THE EFFECT OF KNOWLEDGE, STRATEGIES AND BEHAVIOURAL BIASES ON THE TRADING PERFORMANCE OF EQUITY DERIVATIVE TRADERS IN KERALA

Thesis

submitted to the University of Calicut

for the award of the Degree of

DOCTOR OF PHILOSOPHY IN COMMERCE

By

SUBEESH V. K.

Under the supervision and guidance of

Prof. (Dr.) M. A. JOSEPH
Former Professor & Head

Department of Commerce and Management Studies
University of Calicut, Kerala 673635

July – 2023

DECLARATION

I, hereby declare that the thesis entitled **"The Effect of Knowledge, Strategies and Behavioural Biases on the Trading Performance of Equity Derivative Traders in Kerala"** submitted to the University of Calicut, for the award of the degree of Doctor of Philosophy under the Faculty of Commerce and Management Studies, is a record of the bonafide research work done by me, under the supervision and guidance of **Prof. (Dr.) M. A. Joseph**, Former Professor & Head, Department of Commerce and Management Studies, University of Calicut. I further declare that this thesis has not previously formed the basis for the award of any degree, diploma, associateship, fellowship or other similar title or recognition.

University of Calicut

Date: 12.07.2023.

Subeesh V. K.

DEPARTMENT OF COMMERCE AND MANAGEMENT STUDIES
UNIVERSITY OF CALICUT
Calicut University (PO) Malappuram (Dt)
Kerala- 673635

Prof. (Dr.) M. A. Joseph
Former Professor & Head

Mobile No.: +91 8606032741
Email id: jsphma@gmail.com

CERTIFICATE

This is to certify that the thesis entitled **"The Effect of Knowledge, Strategies and Behavioural Biases on the Trading Performance of Equity Derivative Traders in Kerala"** submitted by **Mr. Subeesh V. K.** for the award of the degree of Doctor of Philosophy in Commerce of University of Calicut is a record of bonafide research work carried out under my supervision and guidance. No part of the thesis has been submitted for any degree, diploma, associateship, fellowship or other similar title to any candidate in any university.

Both the examiners have not recommended any modifications or suggestions and therefore the original thesis is resubmitted as such. The soft copy attached is the same as that of the resubmitted copy.

Prof. (Dr.) M. A. JOSEPH
Supervising Teacher

Prof. (Dr.) M.A. JOSEPH
Supervising Guide
Department of Commerce and Management Studies
University of Calicut
Calicut University P.O., PIN: 673 635

University of Calicut

Date: 26.10.2023

Department of Commerce and Management Studies
UNIVERSITY OF CALICUT
University of Calicut - 673 635

Acknowledgements

This research work would not have been possible without the inspiration, encouragement, support and blessings of a number of individuals. It gives me immense pleasure to acknowledge the support extended to me by them during this research journey.

First and foremost, I am indebted and grateful to my Research Guide, beloved Prof. (Dr) M. A. Joseph, Former Professor & Head of the Department of Commerce and Management Studies (DCMS), University of Calicut for the meticulous guidance, continuous support, valuable advice and constant inspiration throughout the course of this research work. My research work would not have been possible without his able guidance. I feel extremely fortunate and proud to be one of his research scholars and work under his supervision. No words would suffice to express my respect and gratitude to him.

I am very grateful to Prof. (Dr) B. Johnson, Former Professor & Head of DCMS, University of Calicut, for his constant encouragement and guidance in completing this research. I am highly thankful to Dr Sreesha C. H., Associate Professor & Head of DCMS, University of Calicut for the kind help, support and guidance for the successful completion of this endeavour.

I thank all other faculty members of DCMS, University of Calicut (Dr Aparna Sajeev, Dr Natasha P. and Mr Harikumar C.) for their profound support and encouragement. I am very much thankful to Mr Abdulla Moozhikkal (Librarian) for his help and support. I express my deep sense of gratitude to Ms Santhi K.J. (Section Officer), Ms Bindu M.C. (Asst. Section Officer), Ms Syndia Sunder (Computer Assistant) and Ms Molly Varghese (Office Attendant) for their valuable service and support.

I am deeply indebted to my teachers in the Dept. of Commerce and Management Studies especially, Prof (Dr) K. P. Muraleedharan, Prof. (Dr) P. Mohan, Prof. (Dr) B. Vijayachandran Pillai and Prof. (Dr) E. K. Satheesh for their warm support and valuable guidance during my research.

I would like to remember the late Prof. (Dr) V. K. Janardhanan and the late Prof. (Dr) A. K. Saradha, for their knowledge and blessings that have had a great impact on me and my research journey. I will never forget to mention my teacher and former *visiting faculty of DCMS, the late Mr K. P. Rajendran F.C.A., for his invaluable support and scholarly guidance in the initial stage of this research.*

I have immense pleasure to express my sincere gratitude to Dr M. Girish Babu (Associate Professor & Head of the Dept. of Statistics, CHMK, Govt. Arts and Science College, Koduvally) for his great help, generous advice, and timely support during the statistical analysis of primary data. I am highly thankful to Dr Arunima K. V. (Asst. Professor, T. A. Pai Management Institute, Manipal) for the support and encouragement in completing this research work. I also thank Dr Tejil Thomas (Asst. Professor of Commerce, St. Thomas Collage, Palai, Kottayam) for sharing valuable thoughts with respect to the statistical analysis of this research. I am extremely thankful to Dr Aboobacker Kappad (Former Associate Professor of English, SARBTM Govt. College, Koyilandy) for his invaluable suggestions regarding the language of the thesis. I wish to place on record my sincere thanks to Dr Vinodh V. M. (Asst. Librarian, CHMK Library, University of Calicut) for the plagiarism check process.

I was fortunate enough to have a team of highly talented and inspiring research scholars of DCMS. A word of gratitude would not be sufficient for Dr Greeshmadas M. H., Ms T. Shemeera Kunhu (Assistant Professor, PTM Government College, Perinthalmanna), and Mr Umesh K. K. (Asst. Professor, SARBTM Govt. College, Koyilandy) for the valuable help, continuous motivation and great support in completing this research. I wish to express my sincere thanks to all other full-time research scholars of DCMS for their valuable support and auspicious assistance.

I am grateful to the Director of Collegiate Education, Govt. of Kerala for allowing me to do part-time research. I also place on record my sincere gratitude to Dr C. V. Shaji, Assistant Professor in charge of Principal, SARBTM Govt. College, Koyilandy, Dr Sandeep P. V., Head of the Dept. of Commerce, and all other colleagues of the college for the constant encouragement and support in completing this research.

I am greatly indebted to Mr T. S. Anantharaman (Chairman, Leo Pharma and Director Motilal Oswal), Mr Akshay Agarwal (MD, Acumen Capital Market India Ltd.), Mr Nihkil Gopalakrishnan (CEO, Pentad Securities), Dr V. K. Vijaya Kumar, (Chief Investment Strategist, Geojit securities), Ms Uthara Ramakrishnan (Proprietor, Artha Financial Services), Mr Ramki (MD&CEO Sharewealth Securities Ltd.), Mr Antony Joseph (Regional Manager, Geojit Financial Services Ltd.), Mr Nikhil Mathew (Options trader and Admin of 'Oharipadanam' YouTube Channel), Mr Vishnu G. Nair (Senior Software Engineer, Nvidia Corporation), and Mr Sarathlal (Founder, Bulls Moves Calicut) for their help in the data collection process of this research. I would like to express my special gratitude to all the respondents of my study for their kind co-operation.

I also wish to express my special thanks to Mr Balu, Mr Vinesh and Mr Sreejith of Bina Photostat (Chenakkal, Calicut University), for their precious support and assistance in editing, printing and binding of my thesis.

I will be failing in my duty, if I do not express my gratitude to my family for their enormous support. I would like to record my regards to my father Sri. Sami V.K. and mother Smt. Saradha V.K. for their unconditional support and motivation throughout my life. I am grateful to my wife Dr Liya K., who took up most of the domestic responsibilities on my behalf to help me complete my research better. My son Neerav Nandan S. is always my motivation to complete this research on time. Finally, I would like to acknowledge the encouragement and support of my father-in-law and mother-in-law in completing this research work.

Thanks to the Almighty, for all the blessings!!!

Subeesh V. K.

CONTENTS

List of Tables

List of Figures

List of Abbreviations

Chapter	Title	Page No.
I.	Introduction	1 – 16
II.	Review of Literature and Research Gap	17 – 70
III.	Theoretical Background	71 – 148
IV.	Research Methodology	149 – 196
V.	Trading Knowledge, Preferences and Strategies of Equity Derivative Traders in Kerala	197 – 260
VI.	Behavioural Factors Influencing Trading Decisions of Equity Derivative Traders in Kerala	261 – 344
VII.	Trading Performance of Equity Derivative Traders in Kerala	345 – 409
VIII.	Summary, Findings and Conclusion	410 – 442
IX.	Recommendations and Scope for Further Research	443 – 451
	Bibliography	i – xvii
	Annexure – Questionnaire	i – ix

LIST OF TABLES

Table No.	Title	Page No.
1.1	Variables used in the study	1
2.1	Number of selected Documents and their source	18
3.1	Chronology of the events in the development of the Derivatives Market in India	86
3.2	Futures Contract Specifications at NSE	92
3.3	Options Contract Specifications at NSE	93
3.4	Ways of Squaring off futures contract	96
3.5	Total Volumes of Exchange-Traded Futures and Options in 2022	122
3.6	Region-wise Volume of Exchange Traded Derivative contracts in 2022	123
3.7	Asset-wise Volume of Exchange Traded Derivative contracts in 2022	124
3.8	Exchange Ranking by Derivatives Trading Volumes	126
3.9	Equity Index Top Contracts by Trading Volume	127
3.10	NSE’s Business Growth in FO Segment-Turnover	129
3.11	NSE’s Business Growth in FO Segment-Number of Contracts	130
3.12	BSE’s Business Growth in FO Segment- Turnover	130
3.13	BSE’s Business Growth in FO Segment-Number of Contracts	131
4.1	Descriptive Statistics of Pilot Survey	152
4.2	Measurement scales used in the questionnaire	154
4.3	List of experts interviewed to ensure content validity	158
4.4	KMO and Bartlett's Test –Level of Knowledge	162
4.5	Result of EFA- Level of Knowledge	162
4.6	Path estimates and Regression Weights of CFA measurement model - Level of Knowledge about Derivative Trading	166
4.7	Validity and Reliability of CFA measurement model - Level of Knowledge about Derivative Trading	167

Table No.	Title	Page No.
4.8	Model Fit Indices- Level of Knowledge about Derivative Trading	169
4.9	KMO and Bartlett's Test- Trading strategies	17
4.10	Result of EFA- Trading strategies	171
4.11	Path estimates and Regression Weights of CFA measurement model - Trading strategies of equity derivative traders	174
4.12	Validity and Reliability of CFA measurement model – Trading Strategies of Equity derivative traders	175
4.13	Model Fit Indices- Trading strategies	176
4.14	KMO and Bartlett's Test- Behavioural Biases	177
4.15	Result of EFA- Behavioural biases	178
4.16	Path estimates and Regression Weights of CFA measurement model – Behavioural biases of equity derivative traders	182
4.17	Validity and Reliability of CFA measurement model – Behavioural Bias	183
4.18	Model Fit Indices- Behavioural biases	185
4.19	Result of Reliability test- Trading Performance	196
4.20	Path estimates and Regression Weights of CFA measurement model – Trading Performance	188
4.21	Validity and Reliability of CFA measurement model – Trading Performance	189
4.22	Model Fit Indices- Trading Performance	190
4.23	Result of normality test of variables	191
5.1	Demographic Profile of Respondents	198
5.2	Descriptive statistics of scaled demographic variables	199
5.3	Distribution of respondents based on Broker	202
5.4	Level of Knowledge about the Basics of Derivative Market	204
5.5	Overall Level of Knowledge about Basics of Derivative Market	206
5.6	Level of Knowledge about F&O Trading Strategies	208
5.7	Overall Level of Knowledge about F&O trading strategies	210

Table No.	Title	Page No.
5.8	Area-wise analysis of level of knowledge about the derivative market	212
5.9	Gender-wise analysis of level of knowledge about the derivative market	213
5.10	Descriptive statistics of age-wise analysis of knowledge about derivative market	214
5.11	Result of One-way ANOVA: age-wise analysis of knowledge level	214
5.12	Age group-wise Post Hoc (HSD) analysis for multiple comparisons of knowledge level	215
5.13	Descriptive statistics of Education qualification - wise analysis of knowledge about derivative market	216
5.14	Result of One-way ANOVA: Education-wise analysis of knowledge level	217
5.15	Education qualification wise Post Hoc (HSD) analysis for multiple comparisons of knowledge level	217
5.16	Descriptive statistics of trading experience-wise analysis of knowledge about derivative market	219
5.17	Result of One-way ANOVA: Trading experience - wise analysis of knowledge level about derivative market	220
5.18	Trading experience-wise Post Hoc (HSD) analysis for multiple comparisons of knowledge level	221
5.19	Descriptive statistics of trading capital-wise analysis of knowledge about the derivative market	222
5.20	Result of One-way ANOVA: Trading capital-wise analysis of knowledge level about derivative market	223
5.21	Trading capital-wise Post Hoc (HSD) analysis for multiple comparisons of knowledge level	224
5.22	Classification of traders based on Level of knowledge about derivative market	226
5.23	Trading Objectives of equity derivative traders	227
5.24	Preferences of Equity Derivative traders	229
5.25	Trading Techniques and Strategies of equity derivative traders	232

Table No.	Title	Page No.
5.26	Classification of traders based on trading strategies	238
5.27	Area-wise analysis of trading techniques and strategies of equity derivative traders in Kerala	239
5.28	Gender-wise analysis of trading techniques and strategies of equity derivative traders in Kerala	240
5.29	Descriptive statistics of age-wise analysis of use of trading techniques and strategies	241
5.30	Result of One-way ANOVA: age-wise analysis of the use of trading techniques and strategies	242
5.31	Age group wise Post Hoc (HSD) analysis for multiple comparisons of the use of trading techniques and strategies	242
5.32	Descriptive statistics of Education qualification -wise analysis of use of trading techniques and strategies	244
5.33	Result of One-way ANOVA: Education - wise analysis of use of trading techniques and strategies	244
5.34	Education qualification wise Post Hoc (HSD) analysis for multiple comparisons of use of trading techniques and strategies	245
5.35	Descriptive statistics of occupation -wise analysis of the use of trading techniques and strategies	247
5.36	Result of One-way ANOVA: Occupation-wise analysis of the use of trading strategies	247
5.37	Occupation-wise Post Hoc (HSD) analysis for multiple comparisons of use of trading techniques and strategies	248
5.38	Descriptive statistics of trading experience -wise analysis of the use of trading techniques and strategies	250
5.39	Result of One-way ANOVA: Trading experience - wise analysis of trading strategies	250
5.40	Descriptive statistics of trading capital-wise analysis of use of trading techniques and strategies	251
5.41	Result of One-way ANOVA: Trading capital-wise analysis of trading strategies	252
5.42	Trading capital group wise Post Hoc (HSD) analysis for multiple comparisons of trading strategies	252

Table No.	Title	Page No.
5.43	Descriptive statistics of Level of knowledge-wise analysis of use of trading strategies	254
5.44	Result of One-way ANOVA: Level of Knowledge- wise analysis of strategies	255
5.45	Level of knowledge-wise Post Hoc (HSD) analysis for multiple comparisons of trading strategies	255
5.46	Distribution of traders using option strategy builder software	256
5.47	Action taken by a trader when the market moves adversely	258
6.1	Behavioural Factors Influencing the trading decision of equity derivative traders	262
6.2	Influence of the heuristic variables on the trading decisions of equity derivative traders in Kerala	266
6.3	Combined Influence of the Heuristic variables on the trading decision of equity derivative traders	268
6.4	Gender-wise analysis of impact of heuristic variables on trading decisions of equity derivative traders	269
6.5	Age-wise analysis of the influence of Heuristic variables on the trading decision of equity derivative traders	269
6.6	Result of One-way ANOVA: age-wise analysis of influence of heuristic variables	270
6.7	Descriptive statistics of Education qualification -wise analysis of Influence of heuristic variables	271
6.8	Result of One-way ANOVA: Education-wise analysis of Influence of heuristic variables on the trading decision of equity derivative traders	272
6.9	Descriptive statistics of trading experience -wise analysis of Influence of Heuristic variables	273
6.10	Result of One-way ANOVA: Trading experience - wise analysis of Influence of heuristic variables on the trading decision of equity derivative traders	273
6.11	Descriptive statistics of trading capital -wise analysis of influence of Heuristic variables	274

Table No.	Title	Page No.
6.12	Result of One-way ANOVA: Trading capital-wise analysis of the influence of heuristic variables on the trading decision of equity derivative traders	275
6.13	Influence of Prospect Variable on the trading decision of equity derivative traders in Kerala	278
6.14	Combined influences of Prospect Variables on the trading decision of equity derivative traders	280
6.15	Gender-wise analysis of influence of prospect variables on the trading decision of equity derivative traders	281
6.16	Age wise analysis of influence of prospect variables on the trading decision of equity derivative traders	282
6.17	Result of One-way ANOVA: Age-wise analysis of influence of prospect variables	282
6.18	Age group wise Post Hoc (HSD) analysis for multiple comparisons of influence of prospect variables on the trading decision of equity derivative traders	283
6.19	Descriptive statistics of Education qualification -wise analysis of Influence of Prospect variables	284
6.20	Result of One-way ANOVA: Education - wise analysis of Influence of prospect variables on the trading decision of equity derivative traders	285
6.21	Education qualification wise Post Hoc (HSD) analysis for multiple comparison of the influence of prospect variables	286
6.22	Descriptive statistics of trading experience -wise analysis of Influence of prospect variables	287
6.23	Result of One-way ANOVA: Trading experience - wise analysis of Influence of prospect variables on the trading decision of equity derivative traders	288
6.24	Descriptive statistics of trading capital -wise analysis of influence of prospect variables	289
6.25	Result of One-way ANOVA: Trading capital - wise analysis of the influence of prospect variables on the trading decision of equity derivative traders	290
6.26	Influence of herding effect on the trading decision of equity derivative traders	292

Table No.	Title	Page No.
6.27	Combined Influence of Herding Effect on the trading decision of equity derivative trader	293
6.28	Gender-wise analysis of the influence of Herding effect on the trading decision of equity derivative traders	294
6.29	Age-wise analysis of influence of Herding effect on the trading decision of equity derivative traders	295
6.30	Result of One-way ANOVA: Age-wise analysis of influence of Herding effect	296
6.31	Descriptive statistics of Education qualification-wise analysis of Influence of Herding effect	297
6.32	Result of One-way ANOVA: Education-wise analysis of Influence of the Herding effect	298
6.33	Education qualification-wise Post Hoc (HSD) analysis for multiple comparisons of influence of Herding effect	298
6.34	Descriptive statistics of trading experience-wise analysis of Influence of Herding effect	300
6.35	Result of One-way ANOVA: Trading experience-wise analysis of Influence of Herding effect on the trading decision of equity derivative traders	300
6.36	Descriptive statistics of trading capital-wise analysis of influence of Herding effect	301
6.37	Result of One-way ANOVA: Trading capital-wise analysis of the influence of herding effect on the trading decision of equity derivative traders	302
6.38	Influence of Emotions on the trading decisions of equity derivative traders	303
6.39	Combined Influence of Emotional bias on the trading decisions of equity derivative traders	305
6.40	Gender-wise analysis of the influence of Emotional bias on the trading decisions of equity derivative traders	306
6.41	Age-wise analysis of influence of Emotional bias on the trading decision of equity derivative traders	307
6.42	Result of One-way ANOVA: Age-wise analysis of influence of emotional bias	307

Table No.	Title	Page No.
6.43	Age group wise Post Hoc (HSD) analysis for multiple comparison of influence of Emotional bias	308
6.44	Descriptive statistics of Education qualification -wise analysis of Influence of Emotional bias	309
5.45	Result of One-way ANOVA: Education-wise analysis of Influence of the Emotional bias	310
6.46	Descriptive statistics of trading experience-wise analysis of Influence of Emotional bias	311
6.47	Result of One-way ANOVA: Trading experience - wise analysis of Influence of Emotional bias	312
6.48	Trading experience wise Post Hoc (HSD) analysis for multiple comparison of influence of Emotional bias	312
6.49	Descriptive statistics of trading capital-wise analysis of influence of Emotional bias	314
6.50	Result of One-way ANOVA: Trading capital-wise analysis of the influence of Emotional bias	314
6.51	Influence of market impact on the trading decisions of equity derivative traders	316
6.52	Combined Influence of Market impact on the trading decisions of equity derivative traders	318
6.53	Gender-wise analysis of influence of Market impact on trading decision of equity derivative traders	319
6.54	Age-wise analysis of influence of Market impact on the trading decision of equity derivative traders	320
6.55	Result of One-way ANOVA: Age-wise analysis of influence of market impact	320
6.56	Descriptive statistics of Education qualification -wise analysis of Influence of Market impact	321
6.57	Result of One-way ANOVA: Education-wise analysis of Influence of the Market impact	322
6.58	Education qualification wise Post Hoc (HSD) analysis for multiple comparisons of influence of market impact	323
6.59	Descriptive statistics of trading experience -wise analysis of Influence of Market impact	324

Table No.	Title	Page No.
6.60	Result of One-way ANOVA: Trading experience - wise analysis of Influence of Market impact on the trading decision of equity derivative traders	325
6.61	Descriptive statistics of trading capital-wise analysis of influence of Market impact	326
6.62	Result of One-way ANOVA: Trading capital - wise analysis of the influence of Market impact on the trading decision of equity derivative traders	326
6.63	Influence of Behavioural biases on the trading decisions of equity derivative traders	327
6.64	Gender-wise analysis of Influence of behavioural factors	329
6.65	Age-wise analysis of Influence of Behavioural factors on the trading decision of equity derivative traders	330
6.66	Result of One-way ANOVA: Age-wise analysis of influence of behavioural factors	330
6.67	Age group wise Post Hoc (LSD) analysis for multiple comparison of influence of Behavioural factors	331
6.68	Descriptive statistics of Education qualification-wise analysis of Influence of Behavioural factors	332
6.69	Result of One-way ANOVA: Education-wise analysis of Influence of behavioural factors on the trading decision of equity derivative traders	333
6.70	Education qualification wise Post Hoc (LSD) analysis for multiple comparison of Influence of Behavioural factors	334
6.71	Descriptive statistics of trading experience -wise analysis of Influence of Behavioural factors	335
6.72	Result of One-way ANOVA: Trading experience - wise analysis of Influence of behavioural factors on the trading decision of equity derivative traders	336
6.73	Descriptive statistics of trading capital-wise analysis of Influence of Behavioural factors	337
6.74	Result of One-way ANOVA: Trading capital-wise analysis of the influence of Behavioural factors on the trading decision of equity derivative trader	337
6.75	Knowledge-wise analysis of the influence of Behavioural biases	338

Table No.	Title	Page No.
6.76	Result of One-way ANOVA: Knowledge-wise analysis of Influence of Behavioural biases on the trading decisions of equity derivative traders	339
6.77	Knowledge-wise Post Hoc (HSD) analysis for multiple comparisons of Influence of Behavioural factors	339
7.1	Trading return of equity derivative traders in Kerala	347
7.2	Trading satisfaction of equity derivative traders in Kerala	349
7.3	Overall Trading performance of equity derivative traders	351
7.4	Area-wise analysis of Trading Performance of equity derivative traders	352
7.5	Gender-wise analysis of Trading Performance of equity derivative traders	353
7.6	Age-wise analysis of Trading Performance of equity derivative traders	354
7.7	Result of One-way ANOVA: Age-wise analysis of Trading performance	354
7.8	Descriptive statistics of Education qualification-wise analysis of trading performance	355
7.9	Result of One-way ANOVA: Education-wise analysis of the trading performance of equity derivative traders	356
7.10	Education qualification wise Post Hoc (HSD) analysis for multiple comparisons of trading performance	356
7.11	Descriptive statistics of Occupation -wise analysis of trading performance	358
7.12	Result of One-way ANOVA: Occupation - wise analysis of Trading Performance of equity derivative traders	359
7.13	Descriptive statistics of trading experience -wise analysis of Trading Performance	360
7.14	Result of One-way ANOVA: Trading experience - wise analysis of Trading Performance	360
7.15	Descriptive statistics of trading capital -wise analysis Trading Performance	361
7.16	Result of One-way ANOVA: Trading capital - wise analysis of trading performance	362

Table No.	Title	Page No.
7.17	Trading capital-wise Post Hoc (LSD) analysis for multiple comparisons of trading performance	362
7.18	Correlation between Trading Performance and amount of Trading Capital	364
7.19	Descriptive Statistics of influence of Level of Knowledge on Trading Performance	365
7.20	Result of One-way ANOVA: Influence of Level of Knowledge of Traders on trading performance	365
7.21	Knowledge Level-wise Post Hoc (HSD) analysis for multiple comparisons of Trading performance	366
7.22	Descriptive Statistics of the influence of trading strategies on trading performance	367
7.23	Result of One-way ANOVA: Impact of trading strategies of traders on trading performance	368
7.24	Trading Strategy-wise Post Hoc (HSD) analysis for multiple comparisons of Trading Performance	369
7.25	Descriptive Statistics of the influence of Behavioural Biases on the Trading Performance	370
7.26	Result of One-way ANOVA: Influence of Behavioural Biases of Traders on the Trading Performance	370
7.27	Level of Behavioural Bias-wise Post Hoc (HSD) analysis for multiple comparisons of Trading Performance	371
7.28	Profitability analysis of trading experience of equity derivative traders	372
7.29	Winning Ratio of Equity Derivatives Traders	3473
7.30	Average monthly return of Equity Derivatives Traders	374
7.31	Summary of the Model Fit Indices- The Trading Performance Model (TPM)	377
7.32	Hypotheses Tests Results: Trading Performance Model	380
7.33	Summary of Model Fit Indices- The Knowledge-Performance Model	384
7.34	Hypotheses Tests Results: Trading Knowledge-Performance Model	386

