advisors. They consider themselves as know-it-all's, who are perfectly capable of making their own investment decisions. However, when things do not go their planned way, they may not be devastated and dejected. Mental accounting and loss aversion biases are scored at low but herding, overconfidence and self-attribution bias , Recency bias are scored high. Anchoring bias and representative bias are observed at moderate. Disposition effect has observed with score in trading whereas ostrich effect and status quo effect have scored at low. The researcher gives this individual a name, **The Adventurous investors.** Such kind of investors are highly satisfied with their investment performance and also have high reinvestment intension.

Cluster 5:

Consists of individuals who score Very high agreeableness and high on Conscientiousness, moderate on extroversion and Openness to Experience. These people are calculative risk. They are empathetic, helpful and considerate and generally agreeable individuals, who have a moderate level of inertia towards new experiences. However, being high conscientious, they put themselves to the investment process in a rigorous manner, and also do quite a lot of research for their investment decisions. They are emotionally strong and not affected to a great degree by the results of their decisions. Recency , representative and anchoring biases are scored at high. Mental accounting and loss aversion and overconfidence and self-attribution bias and herding bias are scored at moderate level. Disposition effect, ostrich and status quo effect are moderately observed. The researcher gives this individual a name, **The Modesty investors**.

1. Conclusion

The present study employed cluster analysis to classify equity market investors into homogeneous groups based on personality traits, behavioural biases, investment performance, and repurchase intention. Using a two-stage clustering approach—hierarchical clustering through Ward's method followed by K-means clustering—the study successfully identified five distinct investor typologies. Each cluster represents a unique behavioural and psychological profile, reflecting varying levels of emotional stability, social orientation, risk-taking behaviour, and susceptibility to behavioural biases.

The findings clearly establish that investors are not a homogeneous group; rather, they differ significantly in how personality traits interact with behavioural biases to influence investment decisions. Clusters such as *Vulnerable Investors* exhibit high neuroticism and strong bias-driven behaviour, while *Adventurous Investors* and *Gregarious Investors* demonstrate confidence, social influence, and higher risk appetite. In contrast, *Achievement-Striven* and *Modesty Investors* reflect more calculated and disciplined approaches to investing, albeit with selective bias tendencies.

Overall, the cluster-based approach provides a deeper and more nuanced understanding of investor behaviour than traditional variable-wise analysis. By integrating psychological traits, behavioural biases, and outcome variables, the study strengthens the behavioural finance framework and highlights the relevance of investor segmentation in understanding real-world investment behaviour, particularly in emerging markets.

2. Implications of the Study

The findings of the study offer several important implications for key stakeholders in the financial ecosystem:

Implications for Investors

Investors can benefit from recognising their own behavioural and personality-driven tendencies. Awareness of cluster-specific characteristics enables investors to identify personal behavioural weaknesses—such as overconfidence, herding, or loss aversion—and adopt more disciplined and informed investment strategies.

Implications for Financial Advisors and Portfolio Managers

The identified investor typologies provide a practical framework for customised advisory services. Financial advisors can design portfolio strategies, communication styles, and risk management approaches tailored to different investor clusters rather than relying on a one-size-fits-all model. Behavioural profiling can enhance client satisfaction and long-term relationship management.

Implications for Policymakers and Regulators

Regulatory bodies and policymakers can use behavioural segmentation to develop targeted investor education and financial literacy programmes. Understanding which investor groups are more vulnerable to behavioural biases can help in designing interventions aimed at improving market stability and protecting retail investors.

Implications for Academicians and Researchers

The study demonstrates the effectiveness of cluster analysis in behavioural finance research and provides a replicable methodological framework. Future research can extend this approach by incorporating longitudinal data, experimental designs, or actual portfolio performance to validate and refine investor typologies

3. Scope for Further Research

While the present study provides valuable insights into investor typologies based on personality traits and behavioural biases using cluster analysis, several avenues remain open for future research. First, future studies may employ **longitudinal research designs** to examine the stability or evolution of investor clusters over time, particularly during different market phases such as bull and bear periods. This would help in understanding whether investor typologies remain consistent or change with market experience and economic conditions.

Second, subsequent research may integrate **actual portfolio performance data**—such as returns, volatility, and diversification levels—to validate whether the identified behavioural clusters differ significantly in real investment outcomes. Such an approach would strengthen the practical relevance of behavioural segmentation.

Third, future studies can apply **alternative clustering techniques** such as latent class analysis, fuzzy clustering, or machine learning–based segmentation methods to compare the robustness and predictive power of different classification approaches. Cross-validation of clusters across methods may enhance the reliability of investor typologies.

Fourth, extending the study across **different geographical regions, asset classes, or market segments** would allow comparative analysis and improve the generalisability of findings. Comparative studies between retail and institutional investors may also yield deeper insights into behavioural heterogeneity.

Finally, future research may explore the effectiveness of **behavioural interventions**, such as financial education, nudges, or advisory tools, in mitigating bias-driven behaviour within specific investor clusters. Experimental or quasi-experimental designs could assess how tailored interventions influence investment decision-making across different investor typologies.

4. References :

1. Barberis, N., Huang, M., & Santos, T. (2001). Prospect theory and asset prices. *The Quarterly Journal of Economics*, 116(1), 1–53. https://doi.org/10.1162/003355301556310
2. Barberis, N., & Huang, M. (2001). Mental accounting, loss aversion, and individual stock returns. *The Journal of Finance*, 56(4), 1247–1292. https://doi.org/10.1111/0022-1082.00367
3. Barberis, N., & Thaler, R. (2003). A survey of behavioral finance. In G. M. Constantinides, M. Harris, & R. M. Stulz (Eds.), *Handbook of the economics of finance* (Vol. 1B, pp. 1053–1128). Elsevier. https://doi.org/10.1016/S1574-0102(03)01027-6
4. Gigerenzer, G., & Selten, R. (Eds.). (2001). *Bounded rationality: The adaptive toolbox*. MIT Press.
5. Gilovich, T., Griffin, D., & Kahneman, D. (Eds.). (2002). *Heuristics and biases: The psychology of intuitive judgment*. Cambridge University Press. https://doi.org/10.1017/CBO9780511808098
6. Gilovich, T., & Griffin, D. (2002). Introduction—Heuristics and biases: Then and now. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 1–18). Cambridge University Press.
7. Kahneman, D., Slovic, P., & Tversky, A. (Eds.). (1982). *Judgment under uncertainty: Heuristics and biases*. Cambridge University Press.
8. Mercer Consulting. (2006). *Behavioral finance: The impact of investor psychology on investment decisions*. Mercer Investment Consulting.

9. Shapira, Z., & Venezia, I. (2001). Patterns of behavior of professionally managed and independent investors. *Journal of Banking & Finance*, 25(8), 1573–1587. https://doi.org/10.1016/S0378-4266(00)00139-4

10. Shefrin, H. (2002). *Beyond greed and fear: Understanding behavioral finance and the psychology of investing*. Oxford University Press.

11. Slovic, P., Finucane, M., Peters, E., & MacGregor, D. G. (2002). The affect heuristic. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 397–420). Cambridge University Press.