Table No.	Title	Page No.
7.35	Model Fit Indices- The Trading Strategy-Performance Model	389
7.36	Hypotheses Tests Results: Trading Strategy-Performance Model	391
7.37	Model Fit Indices- The Trading bias - Performance Model	394
7.38	Hypotheses Tests Results: Trading bias - Performance Model	396
7.39	Model Fit Indices- The Dimension-wise Model of Impact of Behavioural bias on Trading Performance	401
7.40	Hypotheses Tests Results: The Dimension-wise impact of Behavioural Bias on the Trading Performance Model	403

LIST OF FIGURES

Figure No.	Title	Page No.
1.1	The Research Process	6
1.2	Conceptual model of the study	13
2.1	Annual Number of Publications in the Area of Derivatives Market	19
2.2	Annual trend of research in behavioural finance	43
3.1	Regulatory Framework of Derivatives Trading in India	84
3.2	Payoff Chart-Long Call	99
3.3	Payoff Chart-Short Call	100
3.4	Payoff Chart-Long Put	100
3.5	Payoff Chart-Short Put	101
3.6	The payoff chart-Synthetic Long Call	102
3.7	Payoff Chart-Coved call writing	103
3.8	Pay-off Chart- Covered Put	104
3.9	Pay-off Chart-Long Combo	105
3.10	Payoff Chart-Synthetic Long Put	106
3.11	Payoff Chart-Long Straddle	107
3.12	Payoff Chart-Short Straddle	108
3.13	Payoff chart –Long Strangle	109
3.14	Payoff Chart-Short Strangle	110
3.15	Payoff Chart-Collar	111
3.16	Payoff chart-Bull Call Spread	112
3.17	Payoff Chart-Bull Put Spread	113
3.18	Payoff Chart-Bear Call Spread	114
3.19	Payoff Chart-Bear Put Spread	115
3.20	Payoff Chart-Long Call Butterfly	116
3.21	Payoff Chart-Short Call Butterfly	117
3.22	Payoff Chart-Long Call Condor	118

Figure No.	Title	Page No.
3.23	Payoff Chart-Short Call Condor	119
3.24	Payoff Chart-Strips	120
3.25	Payoff Chart-Straps	120
3.26	Global trading volume of exchange-traded derivatives	121
3.27	Volumes of Exchange-Traded Derivatives by region	122
3.28	Volumes of Exchange-Traded Derivatives by Asset Class	124
3.29	Volumes of Equity Derivatives over five years	125
3.30	Retail trading activity in cash and equity derivative segments of NSE	133
3.31	Prospect theory	138
4.1	CFA Measurement model –Level of Knowledge about Derivative trading	165
4.2	CFA Measurement model – First Order: Trading strategies of Equity derivative traders	173
4.3	CFA Measurement model –First order: Behavioural biases	181
4.4	CFA Measurement model –First order: Trading Performance	187
4.5	Histogram with normal curve of distributions of Knowledge level	192
4.6	Histogram with normal curve of distributions of Trading strategies	192
4.7	Histogram with normal curve of distributions of Behavioural bias	193
4.8	Histogram with normal curve of distributions of Trading performance	193
5.1	Distribution of equity derivative traders based on their broker	203
5.2	Popular Option strategy builder software	257
7.1	The Path diagram of the proposed Trading Performance Modal	376
7.2	Path diagram of final Trading Performance Modal showing the Impact of Trading Knowledge, Trading Strategies and Behavioural Biases on Trading Performance of Equity Derivative Traders	379

Figure No.	Title	Page No.
7.3	The proposed model of impact of Trading Knowledge on different factors of Trading Performance	382
7.4	Path diagram - the influence of trading knowledge on, different dimensions of trading performance of equity derivative traders	385
7.5	The proposed model of the impact of Trading Strategies on different factors of Trading Performance	387
7.6	Path diagram - The Impact of Trading Strategies on different dimensions of trading performance of equity derivative traders	390
7.7	The proposed model of Impact of Behavioural Bias on different factors of Trading Performance	392
7.8	Path diagram - The influence of Trading Bias on different dimensions of Trading Performance of equity derivative traders.	395
7.9	The proposed model of Dimension-wise impact of behavioural bias on different factors of Trading performance	397
7.10	Path diagram - The dimension-wise Impact of Behavioural bias on different trading performance.	402

LIST OF ABBREVIATIONS

Abbreviations		Expansion
AGFI	:	Adjusted Goodness of Fit Index
AMOS	:	Analysis of Moment Structures
ANOVA	:	Analysis of Variance
ARIMA	:	Autoregressive Integrated Moving Average
ATM	:	At-the Money
AVE	:	Average Variance Estimate
BSE	:	Bombay Stock Exchange
CFA	:	Confirmatory Factor Analysis
CFI	:	Comparative Fit Index
CMIN/DF	:	Chi-Square /Degree of Freedom
CR	:	Composite Reliability
DAX	:	Deutscher Aktien Index
DITM	:	Deep In-the-money
DOTM	:	Deep out-of-the-money
EFA	:	Exploratory Factor Analysis
EGARCH	:	Exponential general autoregressive conditional heteroskedasticity
EOD	:	End of the Day
ETF	:	Exchange Traded Funds
EUETS	:	European Union Emissions Trading System
FMC	:	Forward Market Commission
FTSE	:	Financial Times Stock Exchange
GARCH	:	Generalized Autoregressive Conditional Heteroskedasticity
GFI	:	Goodness of Fit Index
HNI	:	High Net-worth Individuals
HSD	:	Honestly Significant Difference
HSI	:	Hang Seng Index
ITM	:	In-the-Money
IV	:	Implied Volatility
KMO	:	Kaiser-Meyer-Olkin
KOSPI	:	Korean Composite Stock Price Index

Abbreviations		Expansion
LSD	:	Least Significant Difference
MCX	:	The Multi Commodity Exchange of India Ltd.
MSV	:	Maximum Shared Variance
NBFCs	:	Non-Banking Financial Company
NCDEX	:	National Commodity and Derivatives Exchange Limited
NFI	:	Normed of Fit Index
NSE	:	National Stock Exchange
OTC	:	Over-the-counter
OTM	:	Out-of-the-Money
PCA	:	Principal Component Analysis
PCR	:	Put-Call Ratio
QIB	:	Qualified Institutional Buyers
RBI	:	Reserve Bank of India
RMR	:	Root Mean Square Residuals
RMSEA	:	Root Mean Square Approximate
SCRA	:	The Securities Contract (Regulation) Act
SEBI	:	Securities Exchange Board of India
SEM	:	Structural Equation Modeling
SFL	:	Standardised Factor Loadings
SIF	:	Stock Index Futures
SPSS	:	Statistical Package for Social Science
SSE	:	Shanghai Stock Exchange
SSF	:	Single Stock Futures
TGARCH	:	Threshold General Autoregressive Conditional Heteroskedasticity
TLI	:	Tucker Lewis Index
UK	:	United Kingdom
VAR	:	Vector Autoregression
VECM	:	Vector Error Correction Model
VIX	:	Volatility Index

Abstract

A thorough knowledge of market and trading strategies are essential for earning consistent speculative profit. Individuals' rational and irrational behaviour may also influence their trading decision and thereby trading performance. Previous research has identified the existence of behavioural biases among equity investors in the Indian stock market, but so far, no studies have examined the influence of behavioural biases on the trading decisions of equity derivative traders. Therefore, this study is aimed at examining the influence of behavioural biases on the trading performance of equity derivative traders in Kerala. A sample of three hundred equity derivative traders was selected purposively for conducting this study. A structured questionnaire was developed and used for data collection, which includes questions/statements to capture data on trading knowledge, trading strategies, influence of behavioural biases and trading performance.

The main objectives of the study include examination of the level of knowledge, identifying trading preferences and strategies, exploring the influence of behavioural biases and assessing the trading performance of equity derivative traders in Kerala. A comparison of trading performance with respect to demographic variables, levels of knowledge, trading strategies and behavioural biases is also made in this study. In addition to the above, the impact of knowledge, trading strategies and behavioural biases on trading performance are also analysed using Structural Equation Modelling. The researcher took the study's objectives one by one and analyzed the relevant data with statistical tools like t-test, one-way ANOVA, correlation, and Structural Equation Modelling with the help of SPSS-22 and AMOS-23 software. The major conclusions based on the findings of the study are explained below.

Two types of knowledge of derivatives traders are assessed in this study – 'knowledge about the basics of the derivatives market' and 'knowledge about the trading strategies.' The analysis proves that equity derivative traders have a high level of

knowledge of all aspects of these two groups of variables and there is no significant difference in the level of knowledge between male and female equity derivative traders. The examination of objectives and preferences of equity derivative traders shows that earning speculative profit is the most preferred trading objective of derivatives traders, and the options market, index options and intra-day trade are the most preferred. An analysis of trading strategies of equity derivative traders reveals that the majority of the traders highly prefer option selling, and at the same time, most of them are considering option Greeks, PCR ratio and VIX (Volatility Index) while designing their trading strategies.

An enquiry into the level of influence of behavioural biases on trading decisions reveals that the equity derivative traders in Kerala are strongly influenced by behavioural biases in their trading decisions, and there is no significant difference in the influence of behavioural factors between male and female equity derivative traders in Kerala. The age, education, and knowledge of traders have a significant influence on the level of behavioural biases of equity derivative traders in Kerala.

The trading performance of equity derivative traders is evaluated by the objective and subjective viewpoints of individual traders. It is found that the return realized by the majority of the equity derivative traders meets their expectations and that the majority of the equity derivative traders are satisfied with the return achieved through trading derivatives. The trading performance of equity derivative traders is compared with respect to different levels of knowledge, strategies and behavioural biases and it is found that the trading performance is high among traders who have high knowledge and low level of behavioural biases. The analysis using Structural Equation Modelling reveals that there is a significant cause-and-effect relationship existing between trading knowledge, trading strategies, behavioural bias and trading performance. Trading knowledge and trading strategies are found to be the important positive predictors of trading performance, but behavioural biases are found to be the negative predictors of trading performance, with significant values of the path coefficients.

Based on the comprehensive study and its findings, it can be accurately stated that sufficient knowledge about the derivatives market is crucial for achieving a

satisfactory yield in the derivatives market. A thorough understanding of derivatives trading strategies is another important factor in deciding the success of equity derivative traders. Apart from these, the influence of behavioural biases also determines the performance of equity derivative traders. Therefore, it can be concluded that traders who possess adequate knowledge, well-crafted strategies and minimum trading bias can attain superior trading performance.

Keywords: *Derivative Market, Equity Derivatives, Options, Futures, Behavioural Bias, Trading Performance, Trading Strategies.*

JEL Classification: *G1, G11, G13, G4, G40, G41*

1.1 Introduction

Derivatives have become increasingly important in finance. Futures and options are actively traded on many exchanges throughout the world. Different types of forward contracts, swaps, options and other derivatives are entered into by individuals and financial institutions *(Hull & Basu, 2017).* It is widely believed in the financial world that the most significant milestone in financial innovation is achieved with the issuance and trading of derivatives. Along with this positive element, the proponents of derivatives also admit that this term arouses more controversies, and most people look at them with suspicion and a few would believe that they do contribute to society's welfare. But the fact is that derivatives are a standard risk management tool that enables risk sharing and facilitates the efficient allocation of capital to productive investment activities *(Kumar, 2015).*

Risk is involved in almost all investments. Variation from expected return to actual return is caused by several factors. The last two decades have witnessed many innovations in the financial market to solve the issue of reducing risk. The emergence of the derivatives market is an ingenious feat of financial engineering that provides an effective and less costly solution to the problem of risk embedded in the underlying asset's price unpredictability. In India, the emergence and growth of the derivatives market is relatively a recent phenomenon. Since its inception, the derivatives market has exhibited exponential growth both in terms of volume and number of traded contracts. Within a short span of time, derivative trading in India has surpassed the cash segment in terms of turnover and the number of traded contracts. The derivatives market received a great deal of attraction nowadays and a lot of people are attracted to derivative trading which motivates the present study. Many skills are required for trading successfully in the derivatives market like trading knowledge, strategies, trading psychology, etc. This study examines the trading knowledge, preferences, strategies, influence of behavioural bias and trading performance of equity derivative traders in Kerala.

This chapter provides a general idea about this study. It presents the research problem, objectives, scope, significance, research process, variables, hypotheses and conceptual model. The limitations of this study and the scheme of reporting this research are also included in this chapter.

1.2 Statement of the Research Problem

The introduction of risk management instruments in India gained momentum in the last few years due to the liberalization process and the Reserve Bank of India's (RBI) efforts in creating a currency-forward market. Financial Derivatives are an integral part of Portfolio Management to hedge risk. In less than three decades of their coming into vogue, derivatives markets have become the most important markets in the world. Any change in the macroeconomic variable will instantly affect the investors' return, particularly in the financial market. One of the major challenges faced by investors is the high degree of volatility of the stock market as well as the foreign exchange market. National and international events like demonetisation, Brexit, and a downturn in the Chinese economy have aggravated the volatility in the market. The increased volatility in the financial market also increased the popularity of the derivatives market. The National Stock Exchange of India Ltd. (*NSE)* emerged as the World's largest derivative exchange in 2019 by the number of contracts traded also evidenced this popularity. In the aftermath of the COVID-19 pandemic, the equity market, particularly the derivatives market, received a great deal of attention *(Khan et al., 2020)*.

People mostly participate in the derivatives market for hedging and speculation. Hedgers employ financial derivatives to safeguard their investment portfolio from market risk; to achieve this they must adopt the right hedging tactics. To obtain complete hedge investors should have expertise in selecting the appropriate derivative instrument. Most investors are unaware of the ways of using derivatives to protect their investment portfolio. Speculators on the other hand enter the market for earning speculative profit through various trading strategies. A thorough knowledge of market and trading strategies are essential for earning consistent speculative profit. In addition to the above the rational and irrational behaviour of traders may also influence their trading decision and thereby trading performance. It is known that behavioural biases exist among investors in the Indian stock market. But so far, no studies have examined the influence of behavioural factors on the trading decisions of equity derivative traders in India. In this background, it is very relevant to study the level of knowledge, trading strategies and the influence of behavioural factors on trading decisions, and their impact on the trading performance of equity derivative traders in Kerala.

1.3 Research Questions

Based on the research problem the following research questions were put forth for giving the right direction to the study:

1. Do the equity derivative traders have adequate knowledge about the derivative market?
2. What are the strategies and techniques of equity derivative traders in Kerala?
3. Does any behavioural bias influence the trading decision of equity derivative traders in Kerala?
4. Does the level of knowledge of derivative traders have any impact on their trading performance?
5. Do the trading strategies of derivative traders have any impact on their trading performance?
6. Do the behavioural biases of equity derivative traders have any impact on their trading performance?

1.4 Objectives of the Study

Based on the research questions, the following objectives are set forth:

1. To examine the level of knowledge of equity derivative traders about the derivative markets and trading strategies.
2. To identify the trading preferences and strategies of equity derivative traders in Kerala.
3. To explore the influence of behavioural biases on the trading decisions of equity derivative traders in Kerala.
4. To assess the trading performance in terms of return and satisfaction of equity derivative traders.
5. To compare trading performance with respect to different levels of knowledge, strategies and behavioural biases of equity derivative traders.
6. To measure the impact of knowledge level, trading strategies and behavioural biases on the trading performance of equity derivative traders.

1.5 Scope of the Study

This study limits its scope only to equity derivatives and its market in India. The study covers the level of knowledge, trading strategies and influence of behavioural factors on the trading performance of equity derivative traders in Kerala only. The study is based on both primary and secondary data. Primary data were collected from individual equity derivative traders in Kerala State only.

1.6 Significance of the Study

A strong financial market with broad participation is essential for a developed economy. With India's growth story unfolding, there is a need to raise resources for companies to fuel the capital needs of the economy and also ensure that the benefits of growth percolate to the bottom of the socio-economic pyramid. India's household savings, one of the highest in the world at 30%, can be channelized through equities, bonds and other instruments to achieve greater financial inclusion and improve the financial markets in India. There's a lack of broad participation. Of a population of over one billion, barely 18 million only invest in equity markets. That means only less than two per cent of the entire population in our country invests in the equity market. The main reason for this is the huge risk associated with high volatility in the Indian equity market. The emergence of the derivatives market provides an effective and cost-effective solution to the problem of risk that is embedded in the price unpredictability of the underlying asset. By popularizing derivative products and their trading strategies, a large number of investors may be attracted to taste the profit of equity investment.

Most investors are unaware of the ways of using derivatives to protect their investment portfolio. This study is aimed at popularising the derivative products and their trading strategies to common individual investors. Irrational decisions and the influence of behavioural biases are the most important problems faced by individual traders. Therefore, identifying the behavioural factors influencing trading decisions will help to reduce the investment mistakes that they are making in their decision-making and reduce the intensity of anomalies in future. The study is very relevant because of the above socio-economic impact and it also tries to fill the research gap in the area of derivatives, as there are only a few studies conducted with an academic interest in this particular area. This study brings a fresh perspective as it tries to cover the following five different aspects related to trading in the derivatives market:

1. Test of knowledge of equity derivative traders about different aspects of the derivative market.
2. Analysis of trading preferences and practices of equity derivative traders.
3. Examining the behavioural biases of equity derivative traders.
4. Checking the trading performance of equity derivative traders, and
5. Finally testing the impact of trading knowledge, trading strategies and behavioural biases on the trading performance of equity derivative traders.

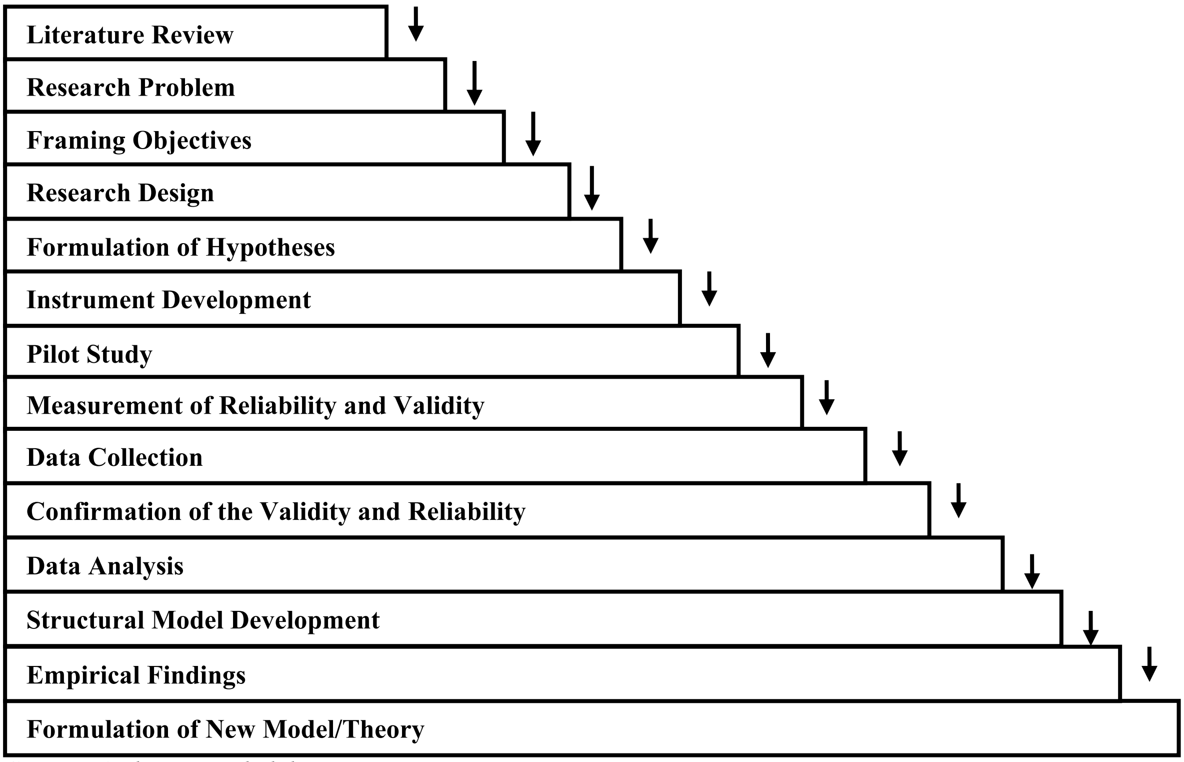
So far, no such comprehensive study has been carried out to examine the trading knowledge, trading strategies, influence of behavioural bias and trading performance of equity derivative traders in Kerala.

1.7 Research Process

This section explains how the methodology is designed in a strategic way using systematic procedures and tools in a logical way to address the research problem. Fig 1.1 illustrates the research process.

Figure 1.1

The Research Process



Source: Author compiled data

1.8 Period of the Study

The period of the study covers a span of six years from August 2017 to June 2023. Primary data were collected during the year 2021-22 from equity derivative traders in Kerala. The data were analysed during 2022-23 and the report is submitted in July 2023.

1.9 Study Variables

The variables leading to the objectives of the study were identified based on a literature survey and are summarised below:

Table 1.1

Variables used in the study

Sl. No.	Purpose	Dimensions	Name of Variable
1	**Level of Knowledge**	**Conceptual Knowledge**	• Basic Concepts of Derivatives • Derivative products • SEBI guidelines • Risk • Margin money • Brokerage and charges • Tax implications
		Trading Knowledge	• Basic F&O strategies • Option Greeks • Trading based on Technical Analysis • Delta neutral trading • Strategy builder software • Algorithmic Trading • Pair trading • Complex Option Strategies
2	**Trading Preferences and Strategies**	**Trading Preferences**	• Trading objectives • Market segment • Type of Contract • Type of Trade • Contract Maturity • Strike price • Preferred Strategy
		Trading Strategies	• Stop loss • Use of Strategy builder software • Use of Algo trading • Use of foreign stock indices • Risk-reward ratio • PCR ratio • Volatility Index

Sl. No.	Purpose	Dimensions	Name of Variable
3	**Behavioural Biases**	**Heuristic Theory**	• Representativeness • Anchoring • Overconfidence • Gambler's fallacy
		Prospect Theory	• Loss aversion • Regret aversion • Mental accounting
		Herding effect	• General market trend • Analysts' recommendations • News about companies
		Emotions and self-attribute bias	• Greed • Hope • Fear
		Market Impact	• Market sentiments • Past trends of stock/index
4	**Trading Performance**	**Return and Satisfaction**	• Rate of return • Market return • Satisfaction • Success ratio
5	**Demographic Variables**		• Area • Gender • Age • Education Level • Occupation • Annual Income
6	**Trading Variables**		• Trading Capital • Trading experience

Source: Literature Review

1.10 Operational Definition of Concepts

Some of the terms used in the study have technical meanings. To avoid confusion, they are operationally defined. The following list includes the operational definitions of the terms and variables used in the study:

1. **Equity Derivatives:** Equity derivatives are financial contracts that derive their value from the secondary market price of an underlying equity asset. In these contracts, buyers and sellers agree to buy or sell an underlying equity or related financial instrument at a predetermined price. These agreements can either be held until the expiry or sold before the expiry. Stock Options, Stock Futures, Index Options and Index Futures are only considered equity derivatives in this study.

2. **Trader:** A trader, also known as an equity derivatives trader, is any individual who buys or sells any type of equity derivative product on the stock market.

3. **Knowledge**: In this study 'knowledge' means the level of understanding about the equity derivative market, market activities and trading strategies, of an equity derivative trader.

4. **Strategy:** In this study, the term "strategy" refers to the futures and options trading plans and methods that equity derivative traders use to profit from changing market conditions.

5. **Trading Preference:** Trading preferences of derivative traders refer to the specific strategies, instruments, and market conditions that derivative traders prefer and are comfortable with when engaging in trading activities. These traders may engage in various types of derivatives trading, including options, futures, swaps, and other complex financial instruments.

6. **Behavioural Bias:** Behavioural bias means the psychological influences and biases that affect the financial behaviour of investors and traders.

7. **Trading Performance:** A technique for assessing how well an equity derivative trader is doing with their transactions is referred to as "trading performance". In this study, the trading performance of stock derivative trader is evaluated using current return, success ratio, and trading satisfaction.

1.11 Hypotheses

In this study, hypotheses are formulated and tested using appropriate test statistics to draw conclusions about the population based on sample data. The following are the objectives of testing of hypotheses in this study.

1. To check the significance of differences in the level of trading knowledge, trading strategies, behavioural bias and trading performance among traders of different demographic groups.
2. To check the significance of differences in the trading performance of equity derivative traders with different knowledge levels.
3. To check the significance of differences in the trading performance of equity derivative traders with different trading strategies.
4. To check the significance of differences in the trading performance of equity derivative traders with different levels of influence of behavioural biases.

Based on the above objectives the following hypotheses have been formulated and classified:

1.11.1 Null Hypotheses based on the First objective of the study are:

$H0_1$: There is no significant difference in the level of knowledge among equity derivative traders of different demographic groups

$H0_2$: There is no significant difference in the level of knowledge among equity derivative traders according to trading variables.

1.11.2 Null Hypotheses based on the second objective of the study are:

$H0_3$: There is no significant difference in the use of trading techniques and strategies among equity derivative traders of different demographic groups

$H0_4$: There is no significant difference in the use of trading techniques and strategies among equity derivative traders according to trading variables.

$H0_5$: There is no significant difference in the use of trading strategies among equity derivative traders with different knowledge levels.

1.11.3 Null Hypotheses based on the third objective of the study are:

$H0_{6}$: There is no significant difference in the influence of behavioural bias among equity derivative traders of different demographic groups

$H0_{7}$: There is no significant difference in the influence of behavioural bias among equity derivative traders according to trading variables.

$H0_{8}$: There is no significant difference in the influence of heuristic variables among equity derivative traders of different demographic groups

$H0_{9}$: There is no significant difference in the influence of heuristic variables among equity derivative traders according to trading variables.

$H0_{10}$: There is no significant difference in the influence of prospect variables among equity derivative traders of different demographic groups

$H0_{11}$: There is no significant difference in the influence of prospect variables among equity derivative traders according to trading variables.

$H0_{12}$: There is no significant difference in the influence of the herding effect among equity derivative traders of different demographic groups

$H0_{13}$: There is no significant difference in the influence of the herding effect among equity derivative traders according to trading variables.

$H0_{14}$: There is no significant difference in the influence of the emotional bias among equity derivative traders of different demographic groups

$H0_{15}$: There is no significant difference in the influence of the emotional bias among equity derivative traders according to trading variables.

$H0_{16}$: There is no significant difference in the influence of the market impact bias among equity derivative traders of different demographic groups

$H0_{17}$: There is no significant difference in the influence of the market impact bias among equity derivative traders according to trading variables.

$H0_{18}$: There is no significant difference in the influence of behavioural factors among equity derivative traders with different knowledge levels.

1.11.4 Null Hypotheses based on the fourth objective of the study are:

$H0_{19}$: There is no significant difference in the trading performance of equity derivative traders among different demographic groups

$H0_{20}$: There is no significant difference in the trading performance among equity derivative traders according to trading variables.

$H0_{21}$: There is no significant difference in the trading performance of equity derivative traders with different knowledge levels.

$H0_{22}$: There is no significant difference in the trading performance of equity derivative traders with different trading strategies.

$H0_{23}$: There is no significant difference in the trading performance of equity derivative traders with different levels of behavioural bias.

$H0_{24}$: There is no relationship between trading performance and the amount of trading capital.

1.11.5 Null Hypotheses based on the fifth objective of the study are:

$H0_{25}$: The level of knowledge of equity derivative traders does not have a significant contribution to the trading performance.

$H0_{26}$: The trading strategy of equity derivative traders does not have a significant contribution to the trading performance.

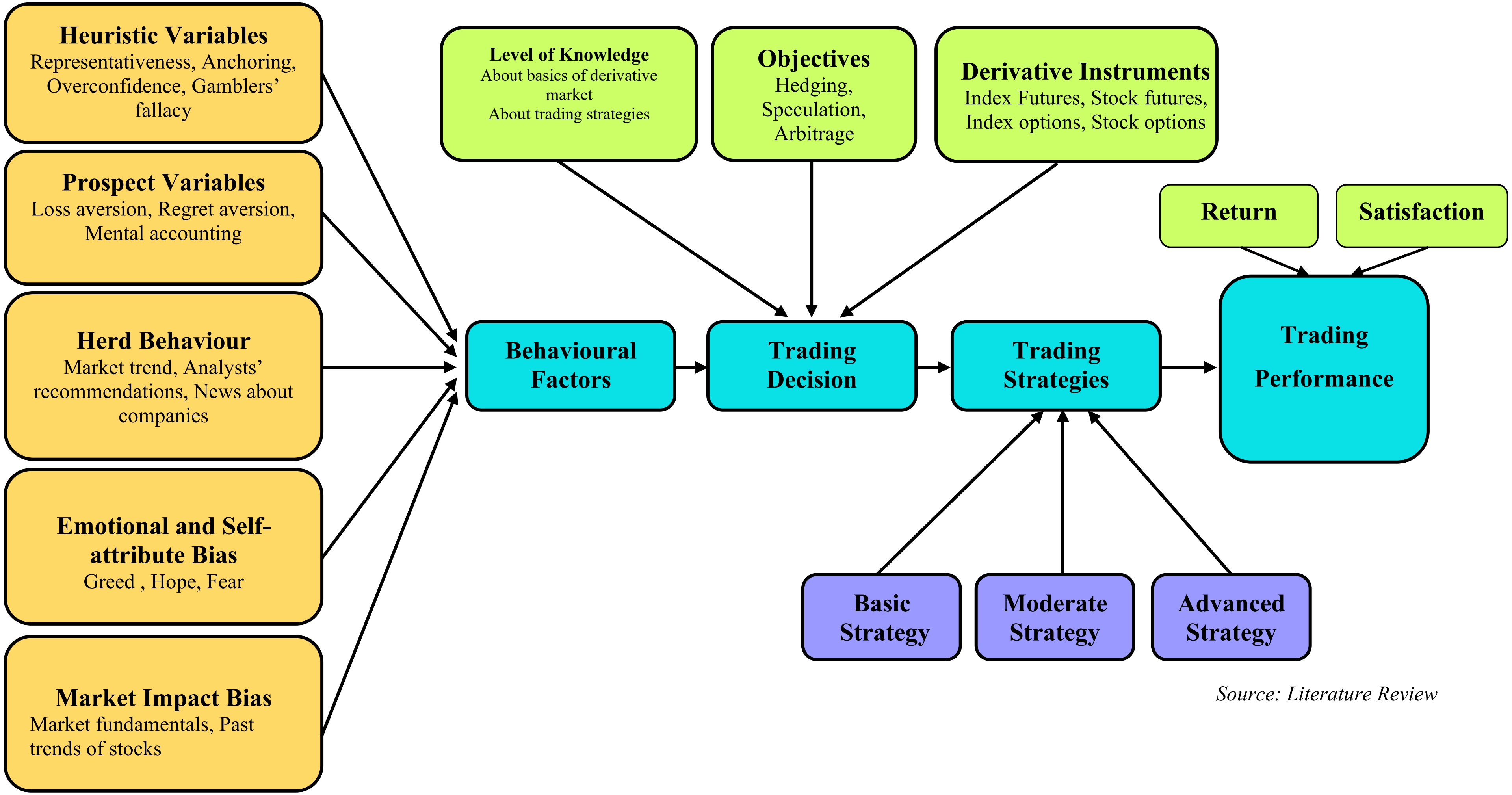
$H0_{27}$: The behavioural biases of equity derivative traders do not have a significant impact on trading performance.

1.12 Conceptual Model of the Study

A conceptual model is a framework that is initially used in research to outline the possible courses of action or to present an idea or thought. When a conceptual model is developed logically, it will provide rigour to the research process *(Elangovan & Rajendran, 2015).* This study has two dimensions; in one dimension the study explores the influence of the behavioural variables on the individual derivative traders' decisions and their investment performance. In the other dimension, the study examines the trading strategies and trading knowledge of equity derivative traders and their impact on their trading performance. Based on variables identified through the literature survey the following conceptual model has been developed according to Dubin's theory-building method *(Lynham, 2002):*

Figure 1.2

Conceptual model of the study



Source: Literature Review

1.13 Limitations of the Study

The following are the limitations of this study

1. The number of derivative traders are comparatively less in the state of Kerala and many traders are not ready to share their trading experience, therefore extensive research with a large sample is very difficult and this study is based on 300 sample respondents selected purposively.
2. There may be several rational and irrational factors affecting the trading decisions of equity derivative traders, but this study is based on a selected number of variables. Hence, there may be inadequate coverage of some dimensions of behavioural influence on trading performance.
3. Although there are many different financial derivative products, the focus of the current study is just on the stock derivative market. Most traders in this market segment solely trade options; they do not trade futures. As a result, the research's findings are primarily based on options traders.
4. This study is based on non-probability sampling, but the researcher has taken all efforts to reduce the potential biases, and made maximum effort to gather a sample that is as representative as possible of the population.

1.14 Chapter Scheme

The research report of this study is presented in Nine chapters as follows:

Chapter 1: Deals with an introduction, research problem, objectives, hypotheses, etc. This chapter's goal is to introduce the reader to the research reported in this thesis.

Chapter 2: Presents the literature review compiled from different sources based on which methodology is adopted and the research gap is identified.

Chapter 3: Provides a theoretical framework for the study. It covers concepts and theories relating to derivatives market, various derivatives trading strategies, trends in global and Indian derivatives market, etc.

Chapter 4: Deals with the research design and methodology of this research. This chapter explains the methods, techniques, and tools used for addressing the research problem.

Chapter 5: Deals with the analysis of data collected from the respondents. It covers the demographic profile of respondents, the level of knowledge of derivative traders about concepts and market fundamentals, and finally the trading preferences and strategies of equity derivative traders in Kerala.

Chapter 6: Gives a detailed analysis of behavioural factors influencing the trading decision of equity derivative traders in Kerala. This chapter presents the raw results of the thesis relating to the influence of behavioural bias on the trading decisions of equity derivative traders in Kerala by following all stated research methods.

Chapter 7: Provides an analysis of the performance of equity derivative traders in Kerala. The main focus of this chapter is to examine the impact of knowledge, trading strategies and behavioural factors on the trading performance of equity derivative traders in Kerala.

Chapter 8: Provides a summary of the major findings of this study. The key findings in relation to research goals and conclusions drawn from the investigations are given in this chapter.

Chapter 9: This chapter presents the implications and recommendations based on the findings of the study. The scope for further studies also included in the last part of this chapter.

1.15 Conclusion

This study tries to examine the trading behaviour of equity derivative traders in Kerala. The research problem, objectives, significance of the study, variables used, hypotheses and conceptual model of the study have been discussed in this chapter. The research design and methodology, results of the pilot study data analysis, reliability and validity analysis of the questionnaire are discussed in the fourth chapter (Research Methodology). The next chapter deals with a review of literatures collected from various secondary sources. It helps to get an idea about earlier studies being conducted on related topics and to find out the research gap.

REFERENCES

Bajpai, N. (2018). *Business Research Methods* (Second Edi). Pearson India Education Services Pvt. Ltd.

Chawla, D., & Sondhi, N. (2016). *Research Methodology- Concepts and Cases* (Second Edi). VikaS Publishing House Pvt. Ltd.

Cooper, D. R., Schindler, P. S., & Sharma, J. (2021). *Business Research Methods* (12th Editi). Mc Graw Hill Education (India) Pvt. Ltd.

Elangovan, N., & Rajendran, R. (2015). Conceptual Model : A Framework for Institutionalizing the Vigor in Business. *Third National Conference on Indian Business Management*, *April*, 1–32. https://doi.org/10.13140/RG.2.1. 2164.8484

Flick, U. (2010). *An Introduction to Qualitative Research* (Fourth Edi). SAGE Publications India Pvt. Ltd.

Hull, J. c, & Basu, S. (2017). *Options, Futures, and Other Derivatives* (9th Editio). Pearson India Education Services Pvt. Ltd.

Khan, S., Upadhyaya, C., Gautam, S., & Natu, P. (2020). A Study on the impact of Covid-19 on the investment pattern of investors with specific reference to traditional investment (Real Estate and Gold) and Market-based financial products (Equities) in Mumbai. *European Journal of Molecular & Clinical Medicine*, *7*(11), 5644–5660.

Kumar, S. S. S. (2015). *Financial Derivatives*. PHI Learning Private Limited.

Krishnaswami, O., & Ranganathan, M. (2016). *Methodology of Research in Social Social Sciences* (Second Edi). Himalaya Publishing House Pvt. Ltd.

Lynham, S. A. (2002). Theory Building : Dubin's Method. *Advances in Developing Human Resources*, *4*(3), 242–276. https://doi.org/10.1177/ 152223020 04003003

Neuman, W. L. (2000). *Social Science Research Methods: Qualitative and Quantitative Approaches* (Fourth Edi). Allyn and Bacon, A Pearson Education Company.

NSE Press Release, Mumbai, January 19, 2022. (2022). https://www.nseindia.com

Phanse, S. (2016). *Research Methodology: Logic, Methods and Cases*. Oxford University Press.

2.1 Introduction

In the last 40 years, derivatives have become increasingly important in finance. Futures and options are actively traded on many exchanges throughout the world. Many different types of forward contracts, swaps, options, and other derivatives are entered into by financial institutions, fund managers, and corporate treasurers in the over-the-counter market *(Hull & Basu, 2017)*. *Derivative* is a generic term referring to forwards, futures, options and swaps *(Kumar, 2015)*. The aim of the literature review is generally to do critical evaluation of material that has already been published, some include meta-analysis (quantitative effects estimation) and some include systematic reviews (without quantitative estimations) *(Donthu et al., 2021).* The goal of this chapter is to identify and synthesize relevant literature in the area of derivative markets and behavioural finance, comprehend recent research advancements in the field, and identify the research gap. The following question will assist the chapter in achieving its purpose.

1. How has the number of publications on the derivatives market changed over time, and what changes have occurred in the literature on derivatives markets?
2. What are the main themes and issues in the derivatives market?
3. What are the areas where research is lacking?

The rest of this chapter is structured as follows. Section 2 discusses the data and methodology; Section 3 presents a review of literature relating to the derivatives market. Section 4 includes important pieces of literature on behavioural finance. Section 5 describes the research gap. Finally, Section 7 concludes the chapter with the future scope of study in the area of the derivatives market.

2.2 Process of Literature Review

The data set for the literature review has been extracted from Scopus, Shodhganga, Social Science Research Network (SSRN), JSTOR, Google Scholar and ResearchGate. In Scopus, the following search string was applied for searching documents in the area of derivative markets. (*TITLE-ABS-KEY (equity AND derivatives AND market) OR TITLE-ABS-KEY (futures AND option AND market) AND TITLE-ABS-KEY (hedging) OR TITLE-ABS-KEY (trading)) AND (LIMIT-TO (DOCTYPE, "ar"))*. As a result of this search, the Scopus database returned 858 results.

While searching research documents in the field of behavioural finance from the Scopus database the following search string was applied: *(TITLE-ABS-KEY (behavioural AND finance) AND TITLE-ABS-KEY (derivatives) OR TITLE-ABS-KEY (futures) OR TITLE-ABS-KEY (options) OR TITLE-ABS-KEY (spot))* – The Scopus returned 741 documents for above search.

While searching documents from Shodhganga, SSRN and ResearchGate the search keyword of '*Derivative Market', 'Futures and Options', 'Options trading strategies', and 'Behavioural finance'* were applied.

Only 142 relevant documents were chosen from the documents returned by the aforementioned searches for a systematic literature evaluation. Table 2.1 lists the documents chosen for the literature study from each database.

Table 2.1

Number of selected Documents and their source

Sl. No.	Database	No. of documents selected	Type of Document
1	Scopus	90	Research Paper
2	Shodhganga	25	PhD. Thesis
3	SSRN	7	Research Paper
4	ResearchGate	7	Research Paper
5	Google Scholar	10	Research Paper
6	JSTOR	3	Research Paper

Source: Literature Survey

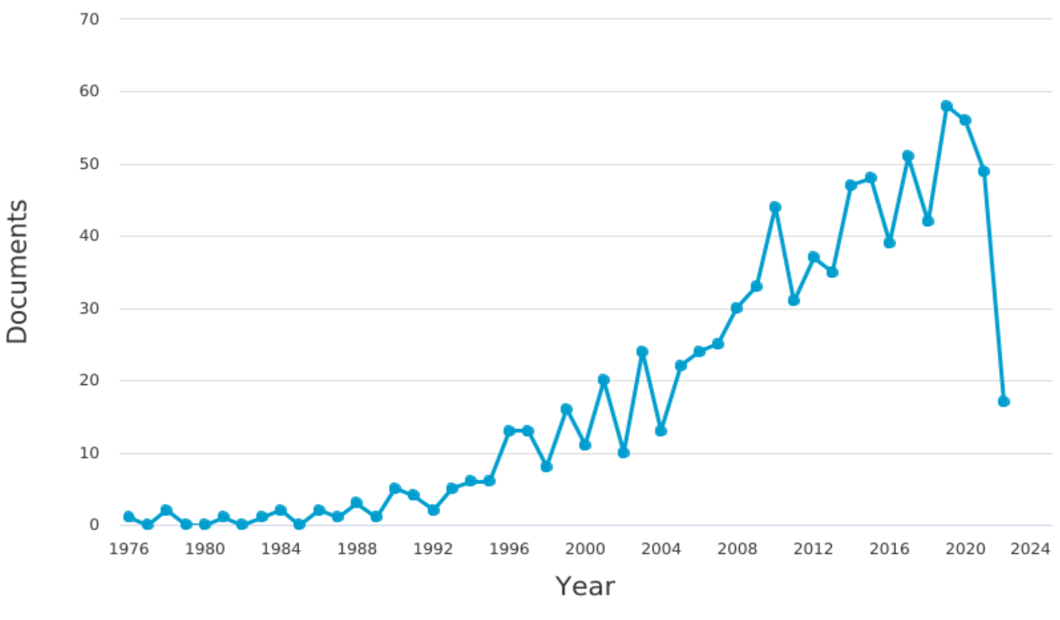
This resulted in a dataset for conducting a literature review for the present study. The search for relevant material began in September 2018 and continued till April 2022.

2.3 Review of documents relating to the Derivatives Market

Several studies relating to derivatives market are very limited till the year 1990. Even though some of the most cited studies in the derivatives market were published in 1970s (*Black & Scholes, (1973*), *Chiras & Manaster, (1978)*, *Ross et al., (1979)*), research in this sector was accelerated only after 1997. Figure 2.1 provides the trend in publications relating to the derivative market. The following analysis is done based on data extracted from the Scopus database.

Figure 2.1

Annual Number of Publications in the Area of Derivatives Market



Source: https://www.scopus.com/

The work of Myron Scholes and Robert C. Merton, who shared the Nobel Prize in Economic Sciences in 1997 for their work on estimating the value of derivatives, is critical here. We can also observe that research in this sector has grown rapidly, particularly since 2004. Between 2005 and 2022, 80.19% of all research was published. This data shows an increase in interest and progress in the field, suggesting that the derivatives market is a significant topic of study.

The notable studies in the above period are discussed as follows. *Black & Scholes, (1973)* developed a model to determine the theoretical value of option price. The study indicates that the actual prices at which options are bought and sold deviate in certain systematic ways from the values predicted by the formula. Option buyers pay prices that are consistently higher than those predicted by the formula, however, option writers receive prices that are about the level predicted by the formula. *Panton, (1976)* tries to determine whether call option prices can be relied upon to predict future rises in common stock prices and the results are indicating the presence of predictive informational content in call prices. Another study *(Chiras & Manaster, 1978)* attempts to determine the informational content of observed option prices. The study found that Black-Scholes-Merton Option Pricing Model can be used to calculate the implied volatility of future stock returns. Based on the findings they developed a trading strategy that exploits the informational content of the implied volatility of option price. The study proves that in contrast to the efficient market hypothesis, this trading strategy generates excessively high returns.

In 1979 presented a simple discrete-time model for valuing options called the *binomial option pricing model.* The study gives a simple and efficient numerical procedure for valuing options for which premature exercise may be optimal. It shows that whenever stock price movements conform to a discrete binomial process or a limiting form of such a process, options can be priced solely based on arbitrage considerations. *Breeden, (1984)* examines the allocational roles of futures markets and commodity options in multi-good and multi-period economies. With certain assumptions, it was shown that contingent futures contracts are not necessary for allocational efficiency, since the same allocations can be attained by options on portfolios of commodity options or by continuous trading in unconditional futures contracts. Another study by *Wolf, (1987)* explores the use of commodity options as risk management tools in incomplete markets with particular attention to alternative hedging strategies in the presence of basis and quantity risks. It was found that commodity options can be used by risk-averse hedgers to reduce uncertainty. The nonlinearity of the option returns gives the hedger a different risk-return pattern. *Figlewski, (1989)* simulates the impact of market imperfections and other problems with the "standard" arbitrage trade, including uncertain volatility, transaction costs, indivisibilities, and rebalancing only at discrete intervals. The study found that in an actual market such as that for stock index options, the standard arbitrage is exposed to such large risk and transaction costs that it can only establish very wide bounds on equilibrium options prices.

The period of the 1990s witnessed a growth in studies relating to the derivative market. Most of the studies during this period are focused to examine the relationship between stock market volatility and derivative trading. *Fedenia & Grammatikos, (1992)* evaluated the impact of option listing on the underlying stock's bid-ask spread. This study demonstrates that listing options have a significant impact on the spreads on the underlying stock. They discovered a trade-off between the advantages of higher liquidity and the cost of informational externalities. Spreads on highly liquid equities tend to rise, whereas spreads on illiquid stocks fall. *Yadav & Pope, (1994)* analyse stock index futures pricing using about four years of synchronous hourly data from the London markets. The results reported in this study suggest that mispricing is more likely to represent profit opportunities rather than risk premia. Another most influential study by *Avellaneda & Levy, (1995)* addresses the issue of derivative asset pricing and hedging in an uncertain future volatility environment and presented a very useful model for pricing and hedging derivative securities and option portfolios in an environment of unknown volatility. This model captures the importance of diversification in managing derivatives positions and can be used systematically to construct efficient hedges using other derivatives in conjunction with the underlying asset. *Grünbichler & Longstaff, (1996)* derives simple closed-form valuation expressions for a variety of volatility derivatives. They examined the implications of the valuation expressions for the properties of these securities. The objective of this analysis is to understand how these derivative securities differ from more conventional futures and options and to provide some insights into the economic role that volatility derivatives may play. The result shows that the properties of volatility derivatives can be very different from those of futures and options on traded assets. *Fleming et al., (1996)* test the trading cost hypothesis by examining the relationship between stock market returns and index option-implied returns. The study found that for individual stocks, price discovery takes place in the stock market because the stock market offers lower direct trading costs and is deeper and more active than any particular stock options series. For market-wide information, price discovery occurs in the index derivative markets where trading costs are considerably less than the costs of executing basket trades in the stock market. *Allen & Santomero, (1998)* examined the state of intermediation theory and attempt to reconcile it with the observed behaviour of institutions. The study points out that Intermediaries have become more important in traditional markets and account for a very large majority of the trading in new markets, such as those for various types of derivatives. Standard theories of intermediation based on transaction costs and asymmetric information are difficult to reconcile with the changes that have taken place. It was argued that the new market for financial futures and options is mainly a market for intermediaries rather than individuals or firms. *Raizada & Sahi, (1998)* examined the efficiency of the commodity futures market in India and also analysed its effect on social welfare and inflation in the economy. The wheat futures market at NCDEX was studied and efficiency was estimated through Johansen's cointegration approach. It was found that the commodity futures market was not efficient even in the short run. The social loss statistics indicated poor price discovery. The growth in commodity futures markets volume showed a significant impact on inflation in the economy

Booth et al., (1999) examined the intraday price discovery process among stock indexes, index futures, and index options in Germany using DAX index securities and intraday transactions data. The result shows that the three markets are informationally linked, with arbitrage being the mechanism by which this linkage is obtained. The driving force appears to be stock index futures, but index options contribute to the price discovery process measurably. In another study *Kyriacou & Sarno, (1999)* examines empirically the dynamic relationship between spot market volatility, futures trading, and options trading in the context of a trivariate simultaneous equations model. The empirical analysis provides strong evidence that significant simultaneity, in addition to feedback, characterizes the relationship between the proxy for time-varying spot market volatility and derivative trading. *Tse, (1999)* examined the market microstructure of the FT-SE Index futures market by analyzing the intraday patterns of bid-ask spreads and trading activity. The results suggest that information asymmetry in the index futures market is insignificant, and traders find it easy to control inventory.

Figure 2.1 shows that, from the year 2000 onwards there is enormous growth in the literature relating to the derivatives market. This may be due to the growth in derivative markets around the world. Most of the studies are related to hedging of price risk and hedge effectiveness. *Battermann et al., (2000)* try to find out the optimal choice of hedging instruments for an exporting firm exposed to exchange rate risk when either currency futures or options are available. In the presence of unbiased futures and options prices, it is shown that the hedge effectiveness of futures is greater than that of options. *Carr, (2000)* introduced the techniques which are used to simplify the derivations of "Greeks" of path-independent claims in the Black-Merton-Scholes model. First, delta, gamma, speed, and other higher-order spatial derivatives of these claims are interpreted as the values of certain quantified contingent claims. The results of this result of this study realize practical significance when numerical methods must be employed to value a claim. *Guo, (2000)* studied the Dynamic Volatility Trading Strategies in the Currency Option Market. This paper study investigates whether predictions of conditional volatility of foreign exchange rates are economically meaningful in trading strategies that are designed only to trade volatility risk. The results provide new evidence on the issue of the information content of implied volatility and GARCH volatility in forecasting future variance. The study proves that in an artificial world without transaction costs both delta-neutral and straddle trading strategies lead to significant positive profits, regardless of which volatility prediction method is used.

Broll et al., (2001) examined the optimality of a full hedge in an unbiased currency futures market and the hedging role of currency options by allowing a nonlinear spot-futures exchange rates relationship. The study found that the combined payoff of the firm's hedge position approximates closer to the firm's nonlinear exchange rate risk exposure in a piecewise linear way. This provides a rationale for the hedging role of options when the underlying uncertainty is nonlinear in nature. *Chiang & Fong,* *(2001)* studied the lead-lag relationships among the spot, futures, and options markets on Hong Kong's Hang Seng Index (HSI). The study found that cash index returns lead more than lag option trade returns, even though the relatively active options contracts are used in our tests and even before the autocorrelation in the cash returns is purged. This suggests that the HSI options market is much less informationally efficient than its counterparts in other countries.

Chen & Leung, (2003) examined the feasibility of basing trading decisions on directly forecasting the expected profit (net of transaction costs) of engaging in a straddle rather than using the conventional two-step method. The result confirmed that the trading strategy with only one source of model risk may be more profitable. *Wong, (2003)* examines the optimal hedging decision of a competitive exporting firm which faces concurrently Hedgeable exchange rate risk and non-Hedgeable price risk. The study shows that if the price risk is negatively correlated with the exchange rate risk and/or if the firm is prudent, a long put option position is part of the firm's optimal hedging strategy. *Carmona & Durrleman, (2003)* surveyed theoretical and computational problems associated with the pricing and hedging of spread options. They presented a general overview of the common features of all spread options by discussing in detail their roles as speculation devices and risk management tools. The study described the mathematical framework used to model them, and they reviewed the numerical algorithms used to price and hedge them. *Jeanneau & Micu, (2003)* studied the relationship between volatility and derivative turnover. The result of the study generally showed a tenuous relationship between volatility and monthly activity in our selected contracts, and there is no statistically significant relationship between volatility and turnover in 10-year US Treasury note futures and options contracts. However, there does seem to be a negative relationship between volatility and turnover in S&P 500 stock index contracts. In one of the most influential study, *Scheinkman & Xiong, (2003)* provides a simple model to study bubbles and trading volume that result from speculative trading among agents with heterogeneous belief. The study shows the presence of overconfidence on the part of potential stock buyers could induce shareholders to use short-term stock compensation to motivate managerial behaviour that increases short-term prices at the expense of long-term performance. The study found that Tobin's Taxcan substantially reduces speculative trading, but it has only a limited impact on the size of the bubble or price volatility. In another study, *Szakmary et al., (2003)* re-examined the predictive power of IVs, relative to historical and GARCH-based volatility estimates using a battery of tests with extensive data on 35 futures options covering a wide variety of asset classes and exchanges. It was found that for this broad array of futures options, IV, though not a completely unbiased predictor of future volatility, performs well in a relative sense. *Raju & Karande, (2003)* examined price discovery between the S&P CNX Nifty and its corresponding futures since the inception of index futures at NSE using cointegration analysis. They also examined the effect of the introduction of S&P CNX Nifty index futures on the underlying spot market. Engle and Granger's methodology was used to find out co- integration of futures and cash markets. The results of co-integration and price discovery showed that index spot and futures markets were integrated. Information flowed from one market to another market. Any regulatory initiative on the futures market had its desired impact on the cash market. Volatility was found to have reduced after the introduction of Index futures.

Alkebäch & Hagelin, (2004) examined potential expiration effects on the OMX index by comparing the trading volume and return process on expiration days and during expiration weeks with a set of comparison days and comparison weeks. The evidence indicates that the trading volume on expiration days and in expiration weeks was significantly larger than on comparison days and during comparison weeks. Secondly, the results suggest that there were no price distortions on the expiration day or during the expiration week for the complete sample period and the second subperiod. *Chakravarty et al., (2004)* investigated the contribution of option markets to price discovery, using a modification of Hasbrouck's "information share" approach. Based on five years of stock and options data for 60 firms, they estimated the options market's contribution to price discovery to be about 17% on average. Options market price discovery is related to trading volume and spreads in both markets and stock volatility. Price discovery across option strike prices is related to leverage, trading volume, and spreads. These results are consistent with theoretical arguments that informed investors' trade in both stock and option markets, suggesting an important informational role for options. *Gupta, (2004)* investigated the conceptual foundation of financial derivatives, the regulatory environment of derivative trading, and the trading practises of derivative trading in India. The organised market was discovered to have a high level of institutionalisation and instrumentalisation. According to the report, derivative exchanges should be self-regulating, with SEBI acting as the regulator of last resort by providing overall supervision and direction to exchanges.

Karmakar, (2005) tries to estimate conditional volatility models to capture the salient features of stock market volatility in India and evaluate the models in terms of out-of-sample forecast accuracy. The study observed that the GARCH (1,1) model provides reasonably good forecasts of market volatility. The study found strong evidence of time-varying volatility and a tendency for the periods of high and low volatility to cluster. *Sarwar, (2005)* examined the dynamic relations between future price volatility of the S&P 500 index and the trading volume of S&P 500 options to explore the informational role of options volume in predicting price volatility. The future volatility of the index is approximated alternatively by implied volatility and by EGARCH volatility. Using a simultaneous equation model to capture the volume-volatility relations, the paper finds that strong contemporaneous feedbacks exist between the future price volatility and the trading volume of call and put options. *Fong et al., (2005)* conducted an empirical investigation of derivative instruments used by institutional investors to gain a better understanding of the function of derivative securities in portfolios and the benefits of their use. The study examined the impact of derivatives using a variety of performance and risk measures. The use of derivatives in portfolios was found to make no substantial difference in either performance or risk across funds. The data revealed that options were exploited to generate exposure to momentum stocks. It was also discovered that there were no abnormal price changes in underlying stock prices in short-term windows surrounding active investment managers' option trades. This lack of market reaction indicated that options were not being used to execute informed trades.

One of the most influential studies during this period by *Pan & Poteshman, (2006)* examines the informational content of options trading for future movements in underlying stock prices. The study suggests that investors could use the options market to trade on information about the future volatility of underlying stocks. *Bartram, (2006)* investigates the motivations and practices of nonfinancial firms about using options in their risk management activities. The study found that, a significant number of (15-25 per cent) of the firms outside the financial sector use options. This reflects the fact that options are very versatile risk management instruments that can be used to hedge various types of exposures, linear as well as nonlinear. *Lien & Wang, (2006)* examines the effect of disappointment aversion on cross-hedging decisions. The study shows that, when both futures and options markets are unbiased, disappointment aversion does not affect the optimal hedge positions. In case either market is biased, disappointment aversion induces the hedger to behave more conservatively. In addition, as the hedger becomes more disappointment averse, his action is more reserved. It is also found that disappointment aversion tends to depress the importance of the put options whereas the effect of risk aversion is not uniform. *P. Carr & Wu, (2006)* examined the major differences between the old and the new volatility indexes of the Chicago Board of Options Exchange. It also looks at the historical behaviour of the new volatility index and discusses the pricing of VIX futures and options. The study found that the new VIX averages about 2 percentage points higher than the bias-corrected version of the old index. The study also proves that the SPX options market offers information on VIX futures valuation bounds. Using the ARCH-GARCH approach, *Sah & Omkarnath, (2006)* attempted to investigate the impact of futures trading on the volatility of the S&P Nifty and BSE Sensex. It also analyses the volatility behaviour of other indexes such as the Nifty Junior, NSE 200, S&P Nifty 500, BSE-100, and BSE-200 to assess if market volatility has decreased over the sample period. According to the GARCH model, the introduction of futures and options has a negligible or no influence on volatility. When a proxy index was used, the S&P Nifty showed a decrease in volatility whereas the BSE Sensex showed a spike in volatility. The EGARCH model predicts a decrease in volatility across all indexes.

In another influential study, *Acharya & Johnson (2007)* attempts to quantify the problem of Insider trading in the credit derivatives market. The study provides empirical evidence that there is an information flow from the credit default swap markets to equity markets. The information flow is concentrated on days with negative credit news, and for entities that experience or are more likely to experience adverse credit events. These findings are consistent with the existence of hedging by banks with lending exposure and access to privileged information. *Dash et al., (2007)* examined the impact of option purchasing and selling methods on the returns of an unhedged equity position. The study tried to identify the optimal strategies (those that generate the highest returns) and to correlate these optimal strategies with the characteristics of the underlying stock's return distribution. The study's findings indicate optimal strategies in two senses: one type of strategy that was optimal at the lowest strike price and whose payoff decreased as the strike price increased, and another type of strategy that was optimal at the highest strike price and whose payoff increased as strike price increased. *Afsal, (2007)* studied how trading in futures and options contracts influences the underlying asset spot market. The GARCH Model is used to examine the volatility behaviour of the underlying stock market. The study employed the daily spot market closing prices of 52 securities as well as the closing prices of the Nifty Junior index and the S& P 500 index. The findings indicate that derivatives have no significant stabilising (or destabilising) influence in India through decreasing (or raising) volatility. According to the report, there has been no discernible reduction in market volatility in the Indian market since the introduction of derivatives due to lower investor engagement in the derivative market.

Ahn & Ryu, (2008) investigated whether informed trading exists in the index option market by studying KOSPI 200 options. They discover that adverse selection costs account for a sizable amount of the transaction costs in index options trading. Information asymmetry costs account for approximately one-third of the spread. Additional analysis reveals that adverse selection costs are positively related to option delta. Finally, the study discovered evidence that overseas investors are better informed than domestic investors and that domestic institutions have an information advantage over domestic individuals.

Daskalakis et al.,(2009) studied the three main markets for emission allowances within the European Union Emissions Trading Scheme. They investigated the pricing of emission allowance options on futures. The study found that the prohibition of banking emission allowances between distinct phases of the EU ETS has significant implications in terms of futures pricing. The study developed a framework for the pricing and hedging of intra-phase and inter-phase futures and options on futures, respectively. Based on the empirical evidence the study concluded that the jump-diffusion model is the most appropriate pricing method for the intra-phase and inter-phase options on futures which are already traded within the EU ETS.

S. Kim, (2009) examined the traders' rules to predict future implied volatilities by applying simple ad hoc rules to the observed current implied volatility function for pricing and hedging options. There are two versions of this approach, the "relative smile" approach and the "absolute smile" approach. It was found that the "absolute smile" approach shows better performance than the Black and Scholes (1973) model and the stochastic volatility model for both pricing and hedging options. *Bhaumik & Bose, (2009)* examined the expiration day effects of equity index derivatives at the National Stock Exchange (NSE). The results indicated that at NSE, the expiration of index-based derivatives contracts has a significant impact on the trading volumes in the cash market; the volume of trading is higher on expiration days than on non-expiration days. However, there is no statistically significant (or meaningful) difference in mean returns and intra-day volatility of the market index. Further, the volatility of inter-day returns is lower on expiration days, relative to non-expiration days. *Bauer et al., (2009)* examined the impact of option trading on individual investor performance. They performed the empirical analysis using a unique database that comprises more than 68,000 accounts and more than eight million trades in stocks and options at a large online broker in the Netherlands. They also examined investor behaviour and performance from January 2000 to March 2006, which covers the top of the stock market boom in 2000, the subsequent bust in stock prices in 2001 and 2002, and the recovery from 2003 to 2006. Thus, they can examine whether major market movements affect trading behaviour and investor performance. They found that options traders incur much larger losses on their investments than equity traders.

The gross return difference between these two groups of investors equals more than 1% a month, after taking risk and style differences into account.

Agarwal et al., (2009) explored the volatility of the spot market as a result of the derivative market, i.e., if the volatility of the spot market has increased, decreased, or remained the same, and if so, to what degree it is attributable to the futures market. The conclusion was reached using two models. The first model looked for any significant differences in the movements of the Nifty and Nifty Junior. The volatility was given as an equation of Nifty Future, Nifty Junior, and Volumes in the second model, i.e. autoregressive model. The results of both models contradicted the hypothesis that futures add to stock market volatility. While model 1 claimed that futures do not contribute to stock market fluctuations, model 2 suggested that futures help to stabilise the market. As a result, the study indicated that derivatives help to stabilise the stock market.

Roy, (2009) aims to estimate market integration in the Indian wheat spot market and evaluates the impact of futures trading on market integration. The findings confirm the evidence of the wheat Futures Market's price disseminating role. Futures trading can greatly reduce market risk, especially when markets (consumption and production centres) are vast and the physical movement of commodities is not smooth (inter-state movement limitations, weak transportation and storage facilities). The study's most intriguing conclusion is the evidence of improvement in inter-state market integration throughout the post-national commodities exchange era. It confirms that common price propagation across spot markets was improved by Futures Trading and exchange-quoted spot pricing.

The majority of studies in the derivative market happened during the period 2010-2020. One of the studies by *Vashishtha & Kumar, (2010)* analyzed the historical roots of derivative trading, types of derivative products, regulation and policy developments, trends and growth, prospects and challenges of the derivative market in India. The study points out that the launch of the equity derivative market in India has been extremely encouraging and successful. *Chang et al., (2010)* studied the information content of options trading volume for future volatility based on the

Taiwan options market. The empirical results show that foreign institutional investors possess the strongest and most direct volatility information, which is realized by the delta-neutral options/futures trades. In addition, a few individual investors (less than 1% of individuals' trades) might be informed and realize their volatility information using the strangle strategy. But this study found no evidence to support the predictive ability of the volatility demand from straddle trades, despite the widespread acknowledgement that such trades are sensitive to volatility. *Srinivasan, (2010)* investigated the impact of the introduction of futures and options trading on the volatility of the underlying spot market in India by using EGARCH and GARCH (1, 1) models. The empirical results reveal that the spot market volatility has declined after the introduction of futures and options trading in India. The study also found that the persistence of volatility shocks has declined in the post-derivatives scenario indicating increased efficiency of the Indian spot market. The study suggested that the introduction of futures and options trading has improved the speed and quality of information flowing in the spot market. This enhances the overall market depth, increases market liquidity and ultimately reduces informational asymmetries and therefore compresses spot market volatility in India

Trivedi, (2010) examined the use of derivatives in the Indian financial system. He investigated the issues and potential for making derivative markets more investor friendly. Descriptive research is conducted to assess the attitudes of investors and corporate executives dealing with derivatives. It was discovered that investors primarily utilize stock derivatives for speculating, whereas corporate management primarily uses them for hedging. According to the study, futures are primarily utilized to cover open wagers in underlying assets, although options might be employed for speculation. It was also discovered that the main issue that derivative traders confront is a lack of information and skill in various trading techniques.

Ryu, (2011) examined the intraday formation process of transaction prices and bid–ask spreads in the KOSPI 200 futures market. He developed a unique cross-market model that can decompose spread components and explain intraday price formation for the futures market by using the order flow information from the KOSPI 200 options market, which is a market that is closely related to the futures market as well as considered to be one of the most remarkable options markets in the world. The study's empirical findings reveal that without the incorporation of options market information, the model-indicated spread and the permanent component of the spread that comes from informed trading are understated. Furthermore, the findings show that trading in-the-money options with high delta values often suffers a higher information cost component of the futures market than trading out-of-the-money options with low delta values. Finally, the study shows that the cross-market model's estimated adverse information cost component exhibits a virtually U-shaped intraday pattern, but it significantly reduces at the end of the trading day.

Sheu & Wei, (2011) developed an algorithm for an effective options trading strategy based on superior volatility forecasts for the Taiwan stock market utilizing actual option pricing data. The primary goal of this research is to determine whether predicting and trading performance could be enhanced by including sentiment information in the decision-making process. The algorithm of the effective options trading strategy suggested in this study is based on a long straddle and can also serve as decision assistance for other hybrid option trading methods. The study's empirical findings support the noisy trader argument that the causality goes from sentiment to market action. The findings further support the notion that volatility forecasting models should give investor emotion a key role.

Das, (2011) attempted to analyze the nature and functioning of the Indian Derivative market. An attempt has also been made to compare between actual futures price and theoretical futures price of selected stocks and nifty futures contracts. He also tried to measure the efficiency of the futures and options market. The empirical result indicates that the boom in the spot market is positively associated with the volume of the futures market in India. It was also found that the random walk hypothesis cannot be rejected during the period of analysis and hence Indian futures market may be efficient in its weak form. The study concluded that the volatility in the underlying stock market declined after the introduction of Futures and Options and hence it leads to the stabilization of the Indian stock market.

Varghese, (2011) evaluated the various models of financial derivatives regulation from a purposeful standpoint. He also provides an account of the historical context and growth of derivative markets in various regions of the world, as well as the history of derivative regulatory frameworks in various countries. It was discovered that derivative regulation in both the United States and India is fundamentally a combination of 'institutional' and 'functional' regulation. The analysis indicates that three authorities now control financial derivatives in India: the Reserve Bank of India (RBI), the Forwards Market Commission (FMC), and the Securities and Exchange Board of India (SEBI). The Reserve Bank of India is only concerned with the activity of banks and non-banking financial companies (NBFCs) dealing with derivative instruments, whereas SEBI is in charge of all other companies dealing with derivatives. It was discovered that India adheres to the UK regulatory model, which is characterized by informal, less transparent, and almost private regulation.

Jose, (2011) researched to determine the informational efficiency of the Indian futures market. This study also aimed to determine the overall performance of the Indian futures market in terms of the long-term link between the spot and futures markets, as well as the short-run relationship between Indian futures and the spot market. This study examined the hedging effectiveness of the futures market as part of determining the informational efficiency of the futures market. The study proved the informational efficiency of the Indian futures market based on empirical evidence. Because of the high degree of speculators present in the Indian market, long-term investment decisions may not be critical. Making the right decision at the right time allows traders to earn from the trading process in the Indian futures market.

Mall, (2011) investigated India's stock index futures market from 2000 to 2011. He has conducted empirical research on the efficiency of the Indian spot and index futures markets. The analysis employs End of Day (EOD) closing values of near-month futures contracts as well as daily closing prices of the S&P CNX Nifty obtained from the NSE database. Time series econometric models based on GARCH class models, ADF, PP, Johansen's Cointegration, and VECM are used in the empirical analysis. The results show that the Indian Spot market is inefficient, whereas the futures market is more efficient than the spot market. The study also provides evidence of significant volatility persistence in the futures market, which leads to unidirectional volatility spillover from index futures to the spot market. The analysis confirmed the long-run causation between index futures market price and spot market price.

Yoon & Kang, (2012) conducted an empirical analysis to compare the volatility forecasting performance of ITMs with that of OTMs. As volatility estimators, they used the model-free IV proposed by Britten-Jones and Neuberger (2000) and Bakshi et al. (2003) and the AIV proposed by Kang et al. (2010). The empirical results of the study showed the risk-neutral density of ITMs is more volatile, more left-skewed, and more leptokurtic than that of OTMs. However, the distributional difference of ITMs does not contain any additional information for future volatilities, even after adjusting for the risk attitudes of investors. This finding is consistent with the extant market microstructure literature that supports the informational inferiority of ITMs. Another study by *Tebogo, (2012)* explored various risk management strategies and their importance in minimising investor's exposure to derivative trading positions. Strategies like dividend spread, collar agreements, etc. are familiarised in this paper. It was found that in case of imperfect markets, options trading improves the quality of information hence enabling investors to engage in speculative and hedging strategies by reducing uncertainties.

Goyal, (2012) studied the nature of volatility over a lengthy time frame to establish generalisations about the impact of derivatives on stock market volatility in India. Using the GARCH (1,1) model, the study examined the influence of index futures trading and single stock futures trading on stock market volatility. It was discovered that volatility clustering exists in the Indian stock market and that the level of volatility has changed since the introduction of derivatives. Trading in Index futures was also discovered to affect price discovery. The analysis also confirmed that no increase in volatility has occurred as a result of derivative trading. Based on the findings and outcomes, it was recommended that investors consider the trends in the derivative market when investing in the cash market.

Narang & Vij, (2013) examined the long-term impact and implications of derivative trading on the spot market. It specifically seeks to determine whether derivative trading increases volatility and endangers financial market stability. The study uses regression techniques and one symmetric & three asymmetric GARCH models viz., TGARCH, EGARCH, and PGARCH to evaluate the impact of derivatives on daily data of the spot market index S&P CNX Nifty. The results of the study provide strong evidence that derivative trading has contributed to very high volumes and altered the structure of conditional volatility and significantly reduced it. The volatility is asymmetric in nature with the asymmetric effect more pronounced in the post-derivative period. This suggests that Indian investors must employ dynamic hedging measures to mitigate risk. Although the returns and volatility on expiration day and the following day are significant, they do not have a destabilizing effect; rather, they demonstrate that the Indian market is inefficient.

Dhar, (2013) attempted to identify various hedging, speculation, and arbitraging strategies using derivative contracts, interpreting how retail investors, High Net worth Individuals (HNIs), and Qualified Institutional Buyers (QIBs) portfolios can be managed, optimised, rebalanced, and monitored. The study also examines how the stock portfolio can be connected with the derivative market and used in corporate risk management, risk management in banking, and investor portfolio risk management. According to the analysis, one of the key reasons for the worldwide meltdown impact that occurred in 2008-09 was Western economies over usage of credit derivative instruments without appropriate underpinning.

Sanyal, (2013) investigates the impact of options and futures on the country's stock market volatility. The study also attempts to use the GARCH model to investigate the impact of market-wide determinants on the conditional volatilities of the BSE SENSEX and NSE NIFTY during pre-derivatives and post-derivatives. The analysis demonstrates the presence of heteroscedasticity in the Sensex and Nifty return series data. This study finds no substantial difference in the conditional volatility of the BSE Sensex and NSE Nifty after the derivatives period. The analysis shows that market-wide factors have a significant impact on the volatility of the Indian stock market; however, the spillover effect is minimal.

Dhanya, (2013) investigates individual derivative traders' hedging efficacy and mindset. The research focused primarily on the usage of derivatives for hedging by individual traders in Kerala. The study examines numerous derivative products, investor attitudes toward derivative markets, investor difficulties, and future potential for promoting hedges. The study discovered that while the Indian derivatives market is effective at hedging, the majority of traders are unaware of proper hedge techniques based on a careful analysis of primary and secondary data. Overuse of speculation will degrade the efficiency of the derivative system; hence actions should be implemented to enhance derivative traders' hedge practices. The study also examined traders' views and behavioural patterns, concluding that there is a need to popularize hedge habits among derivative traders. *Karthika & Karthikeyan, (2013)* investigated the advantages of various option trading techniques. It was discovered that investing in option contracts gives investors with more cost efficiency, less risk, and bigger potential returns. It was also discovered that additional strategic trading options are accessible to earn even in a tumultuous market. According to the study, utilising Index options intelligently can significantly minimise the risk and potential loss of stock investment. This has the potential to greatly boost the risk-to-reward ratio, and thus profitability.

Judge & Reancharoen, (2014) investigates whether a lead-lag relationship exists between the spot market and the futures market in Thailand during the period from 2006 through to 2012. In a rational, efficient market, returns on derivative securities and their underlying assets should be perfectly contemporaneously correlated. However, due to market imperfections, one of these two markets may reflect information faster. The study results show that there is a price discovery in the Thailand futures market and lagged changes in spot prices lead to changes in futures prices.

Blau et al., (2014) attempted to compare the amount of information included in these two widely used option volume ratios. Firstly they discover that Put-Call ratios are more predictive of future stock returns daily than Option volume to Stock ratios. Secondly, unlike the previous set of results, O/S ratios are more predictable about future returns at the weekly and monthly levels than P/C ratios. In reality, the tests reveal that, while P/C ratios contain predictability about future daily returns and, to a lesser extent, future weekly returns, this predictability is transitory. Conversely, O/S ratios significantly indicate negative returns at all levels: daily, weekly, and monthly.

Hayunga & Lung, (2014) examined the options trading in firms that experience a revision of their consensus recommendation by financial analysts. This study lies in the in section between two prominent studies in finance: the information content in options markets and the value of the financial analyst recommendations. The study discovered a distinct pattern in options market measurements days before a consensus revision. The option-implied returns, implied volatilities, and options trading volumes consistently show aberrant levels three or four days before the analysts' consensus revision.

The long-run co-integration connection, price discovery leadership, volatility spillover, and information propagation across spot and futures markets were investigated by *Parsa, (2014)*. To evaluate the influence of futures introduction on spot market volatility, the GARCH family models (i.e. plain GARCH (1, 1), EGARCH (1, 1), and GJR-GARCH (1, 1)) were used. To perform the intraday price discovery leadership role and volatility spillover between spot and futures markets, the vector error correction model (VECM), Granger causality test, and bivariate-BEKK-GARCH model were used. The research on volatility demonstrates that the volatility of the spot market decreased after the introduction of futures trading. This stabilisation effect is also supported by the GARCH family models' conditional (persistence levels) and unconditional (constant) volatility. In general, the GARCH family model estimations of previous information demonstrate that stock return volatility responds more to old news than to fresh information. The GJR-GARCH model estimates show that negative news has a greater influence on stock price volatility than positive shocks.

Mazouz et al., (2015) conducted a study on option and stock market trading activity around informed events with extreme daily stock price changes. It was discovered that knowledgeable agents are more likely to trade options before bad news and stocks before the good news. The study also found that optioned stocks overreact to negative news but respond quickly to positive news. Overreaction patterns, on the other hand, are specific to the subsample of stocks with the lowest pre-event abnormal option/stock volume ratio (O/S). This finding suggests that the incremental benefit of option listing is related to the level of options trading activity, over and beyond the presence of an options market on the firm's stock.

Pathak et al., (2015) evaluated the information content of equity index options trading on the National Stock Exchange (NSE) of India using S&P CNX Nifty Index options. They investigated the concurrent relationship using the linear regression method, and the information content of the markets was studied using the bi-variate vector auto-regression (VAR) model. It was found that when the market cycle is taken into account, the magnitude and direction of this relationship vary. VAR results indicated that at-the-money options are the preferred contracts of informed traders in the Indian market over time. However, the spot market is leading significantly for the in-the-money and out-of-the-money classes and across market trends.

S. Yadav, (2015) evaluated the impact of index futures on Indian stock market growth. The GARCH model was used to analyse the current volatility in the stock market. The empirical findings of this study indicate that volatility in the Indian stock market has altered through time and that clustering volatility exists in the stock market. The paper also claims that derivative trading aids in stock market price discovery due to market informational efficiency. According to the study, the volatility of the Indian stock market has decreased since the introduction of Index futures.

Blau et al., (2016) examined whether investor gambling behaviour influences volume and volatility in financial markets. In the options market, they discovered that the ratio of call option volume relative to overall option volume is largest for stocks having lottery-like return distributions. The analysis shows that gambling-motivated trading in the options market influences future spot price volatility, which is consistent with

Stein's (1987) theoretical expectations. These findings not only establish a link between lottery preferences in the stock market and the options marketssssss but also imply that lottery preferences can lead to destabilised stock prices.

Mistri, (2016) attempted to investigate option trading methods in general among two types of analysts: corporate derivative analysts and individual derivative analysts. The study seeks to learn from analysts the key factors and motivations for trading options methods. The study also attempts to determine the performance of the five various types of option spread strategies, including vertical bull spread, vertical bear spread, strangle, straddle, and butterfly spreads, in four different market outlooks. The study analyses the performance of five selected spread strategies-vertical bull spread, vertical bear spread, Butterfly, strangle and straddle among two types of analysts-Corporate and Individual in four different market outlooks- Bullish, bearish, stable and volatile. It was found that the popular option trading strategies are Vertical Bull Spread in a bullish market, vertical bull spread in a bearish market, and Butterfly in a stable and strangle-straddle in a volatile market.

Lin et al., (2017) investigated the presence of informed trading in Taiwan stock index options and examined the informational function of foreign institutions in incorporating information into Taiwan stock index futures. The finding demonstrates that price predictability is caused by information flow generated by option transactions rather than by liquidity pressure. The study also concludes that option transactions from foreign institutions, particularly out-of-the-money option transactions, give the most significant predictability. *Bhat, (2017)* attempted to investigate the influence of volatility on the Indian stock market following the introduction of derivatives. The analysis demonstrates that there is a causal relationship between futures and spot pricing. The GARCH test was used to calculate volatility, which demonstrates that derivatives trading has had a considerable impact on the volatility of the underlying spot market. According to the study, major elements influencing investor behaviour in the derivatives market include investment influence, investment ease, investment benefits, charges and liquidity, and stockbroker attitude. *Gourav Goutam, (2017)* employs the GARCH(1,1) model to examine the influence of Financial Derivatives trading on stock market volatility. The investigation spans several years, from 1995 to 2015. It was discovered that the amount of volatility in India had changed following the introduction of derivatives. According to the data set study, volatility in the Indian stock market is a time variable, persists to form clusters, and has a long memory process.

Yang et al., (2018) explored price differences between actual and options-implied futures prices by taking option moneyness into account. Trading in OTM options causes more price differences than trading in ATM options, and this is especially pronounced at stricter threshold levels. When it comes to price adjustments following disagreements, the futures (options) market moves less (more) for the OTM call and OTM put groups than for the ATM group, implying that the price dynamics of OTM options are less informative and noisier than those of ATM options.

Manasa & Narayanarao, (2018) investigated the influence of BANKNIFTY derivatives transactions on Indian spot market volatility. The methods employed include descriptive statistics, the ADF test, and the GARCH model. The study indicated that the derivatives market has an impact on the spot market by reducing volatility, allowing investors to trade in the spot market and making it more liquid. *Ganesh Sankar, (2018)* investigates the price behaviour in the futures and options markets. According to empirical evidence, the pricing of equity index options incorporates the risk of increased orders through retail involvement. According to the study, the volatility and liquidity of the underlying have a considerable influence on the mispricing error band. The mispricing band widens as volatility rises, indicating the execution risk of an arbitrage trade. *Binoosa, (2018)* investigated the hedge effectiveness of futures in the banking industry, price discovery, and market trader behaviour. According to the analysis, the hedge effectiveness of banking futures is good. In the case of bank futures, it was discovered that the futures price led to the price discovery of the spot price. According to the report, traders have a favourable attitude toward derivatives, and the majority of traders choose bank futures over other futures offered in the market. *Atif, (2018)* explored the temporal link between the futures market and the underlying spot market in India. The purpose of this study was to determine whether futures price fluctuations predict spot price changes and/or vice versa. The co-integration approach developed by Johansen-Juselius (1990) was used to investigate the long-run link between spot and futures markets. The findings indicate that the CNX Nifty and all of its component stocks' spot and futures price series are co-integrated. Volatility linkages are also examined using the Granger Causality test based on VAR and it was found that for the full sample, no volatility spillovers take place between spot and futures markets. It was concluded that both futures and spot markets serve price discovery functions. Spot and futures markets are found to be linked through their first and second moments. It indicates that significant returns and volatility relationships exist between the two markets.

Malik et al., (2019) examined the mispricing opportunities present in the Indian option market by using put-call-index-parity for European-style Nifty index options. The instances of mispricing of options are the most frequent and profitable for investors and provide various arbitrage opportunities in the Indian market. Some of these opportunities provide excess return up to a high level. It was found that the put options are more overpriced rather than the call options. It shows that the short arbitrage strategy is more profitable relative to the long arbitrage strategy and the short arbitrage occurs more frequently relative to long arbitrage. The mispricing increases as the time to expiration increases and far the money options have low liquidity in the Indian market.

The Pandemic has prompted growing literature to examine its impact on financial markets *(Emm et al., 2021)*. Global equity as well as commodity markets exhibited a considerable decline and increased volatility. Higher market volatility begets more active trading in the derivatives market *(Jeanneau & Micu, 2003)*. *Gang et al., (2020)* investigate the influence of the put-call-ratio (PCR) implied by the Shanghai Stock Exchange (SSE) 50 ETF option on the price discovery process of the SSE50 index, on both the spot and the futures markets. Empirical results indicate an asymmetric V-shaped relationship between the PCRs and the conditional volatility of the stock index returns and the index futures returns. *Rostan et al., (2020)* try to validate an original options trading strategy based on ARIMA forecasting. The study demonstrates that the ARIMA forecasting method is a valid method for forecasting the S&P 500 composite index and is superior to the GARCH model in the context of an application to index options trading.

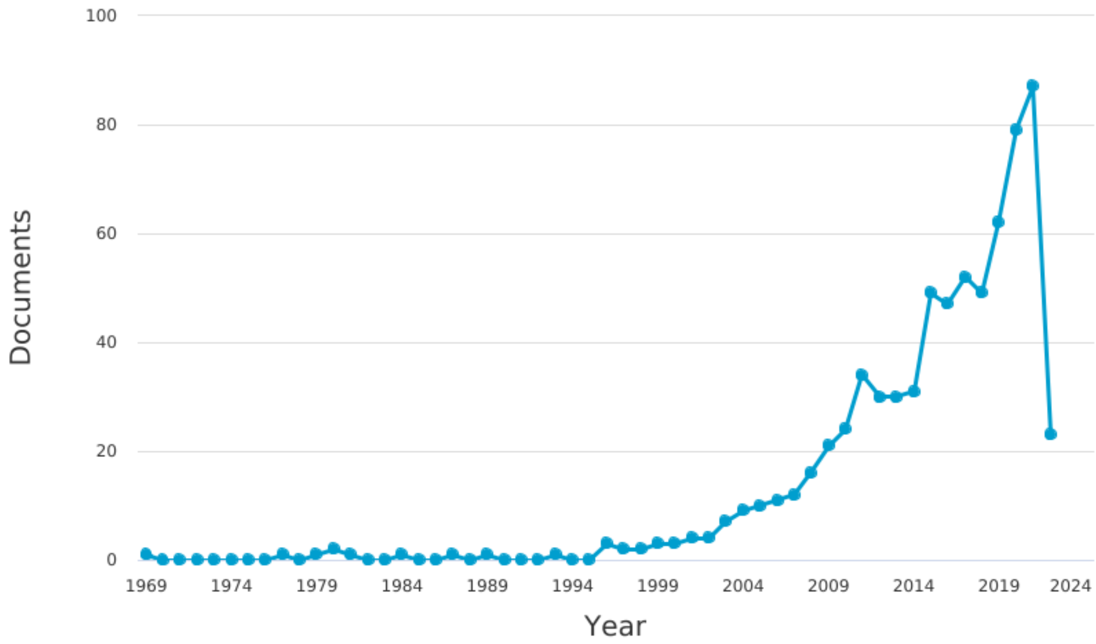
The emerging literature has also attempted to address the effects of the Covid-19 pandemic on the derivative market. *Emm et al., (2021)* studied the effects of the Covid-19 pandemic on derivatives trading activity on exchanges across major geographic regions in the world. The study observed a sharp increase in the total open interest from January 7 to March 10 of 2020 followed by a general downward tapering. The increase in open interest during this period is driven by the increased positions of commercial traders. In contrast, there is a slight drop in open interest for noncommercial traders. *Zhou, (2022)* examined the relationship between options trading volume and the cross-section of stock returns by option moneyness and maturity. It was found that the publicly available and nondirectional options trading volume, of all maturity terms, DITM put options, and DOTM call options, significantly and negatively predict cross-sectional stock returns. Similar results hold for all maturity ranges for DOTM call options. The negative relation between options trading volume and the average future stock return is robust to different weighting schemes.

2.4 Review of documents relating to Behavioural Finance

Behavioural finance is the study of how psychological influences affect market results. Behavioural finance can be used to better understand various outcomes in a range of sectors and companies. The impact of psychological biases is one of the most important parts of behavioural finance research. The research in behavioural finance has grown recently. Figure 2.2 shows the trend of research in behavioural finance.

Figure 2.2

Annual trend of research in behavioural finance



Source: https://www.scopus.com/

This analysis is based on data gathered from the Scopus database. Even though some of the most recognised behavioural studies were published in the 1970s, studies in this field were only boosted around 2010. The most influential study by *Tversky & Kahneman, (1974)* examined the cognitive biases that stem from the reliance on judgmental heuristics. They describe three heuristics used in making decisions under uncertainty: i) *representativeness*, which is commonly used when people are asked to assess the likelihood that an object or event A belongs to a class or process B. (ii) the availability of instances or scenarios, which is frequently used when individuals are asked to rate the frequency of a class or the likelihood of a specific development; and (iii) anchor adjustment, which is commonly used in numerical prediction when a meaningful value is provided. According to the study, these heuristics are highly cost-efficient and usually successful, yet they cause systematic and predictable errors. They propose that a greater knowledge of these heuristics and the biases they cause should improve judgements and decisions in uncertain situations.

Hirshleifer, (2001) examined the theory and evidence regarding investor psychology as a determinant of asset prices. He developed a framework for understanding decision biases, which also asses a priori reasoning and capital market evidence about the relevance of investor psychology in security pricing, and examines contemporary models.

Daniel et al., (2002) examined a large body of information on how psychological biases influence investor behaviour and prices. The study points out that systematic mispricing most likely results in significant resource misallocation and restricted attention and overconfidence leading to investor trust in educated market players' strategic incentives. *Pennings, (2002)* investigates how a manager decides to initiate a futures position in a concrete choice situation. The results show that the managers' futures position initiation behaviour can be explained by the level of risk attitude and the ratio of the futures price level to the manager's reference price.

Novemsky & Kahneman, (2005) emphasise the significance of intentions in loss aversion. According to the researchers, cognitive focus and emotional attachment are not the only methods by which intentions can influence loss aversion. This means that when there is a desire to swap a thing, the reference point is not the existing endowment but the expected endowment at the end of the exchange. Giving up good in exchange would not involve loss aversion in this situation since the good is not part of the reference point. *C.-H. Lin et al., (2005)* examined the trading patterns and performance of different trader types in the Taiwan Futures Market. It was discovered that the individuals are negative feedback traders with poor performance. In our sample period, foreign investors are positive feedback traders who are successful in timing in the Taiwan futures market. Evidence indicates that they are information-driven traders. Futures dealers are positive feedback traders with bad performance in the futures market; nonetheless, there is little evidence to suggest that futures dealers tend to move prices away from the fundamental value.

M. J. Kim et al., (2010) compared the value stocks in the KOSPI 200 to other 513 stocks, futures and equity, and four types of options defined by contract definitions and moneyness. They discovered that market capitalisation and credit rating are both critical factors in determining order parameter sensitivity. Furthermore, put-call parity mitigates the out-of-equilibrium tendency. As a result, the Deviated pattern from two-phase behaviour is observed in the OTM put option and the ITM call option, while the ordinary off-equilibrium pattern is observed in the ITM put option and the OTM call option.

Frijns et al., (2010) looked into behavioural heterogeneity in the options market. This study presented an alternate pricing approach. This model implies that options traders have varying assumptions about future volatility and that this varies affects options pricing. They consider two sorts of agents: fundamentalists and chartists, both of whom can switch between groups using a multinomial logit switching rule. They discover evidence indicating the presence of both types of traders. The proportions of fundamentalist and chartist traders shift throughout time, depending on how well each trading style performs. Following that, they show that their model beats a conventional model without switching in terms of pricing performance, both in and out of the sample, for all maturity–strike combinations.

Wang et al., (2011) investigated whether futures volatility affects investor behaviour and what trading technique various investors might use when faced with varied information conditions. This study applies a two-period overlapping generation model (OLG) to the future market and based the investor behaviour model on the future contract price. It was discovered that the two-period OLG model based on the future market is consistent with the practical situation; second, sufficient information investors such as institutional investors generally adopt reversal trading patterns; and finally, insufficient information investors such as individual investors generally adopt momentum trading patterns.

Luong & Ha, (2011) conducted a study to investigate the behavioural aspects affecting individual investors' decisions at the Ho Chi Minh Stock Exchange. This study also looks at the relationships between these parameters and investment performance. The findings reveal that five behavioural factors influence individual investors' investing decisions at the Ho Chi Minh Stock Exchange: herding, market, prospect, overconfidence-fallacy, gamble's and anchoring-ability bias. The majority of these factors have moderate effects, however, the Market factor has a significant impact

Nuruzzaman, (2011) tries to ascertain the awareness level and attitude of retail investors in futures trading. The study shows that retail investors are prone to self-attribution bias which causes a tendency among them to make wrong decisions. One of the major findings of this study is that behavioural biases are observed in the investor's trading behavior. They tend to use purchase price as the reference point and make decisions based on it. They would sell only if the price of the investment is above the price at which they had made the purchase. The study points out that almost majority of the retail investors are trading in index futures and only a few are engaged in individual stock futures. It was also found that investors are unable to manage the margins required in futures trading. The majority of the investors show their willingness for new futures products like mini stock futures.

Hoffmann et al., (2012) investigated the behavioural aspects of covered call writing and discovered highly significant empirical evidence for a considerable framing effect in different covered call designs with equal net cash flows, as well as covered calls in general. They also discovered just a little amount of empirical evidence for a link between risk aversion in the domain of gains and a preference for covered calls. Investors with above-average risk aversion appear to be required to observe a favorable association between risk aversion and covered call writing.

Nolte & Nolte, (2012) investigated how investors trade on a high-frequency time scale and how prior price process information is reflected in the investors' trading decisions. This study also investigates if investors' decisions to open or exit a position alter depending on whether they already have a position or not. They also look into whether stop-loss orders help or hinder self-reinforcing price movements. They discovered that historical price fluctuations influence investors' future order flow and that these predictive patterns can endure for several hours. This discovery demonstrates that in high-frequency trading, investors base future investment decisions on prior price fluctuations. They show convincing evidence that market and limit order flows are substantially more predictable when utilized to close an existing position rather than to initiate one. This discovery is seen as evidence for the existence of a monitoring effect, which has ramifications for theoretical market microstructure models and behavioural finance phenomena like the endowment effect.

Kumiega & Vliet, (2012) described the difficulties of steady inputs into financial models, as well as how human traders' outputs are insufficiently consistent to meet engineering criteria for stability. They contended that trading strategy outputs may meet such criteria through automation. They developed ambiguity alpha, a way of explanation that explains the possibility of greater descriptive power and excess returns through stability and statistical control. Finally, they devised a set of fundamental assumptions that explicitly ignore the assumption of normality that underpins so much quantitative finance. This financial approach leads to the conclusion that financial returns are driven by the behavioural features of trading system research and development project management rather than the behavioural aspects of market participants, which automated systems, attempt to avoid.

Kliger & Kudryavtsev, (2013) investigated the influence of expected volatility in financial decision-making. They focused on the influence of analyst recommendation modifications on investor reactions. They used the Chicago Board Options Exchange's Implied Volatility Index (VIX), widely known as investors' "fear gauge," as a proxy for current investors' market volatility expectations, and found that positive (negative) stock price reactions to recommendation upgrades (downgrades) were stronger when accompanied by decreases (increases) in the daily value of VIX. The study also discovered that cumulative two-day abnormal stock returns around recommendation revisions were greater if the contemporaneous value of VIX fell during the relevant two days.

Kaminski & Lo, (2013) conducted an empirical study of stop-loss policies used in a buy-and-hold strategy with index futures contracts. They used daily futures data from January 1993 to November 2011 to apply a basic stop-loss rule to a classic asset-allocation problem of stocks vs bonds. They discovered that stop-loss rules exhibit positive stopping premiums over a wider range of threshold values and longer sampling frequencies. The study also discovered that systematic stop-loss strategies can profit from the disposition effect and loss aversion, which is the tendency to sell wins too soon and retain losers for too long.

Another study by *Hoffmann & Shefrin, (2014)* revealed the findings of how utilizing technical analysis affects the portfolios of individual investors. It was discovered that investors who report employing technical analysis have more concentrated portfolios and greater nonsystematic risk-to-total-risk ratios than other investors. They also trade more frequently than other investors, particularly with options. Investors that use technical analysis receive poorer raw and risk-adjusted returns than other investors as a result of these behavioural characteristics.

Raghavendra, (2013) evaluated the amount of awareness of retail investors regarding derivatives, as well as their impression of derivatives as an investment opportunity. Using the GARCH model, this study also investigated the impact of financial derivatives on cash market volatility. According to the survey results, the majority of respondents believe that trading in derivatives is riskier than trading in the equities market. It was also discovered that most investors are unaware of the numerous trading tactics that may be used in derivatives trading to reduce risk. According to the report, women investors avoid derivatives trading because they believe it is a dangerous product.

Aravind, (2013) investigated the demographic and behavioural characteristics that influence customers' preferences for financial derivatives in South Kerala. It was discovered that the majority of investors learned about derivatives through broking businesses, indicating that broking firms in south Kerala are taking an active interest and making efforts to promote financial derivatives. When the market is more volatile, investors prefer to use derivatives. According to the study, retail investors in South Kerala are overly conservative, particularly when it comes to fund allocation to derivatives, and their fund allocation is heavily impacted by the prior trading experience.

Santhini, (2013) conducted a study to analyse retail investors' perceptions of derivatives about futures and options in Tanjore District, Tamil Nadu. It was shown that the majority of capital market investors invest more than half of their overall investment in the derivative market. The frequency of trading in the derivative market has been seen to range from monthly to infrequent for the majority of investors. Trading frequency in the derivative market is strongly related to investor type and risk level. Finally, it was determined that the majority of investors were extremely pleased with the overall performance of the derivative market.

Thamotharan & Prabakaran, (2013) researched the socioeconomic profile of investors in the Indian derivatives market in Tamil Nadu. The survey also attempts to analyse investors' perceptions of the Indian derivatives market. It was shown that the majority of derivatives investors are unmarried males. According to the report, appropriate governmental actions will assist investors in perceiving derivative investments and making sound decisions.

Tripathi, (2014) surveyed to better understand the awareness and appeal of various derivative securities among retail investors. The study also attempts to understand the profile of retail investors involved in derivative trading, as well as the various purposes for which the investors use these securities in order of preference, the popularity of a particular derivative security out of the total set, and the reasons for some investors not investing. It was discovered that education, profession, and gender have little effect on derivative trading behaviour, but income has a considerable effect on derivative investing.

S. Y. Yang et al., (2014), employed a Markov decision process to describe the trading behaviour of numerous market participants in another investigation (MDP). In this model, states are defined by the number of orders in each of a coarse set of bins placed on the limit order book. Experiments using real-world data have proven that we can accurately identify individual trading strategies. It means that individual trading methods with distinct characteristics can be identified with good precision. It is also believed that reward space is better suitable for identifying trading strategies than policy space.

Bowden, (2015) created an agent-based artificial market to study the effects of confirmatory bias on volatility and kurtosis in one-period returns. He discovered that sentiment investors trade based on their forecast of future prices as well as the opinions of their connected neighbours. Confirmatory bias minimizes volatility and kurtosis by biasing fresh information towards their existing decision, lowering trading activity. However, when the fundamental investor's trading volume is low, confirmatory bias raises the levels of kurtosis, implying that while sentiment investors' overall trading activity reduces, it becomes more coordinated.

Hoffmann et al., (2015) investigated how investor perceptions influence actual trading and risk-taking behaviour by constructing a panel dataset by integrating monthly survey data with matching brokerage records. They discovered that investor perceptions, as well as changes in those beliefs, are major drivers of actual trading and risk-taking behaviour. Investors with higher return expectations and upward revisions are more likely to trade, have higher turnover, trade larger sums per transaction, and use derivatives. Investors with higher risk tolerance levels and upward revisions are more likely to trade, have higher buy-sell ratios, utilize limit orders more frequently, and hold riskier portfolios.

Corredor et al., (2015) investigated the role of investor sentiment in the real-time dynamics of spot and futures markets, as well as the volatility spillovers between them. According to the study, the correlation with the level of investor sentiment is not stable. More precisely, during periods of elevated investor sentiment, the correlation between the two markets decreases dramatically. Furthermore, volatility shocks in any market are observed to have a lower impact during these times. These findings are consistent with behavioural finance theories that imply that high investor sentiment increases noisy trading and decreases arbitrage activity as institutional investors seek to limit their risk exposure.

Manrai, (2015) investigated investors' attitudes and perceptions of the derivative market in North India. For a few years, there has been an increase in knowledge of derivatives trading among ordinary investors in India. This was owing to an increase in the number of trading agents or organizations in the market that allow regular investors to trade derivatives on exchanges such as MCX and NCDEX. *Ansari et al., (2015)* conducted a study to find the perception of investors towards derivatives markets. They found that gender, age, income and education do not have a significant effect on the perception of derivatives products.

Lowies et al., (2016) investigated whether anchoring and adjustment as heuristic-driven bias and herding behaviour influence listed property fund managers' property investment decisions in South Africa. The study contributes to the understanding of the impact of heuristic-driven bias and herding behaviour on real estate investment decisions made in a risky setting. Consistency with other studies suggests that listed property fund managers' decisions may be influenced by anchoring and adjustment. However, rather than a lack of knowledge of the new information, fund managers fail to respond to new information because of the current socio-political climate in South Africa.

Lutz, (2016) applied the returns on lottery-like stocks to develop and test a new index of investor sentiment for the stock market. Lottery-like stocks are used because individual investors are attracted to their speculative features. He found that the index accurately times speculative episodes and predicts other measures of investor sentiment. Using the index, he studied the predictive effects of sentiment on stock returns. As in previous empirical studies, this study found that high sentiment relates to low future returns over our entire sample period.

Huang et al., (2016) attempted to assess the contributions of individual researchers and institutional contributors to behavioural finance research from 1995 to 2013. This study also assessed the influence of individual papers and authors using SCI/SSCI citation analysis. The study discovered that during the last two decades, researchers from America (USA), Asia (Taiwan and Peoples R China), Europe (Germany, England, SPAIN, the Netherlands, and France), the Middle East (Israel), and Oceania (Australia) had all made significant contributions to the area.

Y. Gupta, (2016) investigated the impact of behavioural biases on investor decision-making. It was discovered that four out of seven behavioural biases, namely regret aversion bias, herding bias, overconfidence bias, and representativeness bias, influenced both groups of investors equally likely. However, compared to unmarried investors, married investors were found to be more influenced by loss aversion bias, anchoring bias, and cognitive dissonance bias. The study reveals that age, investment experience, and the percentage of savings invested in the stock market all play a major role in affecting investors' anchoring bias.

Gautam & Kavidayal, (2016) investigates market participants' attitudes toward derivative trading, its link with the spot market, and its role in the Subprime crisis. The research was carried out in the Indian state of Uttarakhand to gain insight into the thinking of investors and to investigate how their age and risk profile influence their decision to invest in derivatives. The influence of derivative trading was discovered in the form of massive volumes and liquidity in the Indian market. Experienced derivative traders view derivatives as risky instruments and hence play it safe. It was stated that high transaction costs, a lack of expertise, illegal financial advisors' malpractices, and shorter trade timings are some of the hurdles to derivative trading in India.

Jacob,(2016) assessed stock market investors' perceptions and experiences with derivatives. According to the study's findings, small investors do not view derivatives as a risk-hedging instrument. This demonstrates tiny investors' lack of knowledge about financial derivatives.

Sahi, (2017) attempted to understand the relationship between individual investor biases and financial contentment, as well as to design strategies to address the found individual investor biases. Financial contentment is a measurement of happiness with one's financial condition. Overconfidence bias, dependence on the expert bias, and self-control bias were found to have a positive and substantial relationship with financial satisfaction levels. Under particular control settings, a few additional biases were also associated with financial contentment. This work adds to our understanding of investor behaviour and opens up new avenues for future investigation.

Houlihan & Creamer, (2017) investigated whether sentiment collected from social media and options volume predicts future asset performance. The study collected textual data as well as specific market data to determine the call-put ratio between July 2009 and September 2012. This study demonstrates the significance of sentiment collected from social media messages and market data in explaining and forecasting asset price returns. They show that sentiment gathered from social media and market data can be used to supplement the Fama–French and Carhart models. Furthermore, these findings imply that sentiment can be used in a predictive analytics framework to generate positive residual alpha after controlling for market influences.

Mutum, (2017) investigated if the effectiveness of options trading methods may be enhanced by introducing volatility forecasts incorporating investor mood into the decision-making process in the Indian options market. The multiple-factor model was used in the study to create the Indian volatility forecasting model. The causality and regression test results show that investor sentiment and changes should be included in the forecasting model. Straddle strategies were simulated 15 days before the option's maturity date based on the anticipated direction for several volatility forecasting models. The simulation results demonstrate that introducing volatility forecasting factoring investor sentiment, notably IVIX, into the decision-making process at the Indian options market could improve options trading performance.

Antony & Joseph, (2017) examined the cognitive biases and heuristics of derivative market investors. The study also looked into the impact of behavioural factors on investment decisions. The decision-making process is considered cognitive in nature because investors must make a choice based on the various options available to them. The study revealed that representative bias, overconfidence bias, regret aversion, mental accounting, and herd behaviour were the most prominent behavioural factors influencing investor manifestation. Overconfidence bias had the highest impact on investors' investment decisions of any behavioural element.

Li et al., (2018) investigated the idea that financial products that cater to investors' behavioural biases can result in high trading activity and consequently profit for issuers. This study looks at options having a callback feature; specifically callable bull/bear contracts (CBBCs). The research demonstrates that such contracts have substantial skewness towards the callback and hence appeal to cumulative prospect theory preferences. CBBCs with a high skewness generate negative average returns, although issuers' gross profits fluctuate positively with skewness. Issuers receive approximately $1.67 billion in gross earnings from trading CBBCs on the Hang Seng

Index between 2009 and 2014. These findings emphasize the significance of behavioural finance in financial innovation.

Houlihan & Creamer, (2018) examined whether a put-call ratio, derived from a unique set of market data, can be used to predict directional moves in asset prices during various market conditions between March 2005 and December 2012. The results show that a specific market participant's options trading volume is a predecessor to asset price movements, and portfolios based on the put-call ratio adjusted for four factors Carhart model and transaction costs exhibit abnormal excess returns.

H.-S. Chen & Sabherwal, (2018) investigated whether investor overconfidence is related to high trading activity in the options market. The results provide support to the overconfidence theory in the options market. They employed multiple indicators of options trading activity to demonstrate that historical stock market return is positively associated with options trading activity. It has been discovered that options trading, particularly call options, increases with historical market results.

L. Zhou et al., (2018) examined how investor trading behaviour moves in tandem with agricultural future prices. This research provides fresh insights into the decompositions of investor trading behaviour and differentiates the performance disparities between expected and unexpected investor trading activity. This research also sheds fresh light on the diverse functions of buyer-initiated trading behaviour and seller-initiated trading activity on agricultural future prices. These findings can be seen as direct and strong proof of the major effects of investor trading behaviour on agricultural future prices.

Narasimha & Mushinada,(2018) Narasimha and Mushinada (2018) conducted an experimental study on self-attribution, overconfidence bias, and dynamic market volatility at the Bombay Stock Exchange (BSE) across a range of market capitalizations. When investors make accurate estimates of future returns, they grow overconfident and trade more in subsequent periods, according to research. The relationship between excessive trading volume and excessive price volatility is investigated. According to the study, trading volume is split into two variables: one connected to investor overconfidence and one unrelated to investor overconfidence. The research of tiny companies during the pre-crisis period reveals that conditional volatility is positively connected to trading volume caused by overconfidence. The data demonstrates that throughout the post-crisis period, under-confident investors became particularly gloomy about tiny stocks and tended to overestimate future volatility.

Anu, (2018) analyzed the trading behaviour of investors in the equity derivatives market. She also investigated the issues and remedies associated with dealing with equity derivative instruments. It was discovered that the introduction of stock futures and options has a considerable impact on stock market volatility. The long-run relationship between macroeconomic factors and the country's capital formation is analysed using the ARDL model, and the results show that there is a co-integration between macroeconomic factors and the country's capital formation. According to the report, investors have a poor level of awareness of derivatives and regard them as a more dangerous and complex product. It was also discovered that investors are pleased with derivative trading because they can trade in derivatives with low margins.

Vattoli, (2018) aimed to investigate the awareness, attitude, preferences, and behaviour of individual derivatives traders in Kerala, as well as the overall growth prospects of the Indian derivative market and an estimate of the hedging effectiveness of NSE Nifty 50 futures. The investigation highlighted individual investors' illogical trading preferences and practices, which resulted in large losses. It was discovered that there was a high level of behavioural bias among Kerala derivatives traders, which could be one of the reasons for the non-profitable experience of derivatives traders. Finally, it was concluded that the broker skill levels tested in the study were lower than the mean level. Low broker competence can eventually lead to low investor profitability. The Nifty 50 futures were discovered to be particularly successful for risk hedging.

Voukelatos & Verousis, (2019) investigated whether option-implied knowledge might explain herding behaviour in the equities market. However, this study uncovers evidence of strong herding behaviour when option-implied information indicates a pessimistic view of the equities market's prospects. Individual stock returns, in particular, tend to cluster more tightly around the market consensus on days of greater implied index volatility, more pronounced negative implied skewness, and larger trading volume in index puts.

Gao et al.,(2019) proposed a dynamic futures pricing model to investigate the impact of different investors' sentiments on financial anomalies caused by market inefficiency. The model focuses on the interaction of various sorts of investors in the futures market, with the great majority being short-term investors, and demonstrates how this interaction maintains wrong prices. The main findings are as follows: first, in calm situations, short-term sentiment has a greater impact on pricing than long-term sentiment; second, in crashes, the number of short-term investors decreases, and market efficiency improves when regulators implement policies to reduce the number of short-term investors; and finally, empirical results show that the pricing model in the paper outperforms other models, which is useful for better-predicting futures prices.

Renuka, (2019) explored investors' attitudes about derivatives investments in the Hyderabad region. The study discovered that investors' preferences in derivative investments are determined by investing objectives such as risk, return, safety, and liquidity. The majority of investors participate in Forward contracts for return, Future contracts for risk and safety, and Options and Swaps for future needs.

Mohamed & Hidhayathulla, (2020) has explained the monthly behaviour pattern of commodity derivative trading volume in India from 2014 to 2018. The lowest monthly commodity derivative trading volume was discovered to have occurred primarily in January. The largest monthly commodity derivative trading volume was largely observed in November. The volume of trading decreased in March, July, and December compared to the same months the previous year.

Anbukarasi & Devaki, (2020) investigated retail investors' behaviour myths in the commodity derivative market in Coimbatore City. The dual goals of this research article are to investigate the behavioural myths of commodity derivative market investors and to propose appropriate solutions to overcome them. According to the report, five key behavioural myths exist among commodity derivative market participants. The researcher suggests appropriate ways for overcoming these behavioural biases.

Patil & Bagodi, (2021) undertook a study to determine the elements that impact investors' investment decisions in the Indian stock market, which included 10 sectors and 30 businesses listed on the BSE-30 SENSEX. A 14-attribute study instrument was created and distributed to 2100 respondents. 467 responses were collected over 6 months, and a KANO model was built to categorise the data into must be,' 'linear,' and 'pleasure' qualities. It was discovered that 14 pieces of information (attributes) are useful to investors in the Indian environment. It has been attempted to categorise them as must be,' 'linear,' and 'pleasure' qualities. It was also discovered that the qualities must be, linear, and joy are sector-specific. The overall and sector-specific must be, linear, and enjoyment properties are discovered and presented using the KANO model.

2.5 Research Gap

The review of literature of documents relating to the derivatives market identified seven central themes in which most of the research is carried out; such as *Volatility Forecasting and Options Trading, Informed Trading and Price discovery, Trading behaviour and Market information, The Interaction Between Derivative Trading and Spot Market Volatility, Risk Management and Hedging with Commodity Futures and Options, Pricing and Valuation Commodity Futures and options, Climate Policy, Carbon Trading and Energy Derivative.* These are the areas where most of the research in the derivatives market was concentrated. After reviewing the literature, it is found that studies relating to derivative trading strategies of individual traders are very rare and there is a scope for conducting new research. On reviewing the literature on behavioural finance it is identified that research on behavioural biases of equity derivative traders is not available. As a result, there is a research gap that the author has observed, which inspires the current work. This research is being carried out to explain the level of knowledge, trading strategies and Influence of behavioural biases on the trading performance of Equity Derivative traders in Kerala.

2.6 Conclusion

According to the literature review, the innovative themes of research in the derivatives market are information content in options implied volatility, trading volume, carbon trading, and energy derivatives. The overall analysis of publications reveals that majority of the research is related in some way to the issue of "information flow and price discovery of underlying assets". This means that the vast bulk of derivatives market research is conducted in this sector. This chapter provides a literature review of documents relating to the derivatives market as well as behavioural finance and a research gap is also identified. The next chapter provides an overview of the theoretical aspects of the derivatives market and behavioural finance.

REFERENCES

Acharya, V. V., & Johnson, T. C. (2007). Insider trading in credit derivatives. *Journal of Financial Economics*, *84*(1), 110–141. https://doi.org/10.1016/j.jfineco. 2006.05.003

Afsal, E. M. (2007). *An Analysis of the Impact of Derivatives on the Stock Market in India*. Mangalore University.

Agarwal, R., Kumar, S., Mukhtar, W., & Abar, H. (2009). Impact of Derivatives on the Indian Stock Market. *Indian Finance Summit*.

Ahn, H., & Ryu, D. (2008). Informed trading in the Index Option Market : The case of KOSPI 200 options. *Journal of Futures Markets*, *28*(12), 1118–1146. https://doi.org/10.1002/fut

Alkebäch, P., & Hagelin, N. (2004). Expiration day effects of index futures and options: Evidence from a market with a long settlement period. *Applied Financial Economics*, *14*(6), 385–396. https://doi.org/10.1080/096031004100 01673612

Allen, F., & Santomero, A. M. (1998). The theory of financial intermediation. *Journal of Banking & Finance*, *21*, 1465–1485. https://doi.org/10.1016/S0378-4266(97)00032-0

Anbukarasi, M., & Devaki, M. (2020). Behavioral Myth of Retail Investors in Commodity Derivative Market – With reference to Coimbatore District. *JAC : A Journal Of Composition Theory*, *XIII*(I), 614–620.

Ansari, S., Ubeja, S., Jain, D., & Pathak, S. (2015). A Study of Investor ’ s Perception towards Derivative Market. *Advances in Economics and Business Management (AEBM)*, *2*(8), 781–785.

Antony, A., & Joseph, A. I. (2017). Influence of Behavioural Factors Affecting Investment Decision—An AHP Analysis. *Metamorphosis: A Journal of Management Research*, *16*(2), 107–114. https://doi.org/10.1177/0972622 517738833

Anu, K. (2018). *Investors Trading Behaviour and Performance of Equity Derivatives Market in India with special reference to Tamil Nadu* [Bharathiar University]. http://hdl.handle.net/10603/235892

Aravind, M. (2013). *Customer Preference towards Financial Derivatives with reference to South Kerala Market*. Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya.

Atif, M. (2018). *Returns and Volatility Relationship between futures and spot market in India*. Jamia Millia Islamia.

Avellaneda, M., & Levy, A. (1995). Pricing and hedging derivative securities in markets with uncertain volatilities. *Applied Mathematical Finance*, *2*(2), 73–88. https://doi.org/10.1080/13504869500000005

Bartram, S. M. (2006). The use of options in corporate risk management. *Managerial Finance*, *32*(2), 160–181.

Battermann, H. L., Braulke, M., Broll, U., & Schimmelpfennig, J. (2000). The preferred hedge instrument. *Economics Letters*, *66*(1), 85–91. https://doi.org/10.1016/S0165-1765(99)00180-9

Bauer, R., Cosemans, M., & Eichholtz, P. (2009). Option trading and individual investor performance. *Journal of Banking and Finance*, *33*(4), 731–746. https://doi.org/10.1016/j.jbankfin.2008.11.005

Bhat, R. B. (2017). *Impact of derivatives on price volatility in Indian stock market* (Issue March). Mahatma Gandhi University, Kottayam.

Bhaumik, S. K., & Bose, S. (2009). Impact of derivatives trading on emerging stock markets: Some evidence from India. *Comparative Economic Studies*, *51*(1), 118–137. https://doi.org/10.1057/ces.2008.18

Binoosa, T. (2018). *Role of Futures in Risk Reduction : A Study with Reference to Select Banks ' Futures* (Issue August). University of Calicut.

Black, F., & Scholes, M. (1973). The Pricing of Options and Corporate Liabilities. *The Journal of Political Economy*, *81*(3), 637–654. http://www.jstor.org/stable/1831029

Blau, B. M., Bowles, T. B., & Whitby, R. J. (2016). Gambling Preferences, Options Markets, and Volatility. *Journal of Financial and Quantitative Analysis*, *51*(2), 515–540. https://doi.org/10.1017/S002210901600020X

Blau, B. M., Nguyen, N., & Whitby, R. J. (2014). The information content of option ratios. *Journal of Banking and Finance*, *43*(1), 179–187. https://doi.org/10.1016/j.jbankfin.2014.03.023

Booth, G. G., So, R. W., & Tse, Y. (1999). Price Discovery in the German Equity Index Derivatives M arkets. *The Journal of Futures Markets*, *19*(6), 619–643. https://doi.org/10.1002/(SICI)1096-9934(199909)19:6<619::AID-FUT1>3.0.CO;2-M

Bowden, M. P. (2015). A model of information flows and confirmatory bias in financial markets. *Decisions in Economics and Finance*. https://doi.org/10.1007/s10203-015-0164-y

Breeden, D. T. (1984). Futures markets and commodity options: Hedging and optimality in incomplete markets. *Journal of Economic Theory*, *32*(2), 275–300. https://doi.org/10.1016/0022-0531(84)90055-3

Broll, U., Chow, K. W., & Wong, K. (2001). Hedging and nonlinear risk exposure. *Oxford Economic Papers*, *53*(2), 281–296. https://doi.org/10.1093/oep/

53.2.281

Carmona, R., & Durrleman, V. (2003). Pricing and hedging spread options. *SIAM Review*, *45*(4), 627–685. https://doi.org/10.1137/S0036144503424798

Carr, P. P. (2000). Deriving Derivatives of Derivative Securities. *Journal of Computational Finance*, *4*(2), 4–30. https://doi.org/10.1109/CIFER.2000.844609

Carr, P., & Wu, L. (2006). A Tale of Two Indices. *The Journal of Derivatives*, *13.3*(Vix), 13–29. https://doi.org/10.3905/jod.2006.616865

Chakravarty, S., Gulen, H., & Mayhew, S. (2004). Informed trading in stock and option markets. *Journal of Finance*, *59*(3), 1235–1258. https://doi.org/10.1111/j.1540-6261.2004.00661.x

Chang, C. C., Hsieh, P. F., & Wang, Y. H. (2010). Information content of options trading volume for future volatility: Evidence from the Taiwan options market. *Journal of Banking and Finance*, *34*(1), 174–183. https://doi.org/10.1016/j.jbankfin.2009.07.015

Chen, A. S., & Leung, M. T. (2003). Option straddle trading: Financial performance and economic significance of direct profit forecast and conventional strategies. *Applied Economics Letters*, *10*(8), 493–498. https://doi.org/10.1080/1350485032000095375

Chen, H.-S., & Sabherwal, S. (2018). Overconfidence among options traders. *Review Of Financial Economics*, *37*, 61–91. https://doi.org/10.1002/rfe.1048

Chiang, R., & Fong, W. M. (2001). Relative informational efficiency of cash, futures, and options markets: The case of an emerging market. *Journal of Banking and Finance*, *25*(2), 355–375. https://doi.org/10.1016/S0378-4266(99)00127-2

Chiras, D. P., & Manaster, S. (1978). The information content of option prices and a test of market efficiency. *Journal of Financial Economics*, *6*(2–3), 213–234. https://doi.org/10.1016/0304-405X(78)90030-2

Corredor, P., Ferrer, E., & Santamaria, R. (2015). Sentiment-prone investors and volatility dynamics between spot and futures markets. *International Review of Economics and Finance*, *35*, 180–196. https://doi.org/10.1016/j.iref.2014.09.013

Daniel, K., Hirshleifer, D., & Teoh, S. H. (2002). Supporting social deliberative skills online: The effects of reflective scaffolding tools. *Journal of Monetary Economics*, *49*, 139–209. https://doi.org/10.1007/978-3-642-39371-6_36

Das, A. (2011). *Nature And Functioning of Derivatives Trading in Indian Stock Market : An Empirical Investigation*. University of Burdwan, West Bengal.

Dash, M., Kavitha, V., Deepa, K. M., & Sindhu, S. (2007). A study of optimal stock & options strategies. *SSRN Electronic Journal*. http://ssrn.com/

abstract=1293203

Daskalakis, G., Psychoyios, D., & Markellos, R. N. (2009). Modelling CO 2 emission allowance prices and derivatives : Evidence from the European trading scheme. *Journal of Banking and Finance*, *33*(7), 1230–1241. https://doi.org/10.1016/j.jbankfin.2009.01.001

Dhanya, K. A. (2013). *Hedge effectiveness and attitude of individual derivative traders towards hedging a study with special reference to selected financial derivatives*. University of Calicut.

Dhar, S. K. (2013). *Derivative Trading in India: a New Perspective of Risk Management*. 1–20.

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Marc, W. (2021). How to conduct a bibliometric analysis : An overview and guidelines. *Journal of Business Research*, *133*(March), 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

Emm, E. E., Gay, G. D., Ma, H., & Ren, H. (2021). Effects of the Covid-19 pandemic on derivatives markets_ Evidence from global futures and options exchanges _ Enhanced Reader.pdf. *Journal of Futures Markets, John Wiley & Sons, Ltd*, *42(5)*(May), 823–851.

Fedenia, M., & Grammatikos, T. (1992). Options Trading and the Bid-Ask Spread of the Underlying Stocks. *The Journal of Business*, *65*(3), 335–351. http://www.jstor.com/stable/2353269

Figlewski, S. (1989). Options Arbitrage in Imperfect Markets. *The Journal of Finance*, *44*(5), 1289–1311. https://doi.org/10.1111/j.1540-6261.1989.tb02654.x

Fleming, J., Ostdiek, B., & Whaley, R. E. (1996). Trading costs and the relative rates of price discovery in stock, futures, and options markets. *Journal of Futures Markets*, *16*(4), 353–387. https://doi.org/10.1002/(SICI)1096-9934(199606)16:4<353::AID-FUT1>3.0.CO;2-H

Fong, K., Gallagher, D. R., & Ng, A. (2005). The Use of Derivatives by Investment Managers and Implications for Portfolio Performance and Risk. *International Review of Finance*, *5*(1–2), 1–29.

Frijns, B., Lehnert, T., & Zwinkels, R. C. J. (2010). Behavioural heterogeneity in the options market. *Journal of Economic Dynamics and Control*, *34*(11), 2273–2287. https://doi.org/10.1016/j.jedc.2010.05.009

Ganesh Sankar. (2018). *Determinants of Derivative Pricing – a study on Indian Derivative Markets*. Institute for Financial Management and Research (IFMR).

Gang, J., Huang, N., Song, K., & Zhang, R. (2020). Index volatility and the put-call ratio: a tale of three markets. *Quantitative Finance*, *20*(12), 1983–1996. https://doi.org/10.1080/14697688.2020.1814009

Gao, B., Xie, J., & Jia, Y. (2019). A futures pricing model with long-term and short-term traders. *International Review of Economics and Finance*, *64*, 9–28. https://doi.org/10.1016/j.iref.2019.05.010

Gautam, I., & Kavidayal, P. (2016). Perception of Market Participants towards Derivative Trading: A study of Uttarakhand. *International Journal of Management, IT and Engineering*, *6*(May), 191–207.

Gourav Goutam. (2017). *Impact of Financial Derivatives on Stock Market Volatility in India Market with reference to RBI*. Kurukshetra University.

Goyal, N. (2012). *Impact of financial derivatives on stock market volatility in India*. Kurukshetra University.

Grünbichler, A., & Longstaff, F. A. (1996). Valuing futures and options on volatility. *Journal of Banking and Finance*, *20*(6), 985–1001. https://doi.org/10.1016/0378-4266(95)00034-8

Guo, D. (2000). Dynamic volatility trading strategies in the currency options market. *Review of Derivatives Research*, *4*(2), 133–154. https://doi.org/10.1023/A:1009638225908

Gupta, R. (2004). *Financial Derivatives Trading in India*. Mahatma Gandhi Kashi Vidyapith.

Gupta, Y. (2016). *Behavioural Finance a Study on Investors' Behaviour towards Equity Market Investment concerning Investors of Delhi*. Jamia Milia Islamia.

Hayunga, D. K., & Lung, P. P. (2014). Trading in the Options Market around Financial Analysts ' Consensus Revisions. *The Journal of Financial and Quantitative Analysis*, *49*(3), 725–747. https://www.jstor.org/stable/43303965

Hirshleifer, D. (2001). Investor Psychology and Asset Pricing. *Journal of Finance*, *56*(4), 1533–1598. http://dx.doi.org/10.2139/ssrn.265132

Hoffmann, A. O. I., Fischer, E. T. S., Hoffmann, A. O. I., & Fischer, E. T. S. (2012). Behavioral Aspects of Covered Call Writing : An Empirical Investigation. *Journal of Behavioral Finance*, *13*(1), 66–79. https://doi.org/10.1080/15427560.2012.657314

Hoffmann, A. O. I., Post, T., & Pennings, J. M. E. (2015). How Investor Perceptions Drive Actual Trading and Risk-Taking Behavior. *Journal of Behavioral Finance*, *16*(1), 94–103. https://doi.org/10.1080/15427560.2015.1000332

Hoffmann, A. O. I., & Shefrin, H. (2014). Technical analysis and individual investors ☆. *Journal of Economic Behavior and Organization*, 1–25. https://doi.org/10.1016/j.jebo.2014.04.002

Houlihan, P., & Creamer, G. G. (2017). Can Sentiment Analysis and Options Volume Anticipate Future Returns ? *Computational Economics*. https://doi.org/ 10.1007/s10614-017-9694-4

Houlihan, P., & Creamer, G. G. (2018). Leveraging a call-put ratio as a trading signal. *Quantitative Finance*, *7688*. https://doi.org/10.1080/14697688.2018.1538563

Huang, J. Y., CP, J., & Kao, S. Y.-C. (2016). Starting points for a new researcher in behavioural finance. *International Journal of Managerial Finance Starting*, *12*(1). http://dx.doi.org/10.1108/IJMF-05-2015-0111

Hull, J. c, & Basu, S. (2017). *Options, Futures, and Other Derivatives* (9th Editio). Pearson India Education Services Pvt. Ltd.

Jacob, A. N. (2016). *A Study on Experiences and Perceptions of Capital Market Investors on Financial Derivatives* (Issue May).

Jeanneau, S., & Micu, M. (2003). Volatility and derivatives turnover : a tenuous. *BIS Quarterly Review*, *March*, 57–65.

Jose, B. (2011). *Informational Efficiency of Futures Market in India*. Pondicherry University.

Judge, A., & Reancharoen, T. (2014). An empirical examination of the lead-lag relationship between spot and futures markets: Evidence from Thailand. *Pacific Basin Finance Journal*, *29*, 335–358. https://doi.org/10.1016 /j.pacfin.2014.05.003

Kaminski, K. M., & Lo, A. W. (2013). When Do Stop-Loss Rules Stop Losses ? $. *Journal of Financial Markets*, 1–43. https://doi.org/10.1016/j.finmar.2013. 07.001

Karmakar, M. (2005). Modelling Conditional Volatility of the Indian Stock Markets. *Vikalpa*, *30*(3), 21–37.

Karthika, P., & Karthikeyan, P. (2013). Options Investment Strategy and Their Benefits_ An Analysis. *International Journal of Management Focus*, *2*, 1–10. https://ssrn.com/abstract=2886743

Kim, M. J., Lee, J. E., Kim, S. Y., & Kim, K. (2010). The two-phase phenomenon in linear and non-linear financial instruments. *Physica A: Statistical Mechanics and Its Applications*, *389*(13), 2580–2585. https://doi.org/10.1016/j.physa. 2010.02.031

Kim, S. (2009). The Performance of Traders Rules in Options Market. *Journal of Futures Markets*, *29*(11), 999–1020. https://doi.org/10.1002/fut

Kliger, D., & Kudryavtsev, A. (2013). Volatility expectations and the reaction to analyst recommendations. *Journal of Economic Psychology*, *37*, 1–6. https://doi.org/10.1016/j.joep.2013.04.003

Kumar, S. S. S. (2015). *Financial Derivatives*. PHI Learning Private Limited.

Kumiega, A., & Vliet, B. E. Van. (2012). Automated Finance : The Assumptions and Behavioral Aspects of Algorithmic Trading. *Journal of Behavioral Finance*, *13*(1), 51–55. https://doi.org/10.1080/15427560.2012.654924

Kyriacou, K., & Sarno, L. (1999). The Temporal Relationship between Derivatives Trading and Spot Market Volatility in the U . K .: Empirical Analysis and Monte Carlo Evidence. *The Journal of Futures Markets*, *19*(3), 245–270.

Li, X., Subrahmanyam, A., & Yang, X. (2018). Can financial innovation succeed by catering to behavioural preferences ? Evidence from a callable options market. *Journal of Financial Economics*, 1–28. https://doi.org/10.1016/j.jfineco. 2018.01.010

Lien, D., & Wang, Y. (2006). Cross-hedging with futures and options: The effects of disappointment aversion. *Journal of Multinational Financial Management*, *16*(1), 16–26. https://doi.org/10.1016/j.mulfin.2005.02.001

Lin, C.-H., Hsu, H., & Chiang, C.-Y. (2005). Trading Patterns and Performance of Trader Types in Taiwan Futures Market. *Review of Pacific Basin Financial Markets and Policies*, *8*(2), 217–234.

Lin, W. T., Tsai, S. C., Zheng, Z., & Qiao, S. (2017). Does options trading convey information on futures prices? *North American Journal of Economics and Finance*, *39*, 182–196. https://doi.org/10.1016/j.najef.2016.10.005

Lowies, G. A., Hal, J. H., & Cloete, C. E. (2016). Heuristic-driven bias in property investment decision-making in South Africa. *Journal of Property Investment & Finance*, *34*(1), 51–67. https://doi.org/10.1108/JPIF-08-2014-0055

Luong, L. P., & Ha, D. T. T. (2011). *Behavioural Factors Influencing Individual Investors' Decision-Making and Performance* [Umea University, Sweden]. www.usbe.umu.se

Lutz, C. (2016). The Asymmetric Effects of Investor Sentiment. *Macroeconomic Dynamics*, *20*, 1477–1503. https://doi.org/10.1017/S1365100514000996

Malik, N. S., Bhardwaj, K., & Singla, R. (2019). Price Discovery and Arbitrage Efficiency Test : A Study of the Indian Options Market. *Finance India*, *XXXIII*(3), 623–638.

Mall, M. (2011). *A study on a stock index and stock index futures with special reference to S&P CNX Nifty and Nifty Futures*. Siksha O Anusandhan University, Bhubaneswar.

Manasa, N., & Narayanarao, S. (2018). A Study on the impact of BANKNIFTY derivatives trading on spot market volatility in India. *Academy of Accounting and Financial Studies Journal*, *22*(1).

Manrai, R. (2015). Investor Behavior Towards Derivative Markets in Indian Context.

IOSR Journal of Business and Management (IOSR-JBM), 10–14.

Mazouz, K., Wu, Y., & Yin, S. (2015). Trading Activity in Options and Stock Around Price-Sensitive News Announcements. *Journal of Futures Markets*, *35*(12), 1173–1194. https://doi.org/10.1002/fut.21691

Mistri, A. (2016). *A Study of Derivative Trading Strategies in Indian Stock Market*. Sardar Patel University.

Mohamed, R., & Hidhayathulla. (2020). Month Wise Behavioural Pattern Of Commodity Derivative Trading Volume In. *European Journal of Molecular & Clinical Medicine*, *07*(03), 4859–4864.

Mutum, K. (2017). Volatility Forecast Incorporating Investors ' Sentiment and its Application in Options Trading Strategies : A Behavioural Finance Approach at Nifty 50 Index. *Vision*, *24*(2), 217–227. https://doi.org/10.1177/0972262920914117

Narang, S., & Vij, M. (2013). Long-Term Effects of Expiration of Derivatives on Indian Spot Volatility. *ISRN Economics*. http://dx.doi.org/10.1155/2013/718538

Narasimha, V., & Mushinada, C. (2018). Self-attribution, Overconfidence and Dynamic Market Volatility in Indian Stock Market. *Global Business Review*, *21*(2), 1+ – 20. https://doi.org/10.1177/0972150918779288

Nolte, I., & Nolte, S. (2012). How do individual investors trade ? *The European Journal of Finance*, *18*(10), 921–947. https://doi.org/10.1080/1351847X.2011.601647

Novemsky, N., & Kahneman, D. (2005). How do intentions affect loss aversion? *Journal of Marketing Research*, *42*(2), 139–140. https://doi.org/10.1509/jmkr.42.2.139.62295

Nuruzzaman, M. A. (2011). *Retail Investor's Participation in India's Stock-Based Index Futures Market: Opportunities and Challenges*. Aligarh Muslim University.

Pan, J., & Poteshman, A. M. (2006). The information in option volume for future stock prices. *Review of Financial Studies*, *19*(3), 871–908. https://doi.org/10.1093/rfs/hhj024

Panton, D. (1976). Chicago board call options as predictors of common stock price changes. *Journal of Econometrics*, *4*(2), 101–113. https://doi.org/10.1016/0304-4076(76)90008-7

Parsa, M. (2014). *An Analysis of the Impact of Derivatives on Spot Market, Risk And Portfolio Management* (Issue July). Mangalore University.

Pathak, R., Bhattacharjee, K., & Reddy V., N. (2015). Information Content of Derivatives under Varying Market Conditions and Moneyness: The Case of

S&P CNX Nifty Index Options. *Global Business Review*, *16*(2), 281–302. https://doi.org/10.1177/0972150914564420

Patil, S., & Bagodi, V. (2021). "A study of factors affecting investment decisions in India: The KANO way." *Asia Pacific Management Review*, *26*(4), 197–214. https://doi.org/10.1016/j.apmrv.2021.02.004

Pennings, J. M. E. (2002). Pulling the trigger or not: Factors affecting the behaviour of initiating a position in derivatives markets. *Journal of Economic Psychology*, *23*(2), 263–278. https://doi.org/10.1016/S0167-4870(02)00067-3

Raghavendra. (2013). *An Economic Analysis of Trading in Derivatives and Behavioral Pattern of Investors in Financial Instruments- A Case Study of Dakshina Kannada District in Karnataka*. University of Mysore.

Raizada, G., & Sahi, G. S. (2006). Commodity Futures Market Efficiency in India and Effect on Inflation. *SSRN Electronic Journal*. https://doi.org/DOI: 10.2139/ssrn.949161

Raju, M. T., & Karande, K. (2003). Price Discovery and Volatility on NSE Futures Market. In *Securities and Exchange Board of India Working Paper* (Issue 7).

Renuka, N. (2019). Investors' Perception towards Investments in Derivatives. *International Journal of Innovative Technology and Exploring Engineering*, *8*(12), 5421–5428. https://doi.org/10.35940/ijitee.

Ross, S. A., Rubinstein, M., & Cox, J. C. (1979). Option pricing: A simplified approach. *Journal of Financial Economics*, *7*(3), 229–263.

Rostan, P., Rostan, A., & Nurunnabi, M. (2020). Options trading strategy based on ARIMA forecasting. *PSU Research Review*, *4*(2), 111–127. https://doi.org/10.1108/prr-07-2019-0023

Roy, A. (2009). Market Integration and Impact of Futures Derivative Trading - Case of Indian Wheat Market. *SSRN Electronic Journal*, 1–19. https://doi.org/10.2139/ssrn.1494879

Ryu, D. (2011). Intraday price formation and Bid-Ask spread components : A New Approach Using a Cross Market Model. *The Journal of Futures Markets*, *31*(12), 1142–1169. https://doi.org/10.1002/fut 20533

Sah, A. N., & Omkarnath, G. (2006). Derivatives Trading and Volatility - A Study of the Indian Stock Markets. *SSRN Electronic Journal*, 1–15. https://doi.org/10.2139/ssrn.873968

Sahi, S. K. (2017). Psychological biases of individual investors and financial satisfaction. *Journal of Consumer Behaviour*, 1–25. https://doi.org/10.1002/cb.1644

Santhini, M. (2013). *Investors' Perception Towards Derivatives with reference to Futures and Options in Tanjore District, Tamilnadu*. Bharatidasan University, Tiruchirappally-Tamilnadu.

Sanyal, P. K. (2013). *Impact of Financial Derivatives on Stock Market Volatility- A case study of Options and Futures on BSE Sensex and NSE Nifty* (Vol. 003, Issue July). Sambalpur University.

Sarwar, G. (2005). The informational role of option trading volume in equity index options markets. *Review of Quantitative Finance and Accounting*, *24*(2), 159–176. https://doi.org/10.1007/s11156-005-6335-0

Scheinkman, J. A., & Xiong, W. (2003). Overconfidence and speculative bubbles. *Journal of Political Economy*, *111*(6), 1183–1219. https://doi.org/10.1086/378531

Sheu, H. J., & Wei, Y. C. (2011). Effective options trading strategies based on volatility forecasting recruiting investor sentiment. *Expert Systems with Applications*, *38*(1), 585–596. https://doi.org/10.1016/j.eswa.2010.07.007

Srinivasan, P. (2010). Do futures and options trading increase spot market volatility in India? the case of S&P CNX Nifty. *International Journal of Business Performance and Supply Chain Modelling*, *2*(2), 134–145. https://doi.org/10.1504/IJBPSCM.2010.036166

Szakmary, A., Ors, E., Kyoung Kim, J., & Davidson, W. N. (2003). The predictive power of implied volatility: Evidence from 35 futures markets. *Journal of Banking and Finance*, *27*(11), 2151–2175. https://doi.org/10.1016/S0378-4266(02)00323-0

Tebogo, B. (2012). Derivatives: Markets, Risk Management Strategies, and Valuation. *SSRN Electronic Journal*, *April 2012*, 1–11. https://doi.org/10.2139/ssrn.2043390

Thamotharan, A., & Prabakaran, G. (2013). Investors ' Perception on Derivatives Market, Indications from Derivatives Market in India with Special References to Dharmapuri District. *International Journal of Scientific Research*, *2*(12), 338–343.

Tripathi, G. (2014). An Empirical Investigation of Investors Perception towards. *Global Journal of Finance and Management.*, *6*(2), 99–104. http://www.ripublication.com

Trivedi, K. N. (2010). *A Study On Derivatives*. Gujrat University, Ahmedabad.

Tse, Y. (1999). Market Microstructure of FT-SE 100 Index Futures : An Intraday Empirical Analysis. *The Journal of Futures Markets*, *19*(1), 31–58.

Tversky, A., & Kanheman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, *185*(4157), 1124–1131. https://doi.org/10.4324/9781912

282562

Varghese, J. (2011). Regulation of Financial Derivatives: Some Policy Considerations. *The IUP Law Review*, *1*(3), 27–42. https://ssrn.com/abstract=2063695

Vashishtha, A., & Kumar, S. (2010). Development of financial derivatives market in India - A case study. *International Research Journal of Finance and Economics*, *37*(37), 15–29.

Vattoli, A. (2018). *Index Derivatives and ETFs: Hedge Effectiveness and the behaviour of Individual Investors in Kerala* (Issue July). Mahatma Gandhi University, Kottayam.

Voukelatos, N., & Verousis, T. (2019). Option-implied information and stock herding. *International Journal of Finance and Economics*, *24*(4), 1429–1442. https://doi.org/10.1002/ijfe.1741

Wang, Y., Hua, R., & Zang, Z. (2011). The investor behaviour and futures market volatility. *China Finance Review International*, *1*(4), 388–407. https://doi.org/10.1108/20441391111167496

Wolf, A. (1987). Optimal hedging with futures options. *Journal of Economics and Business*, *39*(2), 141–158. https://doi.org/10.1016/0148-6195(87)90013-0

Wong, K. P. (2003). Currency hedging with options and futures. *European Economic Review*, *47*(5), 833–839. https://doi.org/10.1016/S0014-2921(02)00287-8

Yadav, P. K., & Pope, P. F. (1994). Are stock index futures mispricing: profit opportunities or risk premia? *Journal of Banking and Finance*, *18*(5), 921–953. https://doi.org/10.1016/0378-4266(94)00026-3

Yadav, S. (2015). *Impact of financial derivatives on the growth of the Indian stock market*. University of Rajasthan.

Yang, H., Kutan, A. M., & Ryu, D. (2018). Option moneyness and price disagreements. *Applied Economics Letters*, *25*(3), 192–196. https://doi.org/10.1080/13504851.2017.1307931

Yang, S. Y., Qiao, Q., Beling, P. A., & Scherer, W. T. (2014). Algorithmic Trading Behavior Identification using Reward Learning Method. *International Joint Conference on Neural Networks (IJCNN)*, 3807–3814.

Yoon, S. J., & Kang, S. H. (2012). ITMs versus OTMs. *Asia-Pacific Journal of Financial Studies*, *41*(4), 517–539. https://doi.org/10.1111/j.2041-6156.2012.01081.x

Zhou, L., Zhang, R., & Huang, J. (2018). Investor trading behavior on agricultural future prices. *North American Journal of Economics and Finance*, *March*, 1–15. https://doi.org/10.1016/j.najef.2018.05.004

Zhou, Y. (2022). Options trading volume by moneyness, firm fundamentals, and expected stock returns. *Journal of Financial Markets*, *58*(October 2019), 100648. https://doi.org/10.1016/j.finmar.2021.100648

3.1 Introduction

The worldwide 'derivative market' has grown at an exponential rate during the previous decade *(Palathara & Yadukrishnan, 2020)*. Derivatives perform critical purposes such as risk mitigation through hedging, market efficiency, and underlying asset deal price discovery. Derivatives are financial products that derive their value from some other asset called the underlying asset *(Srivastava, 2014)*. The Underlying asset can be a stock index, a stock, a commodity such as pepper, or even a complex characteristic such as the interest rate. Derivatives were first developed as risk management tools, but now the majority of people use them to make speculative gains, increasing their popularity. The volume of derivatives trading is expanding every day, indicating the importance of derivatives. This chapter aims to identify and summarize the relevant theories and concepts relating to derivative markets as well as behavioural finance, to offer a solid foundation for understanding the derivatives market and concepts of behavioural finance better.

3.2 Concept of Derivatives

Derivatives are financial instruments, which derive their value from the value of an underlying asset. This implies that Derivative instruments have no independent value. The underlying asset in the derivatives contract can be securities, commodities, bullion, currency, livestock or anything else.

The Securities Contracts (Regulation) Act, 1956, defines "derivative" as under,

“Derivative” includes:

1. “Security derived from a debt instrument, share, loan whether secured or unsecured, risk instrument or contract for differences or any other form of security”.

2. "A contract which derives its value from the prices, or index of prices of underlying securities"

IMF, (1998) defines Derivatives as "Financial instruments that are linked to a specific financial instrument or indicator or commodity and through which specific risks can be traded in financial markets in their own right. The value of a financial derivative derives from the price of an underlying item, such as an asset or index. Unlike debt securities, no principal is advanced to be repaid and no investment income accrues." - *The International Monetary Fund (IMF).*

According to *Hull & Basu, (2017),* "A derivative is a financial instrument whose value depends on (or derives from) the values of other, more basic underlying variables".

McDonald, (2014) defines derivative as "A financial instrument "which has a value determined by the price of something else. This "something else" can be almost anything: it can be assets or commodities".

Kumar, (2015) defines financial derivative as "a financial instrument whose payoff is based on the price of an underlying asset, reference rate or an index.

3.3 Features of Derivatives

The basic features of the derivative instrument can be drawn from the general definition of a derivative irrespective of its type. Derivative or derivative securities are future contracts which are written between two parties and whose value is derived from the value of underlying widely held and easily marketable assets such as agriculture and other physical commodities, or short-term and long-term financial instruments, or intangible things like weather, commodities price index (inflation rate), equity price index, bond price index, stock market index, etc. Usually, the counterparties to such contracts are those other than the original issuer of the underlying asset *(Gupta, 2017).* In the light of this, the basic features of a derivative may be stated as follows:

1. A derivatives instrument relates to the future contract between two parties. It means there must be a contract binding on the underlying parties and the same to

be fulfilled in future. The future period may be short or long depending upon the nature of the contract.

2. The derivative instruments have a value which is derived from the values of underlying assets, such as agricultural commodities, metal, financial assets, intangible assets, etc. Value of derivatives changes according to the changes in the value of underlying instruments. Sometimes, it may be nil or zero, but never less than zero.

3. The counterparties have specified obligations under the derivative contracts. Obviously, the nature of obligation would be different as per the type of instrument of a derivative. For example, the obligation of the counterparties, under forwards and futures contracts are different from the obligations in options contracts.

4. The derivatives contract can be undertaken directly between two parties or through a particular exchange like financial future contracts. The exchange-traded derivatives such as Futures and Options are quite liquid and have low transaction costs in comparison to tailor-made contracts like Forwards.

5. In general, the financial derivatives are carried off-balance sheet. The size of the derivative contract depends upon its notional amount. The notional amount is the amount used to calculate the payoff.

6. In derivatives trading, transactions are mostly settled by taking offsetting positions in the derivatives themselves.

7. Derivatives are also known as deferred delivery and deferred payment instruments.

8. It means that it is easier to take short or long position in derivatives in comparison to other assets or securities. Further, it is possible to combine them to match specific requirements, i.e., they are more easily amenable to financial engineering.

9. Derivatives are mostly secondary market instruments and have little usefulness in mobilizing fresh capital by the corporate world. However, warrants and convertibles are exceptions in this respect.

10. Although the standardized, general and exchange-traded derivatives are being increasingly evolved in the market, there are still so many privately negotiated, customized and over-the -Counter (OTC) traded derivatives in existence. They expose the trading parties to operational risk, counter-party risk and legal risk. Further, there may also be uncertainty about the regularity status of such derivatives.

11. Finally, the derivative instruments, sometimes, because of their off-balance sheet nature, can be used to clear up the balance sheet. For example, a fund manager who is restricted from taking a particular currency can buy a structured note whose coupon is tied to the performance of a particular currency pair.

3.4 Need for Derivatives

In reality, derivatives were developed out of the need for financial markets. They can fulfil many functions, which is why they exist *(Juneja, 2020).* The following factors are the driving force for the growth of derivatives:

1. **Hedging:** Derivatives were originally created as tools for hedging. Businesses face a lot of risks related to commodity prices in their day-to-day operations, in order to hedge against this price risk, they use derivatives. Hedging is the legitimate reason for the existence of derivatives *(Juneja, 2020)*.

2. **Speculation:** The second most common reason behind the usage of derivatives is speculation. Speculators are necessary participants in any market as they provide liquidity. Hedging happens when the parties to a contract have genuine business interests in the underlying asset. Speculation is the exact opposite. Speculators have no interest in the underlying asset and take part in the contract because they believe that they can make a gain out of the price movements *(Juneja, 2020)*.

3. **Circumventing Regulation:** The third reason why derivatives are used in the marketplace is to circumvent regulation. Certain institutions like pension funds are prohibited from making investments in any kind of risky securities. Hence, derivatives help in superficially de-risking the securities and making it legal for pension funds to purchase them *(Juneja, 2020)*.

4. **Minimizing Trade Cost:** Investors all over the world do not like transaction costs. Derivatives provide a great way to avoid and evade them. This can be explained with the help of an example. Consider the case of a company that has availed of a fixed-rate loan from a bank. However, now they believe that the interest rates will go down. Hence, they feel like they should take a floating-rate loan. However, closing the loan before its due date would attract a prepayment penalty. Also, taking a new loan would generally incur processing charges. Hence to avoid these transaction costs on both sides, a firm can simply enter into a swap wherein they can switch over to floating interest rates without bearing any of the above-mentioned transaction charges. Hence, derivatives are extremely useful financial instruments. This usefulness adds tremendously to their popularity and explains why every Multinational Corporation, major bank or investment bank in the world is highly involved in derivative trading *(Juneja, 2020)*.

3.5 Functions of the Derivative Market

Derivatives were invented to fulfil the need for hedging against price risk. They enable the transfer of risk from those wanting to avoid it to those willing to assume it. These have led to many advantages at broader level making the market more competitive, informative, deeper and more efficient *(Srivastava, 2014)*. The derivatives market performs a number of economic functions. Some of them are as follows:

1. **Price discovery:** Prices in an organized derivatives market reflect the perception of the market participants about the future and lead the prices of underlying to the perceived future level. The prices of derivatives converge with the prices of the underlying at the expiration of the derivative contract. Thus, derivatives help in the discovery of future as well as current prices.

2. **Transfer of risk:** The derivatives market helps to transfer risks from those who want to eliminate them to those who are willing to assume risk.

3. **Leveraging:** Taking a position in derivatives involves only a fractional outlay of capital when compared with the position in the underlying asset in the spot market. When derivatives are introduced, the underlying market experiences larger trading volumes because more participants participate who would not have done so in the absence of a risk-transfer agreement *(Dubofksy, 2003)*.

4. **Controlled speculation:** Speculative trades shift to a more controlled environment in the derivatives market. In the absence of an organized derivatives market, speculators trade in the underlying cash markets. Margining, monitoring and surveillance of the activities of various participants become extremely difficult in these kinds of mixed markets.

5. **New entrepreneurial activity:** An important incidental benefit that flows from derivatives trading is that it acts as a catalyst for new entrepreneurial activity. The derivatives have a history of attracting many bright, creative, well-educated people with an entrepreneurial attitude. They often energize others to create new businesses, new products and new employment opportunities, the benefit of which are immense.

3.6 Participants in a Derivative Market

The derivatives market is similar to any other financial market and has the following three broad categories of participants *(Srivastava, 2014)*:

1. **Hedgers:** Hedgers are those who enter into a derivative contract with the objective of covering risk. These are investors with a present or anticipated exposure to the underlying asset which is subject to price risks. Hedgers use the derivatives markets primarily for price risk management of assets and portfolios.

2. **Speculators:** Speculators are those who enter into a derivative contract to make a profit by assuming risk. These are individuals who take a view on the future direction of the markets. They take a view of whether prices would rise or fall in

future and accordingly buy or sell futures and options to try and make a profit from the future price movements of the underlying asset.

3. **Arbitrageurs:** They take positions in financial markets to earn riskless profits. The arbitrageurs take short and long positions in the same or different contracts at the same time to create a position, which can generate a riskless profit.

3.7 Classification of Derivatives

Broadly, Derivatives can be classified into two categories Commodity Derivatives and Financial Derivatives. A commodity derivative is a derivative contract specifying a commodity or commodity index as the underlying *(Kolb & Overdahl, 2007).* In the case of commodity derivatives, the underlying asset can be a commodity like wheat, gold, silver, crude oil, gas etc., whereas in the case of financial derivatives underlying assets are stocks, currencies, bonds and other interest rate-bearing securities etc.

Another way of classifying financial derivatives is into basic and complex derivatives. In this, Forward contracts, Future contracts and Options contracts have been included in the basic derivatives whereas Swaps and other Derivatives are categorized as complex because they are built up from either Forward/Futures or Options contracts or both. In fact, such derivatives are effectively derivatives on derivatives *(Srivastava, 2014).*

1. **Forward Contract:** A forward contract is among the oldest and simplest of derivative contracts. It is simply a purchase or sale transaction in which the price and other terms have been agreed upon, but the delivery and payments are postponed to a later date *(Varma, 2008).* A forward contract is an agreement between two parties to buy or sell an asset at a specified point of time in the future for a certain price *(Hull & Basu, 2017).* It is the simplest form of derivative contract mostly entered by individuals in day-to-day life. A forward contract is a cash market transaction in which delivery of the instrument is deferred until the contract has been made. Although the delivery is made in the future, the price is determined on the initial trade date. One of the parties to a forward contract assumes a long position (buyer) and agrees to buy the underlying asset at a certain

future date for a certain price. The other party to the contract known as the seller assumes a short position and agrees to sell the asset on the same date for the same price *(Hull & Basu, 2017).* The specified price is referred to as the delivery price. The contract terms like delivery price and quantity are mutually agreed upon by the parties to the contract.

2. **Futures Contract:** Like a forward contract, a futures contract is an agreement between two parties to buy or sell an asset at a certain time in future for a certain price. Unlike forward contracts, futures contracts are normally traded on an exchange *(Hull & Basu, 2017).* Futures is a standardized Forward contract to buy (long) or sell (short) the underlying asset at a specified price at a specified future date through a specified exchange. In the Futures, contracts the exchanges will act as a buyer as well as seller. The specifications of futures contracts are determined by the exchanges where they are traded and may vary from exchange to exchange *(Srivastava, 2014).* Exchange sets the standards for quality, quantity, price quotation, date and delivery place (in the case of a commodity). Futures contracts being traded on organized exchanges impart high liquidity to the transaction. The clearing house, being the counterparty to both sides of a transaction, provides a mechanism that guarantees the honouring of the contract and ensures very low level of default.

3. **Options Contract:** Options are the most important group of derivative securities. Option may be defined as “a contract between two parties whereby one party obtains the right, but not the obligation, to buy or sell a particular asset, at a specified price, on or before a specified date. The person who acquires the right is known as the *option buyer* or *option holder*, while the other person is known as the *option seller* or *option writer*. The seller of the option for giving such an option to the buyer charges an amount which is known as the *option premium (Gupta, 2017).* In the case of Futures contract, both parties are under obligation to perform their respective obligations out of a contract. But an options contract, as the name suggests, is in some sense, an optional contract. An option is the right, but not the

obligation, to buy or sell something at a stated date at a stated price *(Edwards & Maa, 1992).* Options can be divided into two types *calls* and *puts.*

A "call option" gives the holder the right to buy an asset at a specified date for a specified price, whereas in a "put option" the holder gets the right to sell an asset at a specified price and time *(Gupta, 2017).* The specified price in such a contract is known as the *exercise price* or the *strike price* and the date in the contract is known as the expiration date or the maturity date. The asset or security instrument or commodity covered under the contract is called the underlying asset. Further options can be American or European. A European option can be exercised on the expiration date only, whereas the American option can be exercised at any time before maturity *(Gupta, 2017).*

4. **Swaps:** Swaps have become popular derivative instruments in recent years all over the world. A swap is an agreement between two counterparties to exchange cash flows in future *(Gupta, 2017).* A Swap can be defined as a barter or exchange. It is a contract whereby parties agree to exchange obligations that each of them has under their respective underlying contracts.

   "A swap is an agreement between two or more parties to exchange a stream of cash flows over a period of time in the future". There are two most popular forms of swap contracts, i.e., *interest rate swap* and *currency swap*. In the interest rate swap, one party agrees to pay the other party interest at a fixed rate on a notional principal amount, and in return, it receives interest at a floating rate on the same principal notional amount for a specified period. The currencies of the two sets of cash flows are the same. In the case of currency swap, it involves exchanging interest flows in one currency for interest flows in another currency. In other words, it requires the exchange of cash flows in two currencies *(Gupta, 2017).*

5. **Warrants:** Warrants and Convertibles are other important categories of financial derivatives, which are frequently traded in the market. Warrants are just like an option contract where the holder has the right to buy the shares of a specified company at a certain price during the given period. In other words, the holder of a warrant instrument has the right to purchase a specific number of shares at a

fixed price in a fixed period from an issuing company *(Gupta, 2017)*. If the holder exercised the right, it increases the number of shares of the issuing company, and thus, dilutes the equities of its shareholder. Warrants are usually issued as sweeteners attached to senior securities like bonds and debentures so that they are successful in their equity issues in terms of volume and price. Warrants can be detached and traded separately. Warrants are highly speculative and leverage instruments, so trading in them must be done cautiously.

6. **Convertibles:** Convertibles are hybrid securities, which combine the basic attributes of fixed-interest, and variable-return securities *(Gupta, 2017)*. Most popular among these are convertible bonds, convertible debentures and convertible preference shares. These are also called equity derivatives securities. They can be fully or partially converted into the equity shares of the issuing company at the predetermined specified terms with regards to the conversion period, conversion ratio and conversion price.

7. **Other Derivatives:** In the early 1980s, some banks and other financial institutions have been very imaginative and designed some new derivatives to meet the specific needs of their clients. These derivatives have been described as 'non-standard' derivatives *(Gupta, 2017)*. Traditionally, it is evident that important variables underlying financial derivatives have been interest rates, exchange rates, commodity prices, stock prices, stock indices, etc. However recently some other underlying variables are also getting popular in the financial derivative market such as creditworthiness, weather, insurance, electricity and soon.

   a. ***Credit Derivatives:*** The credit derivative refers to the offsetting of credit risk in a firm due to default in the credit asset. It is a contract between two parties which compensates credit risk by one party to the other *(Bomfin, 2005)*. In other words, credit derivatives relate to hedging of credit risk which arises due to default of non-payment of a loan. For example, a bank can enter into a credit derivative contract with an investor in which the bank transfers the credit risk in a loan or portfolio of loans to the investor, and against this, the banker will pay a premium to the investor. Credit derivative contracts are of different forms with different features such as credit default swaps (CDS), total return swaps, credit options, credit-linked notes, etc. *(Gupta, 2017).*

b. ***Weather derivatives:*** Weather derivative is another important derivative instrument which is being introduced by different countries. As the name indicates, weather derivatives are used to hedge risk caused due to changes in weather in the business in future *(Hull & Basu, 2017).* Most of the industries are directly or indirectly affected by weather fluctuations. So, *weather risk* may be defined as an uncertainty in the occurrence of normal weather conditions in future periods, the risk to be termed as the uncertainty in the earnings and cash flows on account of changes in weather conditions. The first weather derivative contracts appeared in the US energy industry in 1996.

3.8 Regulatory Framework of Derivative Trading in India

Financial derivatives were first introduced in the nation in June 2000, despite the fact that carry forward of positions and weekly settlement had allowed for the existence of a quasi-forward market for more than a century *(Gupta, 2017).* There were a number of factors which contributed to the development of a regulatory framework for trading Derivative Instruments in India. The first trade in derivatives was a culmination of legislative and legal efforts which had begun as early as 1995. In 1995, SEBI appointed a committee for exploring issues in the introduction and creating a regulatory framework for a derivative market *(Gupta, 2017).* L. C. Gupta Committee (1996) recommended that proper regulatory initiatives should provide for a clear description of the concept of Derivatives, how they should provide for market efficiency and remove the differences in the trading cycles of different stock exchanges, improve administrative and monitoring machinery and the acceleration of progress towards a Depository System.

Soon after independence, Forward Contracts (Regulation) Act, 1952 and Securities Contract (Regulation) Act, 1956 were enacted in quick succession in India, and the objectives of these Acts, interestingly, were to prevent undesirable transactions in securities by regulating the business of dealing therein, “by prohibiting options and by providing for certain other matters connected therewith”. There were specific provisions in these statutes, which prohibit the trading of certain financial derivative products. However, trading in such financial derivatives continued in the grey market throughout this period.

Derivative trading in India is currently regulated by three agencies, namely the Securities and Exchange Board of India (SEBI), Forward Markets Commission (FMC), and Reserve Bank of India (RBI). The derivatives can be classified into two categories: Commodities Derivatives and Financial Derivatives. In India, the statutory basis for regulating commodity derivative trading is enacted through the Forward Contract Regulation Act (FCRA), 1953 which has laid down certain fundamental ground rules. Under this Act, a permanent regulatory body known as Forward Markets Commission is also created which carries out its functions through the recognized associations and holds the overall charge of regulation of all forwards in commodities specifically. The SEBI is entrusted to regulate the carry-forward trading on the stock market and other financial derivatives like, equity stock, stock index, options, etc. through recognized stock exchanges of the country. Over-the-counter (OTC) forward contracts and options on foreign currencies are regulated by the Reserve Bank of India *(Gupta, 2017).* There is also a level of self-regulation among the market players. However, each of these regulators plays on a different turf, for example, Reserve Bank of India is concerned with only the activity of banks and Non-Banking Financial Companies (NBFCs) in dealing with derivative instruments; whereas other companies dealing in derivatives are being controlled by SEBI *(Varghese, 2011*).

In India, derivatives trading is regulated by a mixture of command control, franchising, contractual and self-regulatory mechanism. As already mentioned, the Securities Contract (Regulation) Act 1956 (SCRA), the Forward Contracts (Regulation) Act, 1952, Depositories Act, 1996 and certain provisions of the Companies Act, 1956 provide the statutory backbone for derivatives regulation. However, it is worth noting that apart from creating a regulator and entrusting the duty of regulating derivatives to the regulator, these statutes do not deal with the regulation of derivatives in great respect *(Varghese, 2011).*

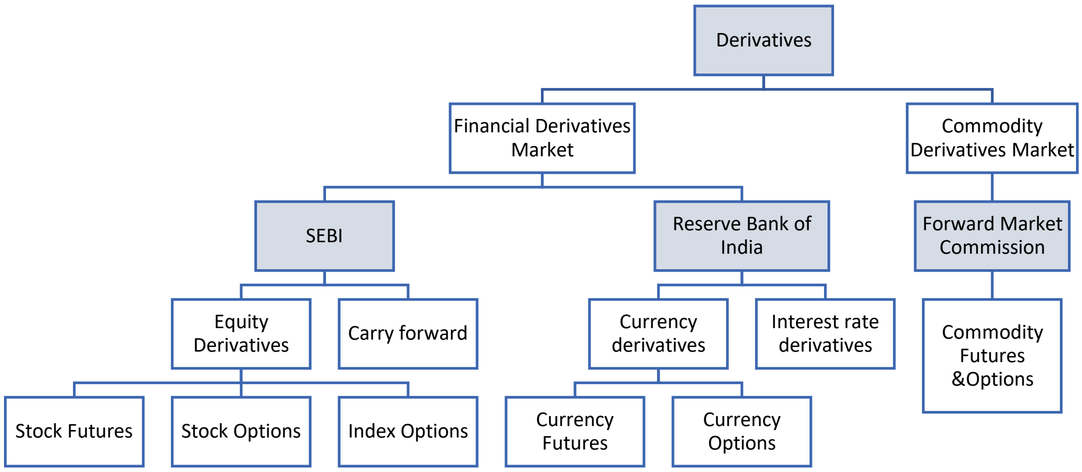
While Section 17 of SCRA entrust the regulatory responsibility of certain types of derivatives to SEBI, Sections 20, 21 and 21A of the Reserve Bank of India Act, 1934 empowers RBI as the regulator in respect of certain government securities market and also regulate the major players in the derivatives banks-the financial institutions *(Varghese, 2011).*

SEBI has created certain Self-Regulatory Organisations (SROs) which are non-governmental bodies with the responsibility to regulate their members through a set of rules of conduct for fair, ethical and efficient practices. SEBI also exercises its regulatory oversight through Stock Exchanges. Stock Exchanges are bodies created by cooperation among market players and the SEBI generally maintains tight regulatory oversight over these marketplaces. These bodies like the National Stock Exchange, Bombay Stock Exchange (BSE), Multi Commodities Stock Exchange (MCX) etc, act as franchisees to SEBI to enforce regulation of players in the derivatives market through a process of listing contracts, rules and guidelines *(Varghese, 2011).*

The commodities market is regulated by yet another regulator, Forwards Market Commission (FMC) which, unlike SEBI and RBI is not a statutory body but a department of Ministry of Consumer Affairs. FMC exercises considerable powers under Forwards Contract (Regulation) Act, 1952 regarding futures and options trading in commodities, (which is a variant of derivatives) and exercises its control both through command and control mechanism as well as through franchising regulatory duties to commodities exchanges like MCX etc., *(Varghese, 2011).* Figure 3.1 illustrated the regulatory framework of derivatives trading in India.

Figure 3.1

Regulatory Framework of Derivatives Trading in India



Source: Gupta, (2017), *Varghese, (2011)*

3.9 Evolution of the Derivative Market

Derivatives are not a modern invention, they were known and were used from ancient times. *Bernstein, (1996)* attributes the first option transaction to the Greek philosopher Thales from Miletus who was adept at forecasting the harvest of olives in the ensuing season. He predicted an outstanding next autumn and so also the demand for the olive presses. Therefore, he entered into agreements with olive press owners before autumn for the exclusive use of their presses. For this, he paid the deposits in advance with an agreement that he will not demand his money if the harvest is not good. When the harvest time came, there was plenty of demand for the presses and since he had the right to use them, he hired them out at high prices and made big money. Though Thales was not interested in making money, all he wanted was to prove that philosophers can make money if they so desire. This is a primitive form of derivative where Thales knew well in advance that his maximum losses will be the advance he paid while his profits depended on what he demanded *(Kumar, 2015)*.

Most Futures markets had evolved from the base commodity markets and futures were the foremost contracts that made their appearance long before financial futures.

The futures industry got a shot in the arm with the establishment of the Chicago Board of Trade in 1848; the Butter and Cheese Exchange of New York was founded in 1872;

today's New York Mercantile Exchange (NYMEX) in 1877; London Metal Exchange, Chicago Mercantile Exchange (CME) predecessor – the Chicago Butter and Egg Board – was founded in 1898 and later it became CME in 1919.

But the real action in financial derivatives started with the commencement of trading futures on foreign currency in 1972 at the Chicago Mercantile Exchange. With the publication of the Black–Scholes Option pricing model in 1973, trading of options became a reality in 1975.

3.10 History of Derivatives in India

The origin of derivatives can be traced back to the need of farmers to protect themselves against fluctuations in the price of their crops. From the time it was sown to the time it was ready for harvest, farmers would face price uncertainty. Through the use of simple derivative products, it was possible for the farmer to partially or fully transfer price risks by locking-in asset prices. These were simple contracts developed to meet the needs of farmers and were basically a means of reducing risk *(Gupta, 2017)*.

Derivative markets in India have been in existence in one form or the other for a long time. In the area of commodities, the Bombay Cotton Trade Association started futures trading way back in 1875. This was the first organized futures market. Then Bombay Cotton Exchange Ltd. in 1893, Gujarat Vyapari Mandall in 1900, and Calcutta Hessian Exchange Ltd. in 1919 started the futures market. After the country attained independence, the derivative market came through a full circle from the prohibition of all sorts of derivative trades to their recent reintroduction. In 1952, the government of India banned cash settlement and options trading, derivatives trading shifted to informal forwards markets. In recent years government policy has shifted in favour of an increased role in market-based pricing and less suspicious derivatives trading.

The first step towards the introduction of financial derivatives trading in India was the promulgation of the Securities Laws (Amendment) Ordinance 1995. It provided for withdrawal at prohibition on options in securities. The last decade, beginning in the year 2000, saw the lifting of the ban on futures trading in many commodities. Around the same period, national electronic commodity exchanges were set up. Derivatives trading commenced in India in June 2000 after SEBI granted the final approval to this effect in May 2001 on the recommendation of the L. C Gupta committee. The Securities and Exchange Board of India (SEBI) permitted the derivative segments of two stock exchanges, NSE and BSE, and their clearing house/corporation to commence trading and settlement in approved derivatives contracts. Initially, SEBI approved trading in index futures contracts based on various stock market indices such as S&P CNX, Nifty and Sensex. Subsequently, index-based trading was permitted in options as well as individual securities.

A chronology of the events in the development of the Derivatives Market in India is presented in Table 3.1 below:

Table 3.1

Chronology of the events in the development of the Derivatives Market in India

Sl. No	Year	Event
1	1875	Cotton Trade Association started Futures trading.
2	1900	Derivatives trading started in oilseeds in Mumbai.
3	1912	Derivatives trading started in raw jute and jute goods in Kolkata.
4	1913	Derivatives trading started in wheat in Hapur.
5	1920	Derivatives trading started in bullion in Mumbai.
6	1952	Enactment of the Forward Contracts (Regulation) Act.
7	1953	Setting up of the Forward Markets Commission.
8	1956	Enactment of SCRA.
9	1969	Prohibition of all forms of forward trading under Section 16 of SCRA.
10	1972	Informal carry-forward trades between two settlement cycles began on BSE.
11	1980	Khurso Committee recommends the reintroduction of futures in most commodities.
12	1983	Government amends the bye-laws of exchanges of Bombay, Calcutta and Ahmedabad, and introduced carry-forward trading in specified shares.

Sl. No	Year	Event
13	1992	Enactment of the SEBI Act.
14	1993	SEBI prohibits carry-forward transactions.
15	1994	Kabra Committee recommends Futures trading in nine commodities.
16	1995	G. S. Patel Committee recommends a Revised carry Forward System.
17	1996	The Revised system restarted on BSE.
18	1996	SEBI appoints LC Gupta Committee to develop a regulatory framework for derivatives trading.
19	1997	Varma committee recommends a modified carry forward system.
20	1998	Varma Committee to recommend Risk Containment Measures for derivatives trading.
21	1999	Securities Laws (Amendment) Act, 1999 permits legal framework for derivatives trading in India.
22	June 1999	Interest rate swaps/forward rate agreements allowed at BSE
23	May 2000	SIMEX chose Nifty for trading futures and options on an Indian index
24	May 2000	SEBI permitted NSE & BSE to do index futures trading
25	June 2000	Equity derivatives introduced at BSE
26	June 2000	Commencement of derivatives trading (index futures) at NSE
27	Aug. 2000	Commencement of trading futures & options on Nifty at SIMEX
28	June 2001	Index option launched at BSE and NSE
29	July 2001	Trading of stock options at NSE and BSE
30	Nov. 2001	Stock futures launched at NSE and BSE
31	June 2003	Trading of Interest rate futures at NSE
32	Aug. 2003	Launch of futures & options in CNX IT index
33	2003	Commencement of NCDEX and MCX commodity exchange
34	Sep. 2004	Weekly options of BSE
35	June 2005	Launch of futures & options in the Bank Nifty index
36	Dec. 2006	Derivative Exchange of the Year by Asia Risk magazine
37	June 2007	NSE launches derivatives on Nifty Junior & CNX 100
38	Oct. 2007	NSE launches derivatives on Nifty Midcap -50
39	Aug. 2008	Trading of currency futures at NSE
40	Aug. 2009	Launch of interest rate futures at NSE

Sl. No	Year	Event
41	July 2010	Commencement trading of S&P CNX Nifty futures on CME at NSE
42	Oct. 2010	Introduction of European style stock option at NSE
43	Oct. 2010	Introduction of Currency options on USD INR by NSE
44	July 2011	Commencement of 91-day GOI trading Bill futures by NSE
45	Aug. 2011	Launch of derivative on Global Indices at NSE
46	Nove.2013	BSE launched a currency derivative segment

Source: NSE, (Shalini & Raveendra, 2014),(Sing, 2022)

3.11 Equity Derivatives Trading Mechanism at NSE

NSE introduced for the first time in India, fully automated screen-based trading. It uses a modern, fully computerised trading system designed to offer investors across the length and breadth of the country a safe and easy way to invest. NSE's automated screen-based trading, modern, fully computerised trading system designed to offer investors across the length and breadth of the country a safe and easy way to invest. The NSE trading system called 'National Exchange for Automated Trading' (NEAT+) is a fully automated screen based trading system, which adopts the principle of an order driven market *(https://www.nseindia.Com/, 2023)*.

1. **Market Timings:** Trading on the derivatives segment takes place on all days of the week (except Saturdays and Sundays and holidays declared by the Exchange in advance). The market timings of the derivatives segment are:

   - Normal market / Exercise market open time: 09:15 hrs
   - Normal market close time: 15:30 hrs
   - Setup cutoff time for Position limit/Collateral value: 16:15 hrs
   - Trade modification / Exercise market end time: 16:15 hrs

2. **Price Bands:** There are no day minimum/maximum price ranges applicable in the derivatives segment. However, in order to prevent erroneous order entry, operating ranges and day minimum/maximum ranges are kept as below:

   - For Index Futures: at 10% of the base price

- For Futures on Individual Securities: at 10% of the base price
- For Index and Stock Options: A contract-specific price range based on its delta value is computed and updated on a daily basis.

In view of this, orders placed at prices which are beyond the operating ranges would reach the Exchange as a price freeze.

3. **Trading System:** The Futures and Options Trading System provides a fully automated trading environment for screen-based, floor-less trading on a nationwide basis and an online monitoring and surveillance mechanism. The system supports an order-driven market and provides complete transparency of trading operations.

   Orders, as and when they are received, are first time stamped and then immediately processed for a potential match. If a match is not found, then the orders are stored in different 'books'. Orders are stored in price-time priority in various books in the following sequence:

   - Best Price
   - Within Price, by time priority.

4. **Order Matching Rules:** The best-buy order will match with the best-sell order. An order may match partially with another order resulting in multiple trades. For order matching, the best buy order is the one with the highest price and the best sell order is the one with the lowest price. This is because the computer views all buy orders available from the point of view of a seller and all sell orders from the point of view of the buyers in the market. So, of all buy orders available in the market at any point of time, a seller would obviously like to sell at the highest possible buy price that is offered. Hence, the best buy order is the order with highest price and vice-versa *(https://www.nseindia.Com/, 2023)*.

   Members can proactively enter orders in the system which will be displayed in the system till the full quantity is matched by one or more counter-orders and result into trade(s). Alternatively, members may be reactive and put in orders that match with existing orders in the system. Orders lying unmatched in the system are 'passive' orders and orders that come in to match the existing orders are called 'active' orders. Orders are always matched at the passive order price. This ensures that the earlier orders get priority over the orders that come in later *(https://www.nseindia.Com/, 2023)*.

5. **Order Conditions:** A Trading Member can enter various types of orders depending upon his/her requirements. These conditions are broadly classified into 2 categories: time-related conditions and price-related conditions.

A. Time Conditions:

- DAY - A Day order, as the name suggests, is an order which is valid for the day on which it is entered. If the order is not matched during the day, the order gets cancelled automatically at the end of the trading day.
- IOC - An Immediate or Cancel (IOC) order allows a Trading Member to buy or sell a security as soon as the order is released into the market, failing which the order will be removed from the market. Partial match is possible for the order, and the unmatched portion of the order is cancelled immediately.

B. Price Conditions

- Limit Price/Order - An order that allows the price to be specified while entering the order into the system.
- Market Price/Order - An order to buy or sell securities at the best price obtainable at the time of entering the order.
- Stop Loss (SL) Price/Order - The one that allows the Trading Member to place an order which gets activated only when the market price of the relevant security reaches or crosses a threshold price. Until then the order does not enter the market.

A sell order in the Stop Loss book gets triggered when the last traded price in the normal market reaches or falls below the trigger price of the order. A buy order in the Stop Loss book gets triggered when the last traded price in the normal market reaches or exceeds the trigger price of the order *(https://www.nseindia.Com/, 2023)*.

3.12 Equity Futures Trading at NSE

The National Stock Exchange of India Limited (NSE) commenced trading in derivatives with the launch of index futures on June 12, 2000. The futures contracts are based on the popular benchmark Nifty 50 Index. Futures on individual securities were introduced on November 9, 2001(NSE). Now at NSE, the following futures contracts are available for trading:

- Nifty 50 futures
- BANK Nifty futures
- Nifty Financial Services Index futures
- Nifty Midcap Select Index futures
- NFTYMCAP50 futures
- Nifty PSE futures
- Nifty Infra futures
- Nifty IT Futures
- Nifty CPSE futures
- Individual securities futures: The futures contracts are available on 187 securities stipulated by the Securities & Exchange Board of India (SEBI)

3.12.1 Contract Specifications: NSE defines the characteristics of the futures contract such as the underlying index, market lot, and the maturity date of the contract. The futures contracts are available for trading from the introduction to the expiry date. Table 3.5 shows the contract specifications of equity futures at NSE.

Table 3.2

Futures Contract Specifications at NSE

Trading cycle	Futures contracts have a maximum of 3-month trading cycle - the near month (one), the next month (two) and the far month (three). A new contract is introduced on the trading day following the expiry of the near month contract.
Expiry day	Futures contracts expire on the last Thursday of the expiry month. If the last Thursday is a trading holiday, the contracts expire on the previous trading day.
Contract size	The value of the futures contracts may not be less than Rs. 5 lakhs at the time of introduction. The permitted lot size for futures contracts & options contracts shall be the same for a given underlying or such lot size as may be stipulated by the Exchange from time to time.
Price steps	The price step in respect of futures contracts is Re.0.05.
Base Prices	Base price of futures contracts on the first day of trading shall be theoretical futures price. The base price of the contracts on subsequent trading days shall be the daily settlement price of the futures contracts as computed by Clearing Corporation.
Price bands	There shall be no fixed price band applicable for stock/index futures contracts. However, in order to prevent erroneous order entry by trading members, operating ranges are kept at +/- 10 %. In respect of orders which have come under price freeze, members would be required to confirm to the Exchange that there is no inadvertent error in the order entry and that the order is genuine. On such confirmation, the Exchange may approve such order.

Source: NSE (https://www.nseindia.com/products-services/equity-derivatives)

3.13 Equity Options Trading at NSE

NSE introduced trading in index options on June 4, 2001. The options contracts are European style and cash settled and are based on the popular market benchmark Nifty 50 index. NSE became the first exchange to launch trading in options on individual securities. Trading in options on individual securities commenced from July 2, 2001. Options contracts are European style and physically settled and are available on 187 securities stipulated by the Securities & Exchange Board of India (SEBI). Now at NSE, the following options contracts are available for trading:

- Nifty 50 options
- BANK NIFTY options

- Nifty Financial Services Index options (FIN NIFTY options)
- Nifty Midcap Select Index options
- NFTYMCAP50 options
- NIFTY PSE options
- NIFTY INFRA options
- NIFTY IT options
- NIFTY CPSE options
- Individual securities options: Options contracts are available on 187 securities stipulated by the Securities & Exchange Board of India (SEBI)

3.13.1 Contract Specifications

NSE defines the characteristics of the options contract such as the underlying index, market lot, and the maturity date of the contract. The options contracts are available for trading from the introduction to the expiry date.

Table 3.3

Options Contract Specifications at NSE

Option Type	CE/ PE, Option type identifies whether it is a call or a put option., CE - Call European, PE - Put European	
Trading cycle	Nifty 50	4 weekly expiry contracts *(Circular Ref. No.137/2022, 2022)*, 3 consecutive monthly contracts, 3 quarterly months of the cycle March / June / September / December and 8 following semi-annual months of the cycle June / December would be available
	BANKNIFTY	4 weekly expires excluding the expiry week of monthly contract. 3-month trading cycle Three quarterly expiries (March, June, Sept & Dec cycle).
	FIN NIFTY and NIFTY Midcap select	4 serial weekly cycles (Circular Ref. No: 136/2022) excluding the monthly expiry and 3 consecutive months trading cycle – Near-Month, Mid-Month and Far-Month

Trading cycle	NFTYMCAP50 NIFTYPSE NIFTYINFRA and **Individual Securities**	3-month trading cycle - the near month (one), the next month (two) and the far month (three)
	NIFTYIT	7 weekly expiry contracts, 3-month trading cycle - the near month, the next month and the far month
	NIFTYCPSE	3-month trading cycle - the near month, the next month and the far month. 7 weekly expires excluding the expiry week of monthly contract.
Expiry Day	Nifty 50 NIFTYCPSE	Last Thursday of the expiry month and weekly contracts expire every Thursday of the week.
	BANK NIFTY	Last Thursday of the expiry month and weekly options contracts expire every Thursday of the week. ***Note:*** Effective from July 07, 2023, the expiry day will be revised from the existing THURSDAY to FRIDAY *(Circular NSE 56967, 2023)*
	FIN NIFTY	Last Tuesday of the expiry period. If the last Tuesday is a trading holiday, then the expiry day is the previous trading day.
	MIDCAP SELECT	Last Wednesday of the expiry month for the monthly and Wednesday of the expiring week for weekly expiry contracts excluding the expiry week of the monthly contract.
	NFTYMCAP50 NIFTYPSE NIFTYINFRA and **Individual Securities**	Last Thursday of the expiry month.
Contract size	The value of the options contracts may not be less than Rs. 5 lakhs at the time of introduction. The permitted lot size for futures contracts & options contracts shall be the same for a given underlying or such lot size as may be stipulated by the Exchange from time to time.	
Price steps	The price step in respect of futures contracts is Re.0.05.	
Base Prices	The base price of the options contracts, on the introduction of new contracts, would be the theoretical value of the options contract arrived at based on the Black-Scholes model of calculation of options premiums or the settlement price as computed by Clearing Corporation	

Source: NSE (https://www.nseindia.com/products-services/equity-derivatives)

3.14 Trading Strategies of Equity Derivatives Traders

Derivatives trading provides investors with a fast and cost-effective means of accessing global financial and commodity markets. Investors can speculate or hedge on the price direction of the particular security or instrument they're trading. This is done by buying or selling a futures/options contract. This section provides a brief outline about the futures and options trading strategies of equity derivative traders.

3.15 Futures Trading Strategies

A futures contract is a legal agreement to buy or sell an asset at a predetermined price at a specified time in the future. Futures can be used for hedging as well as speculation. Hedging refers to by taking a position in the futures that is opposite to a position taken in the cash market or to a future cash obligation that one has or will incur *(Gupta, 2017).* Many of the participants in the futures market are hedgers (Hull & Basu, 2017). In general, there are three futures trading strategies:

1. **Long Futures**: Buy futures and profit when the prices increase. A hedge that involves taking a long position in futures contract is known as a long hedge *(Hull & Basu, 2017)*.

2. **Short Futures**: Sell futures contracts and profit when the prices decrease. Hedge that involves taking a short position in a futures contract is known as short hedge *(Hull & Basu, 2017)*.

3. **Futures Spread**: Simultaneously buy different futures contracts and profit when the relative price difference widens (or narrows). These can be on the same underlying but using different expiration dates, or on futures in two closely-related products like crude oil and gasoline.

Closing an existing futures position is called "square-off". By squaring off, the trader offset an existing open position. Table 3.4 summarizes the concept of square off in general:

Table 3.4

Ways of Squaring off futures contract

Sl. No	Initial Leg	View at the time of initial leg	Square off leg	View at the time of squaring off
1	Buy/Long	Expect price to go higher – Bullish	Sell	No longer expect the price to go higher, or one just wants to get out of the existing position (for whatever reason)
2	Sell/Short	Expect price to go lower – Bearish	Buy	No longer expect the price to go lower, or one just wants to get out of the existing position (for whatever reason)

Source: https://zerodha.com/varsity/

3.16 Options Trading Strategies

An option is a popular financial derivative in the financial market and is traded widely all over the world *(Gupta, 2017)*. An **option** is a contract written by a seller that conveys to the buyer the right but not the obligation to buy (in the case of a *call* option) or to sell (in the case of a *put* option) a particular asset, at a particular price (*Strike price/Exercise price*) in future *(NSE, 2009)*. In return for granting the option, the seller collects a payment (the *premium*) from the buyer. Exchange-traded options are a significant kind of options that trade on public exchanges and have standardised contract features, allowing trading among many participants. They provide a settlement guarantee by the Clearing Corporation thereby reducing counterparty risk. Options can be used for hedging, taking a view on the future direction of the market, for arbitrage or for implementing strategies which can help in generating income for investors under various market conditions.

3.16.1 Options Terminology

Following are the important terms which are frequently used in options trading:

1. ***Index options:*** These options have the index as the underlying. In India, they have a European-style settlement. E.g. Nifty options, Bank Nifty options etc.

2. ***Stock options:*** Stock options are options on individual stocks. A stock option contract gives the holder the right to buy or sell the underlying shares at the specified price.
3. ***Buyer of an option:*** The buyer of an option is the one who by paying the option premium buys the right but not the obligation to exercise his option on the seller/writer.
4. ***Writer/seller of an option:*** The writer/seller of a call/put option is the one who receives the option premium and is thereby obliged to sell/buy the asset if the buyer exercises on him.
5. ***Call option:*** A call option gives the holder the right but not the obligation to buy an asset by a certain date for a certain price.
6. ***Put option:*** A put option gives the holder the right but not the obligation to sell an asset by a certain date for a certain price.
7. ***Option price/premium:*** Option price is the price which the option buyer pays to the option seller. It is also referred to as the option premium.
8. ***Expiration date:*** The date specified in the options contract is known as the expiration date, the exercise date, the strike date or the maturity.
9. ***Strike price:*** The price specified in the options contract is known as the strike price or the exercise price.
10. ***American options:*** American options are options that can be exercised up to the expiration date.
11. ***European options:*** European options are options that can be exercised only on the expiration date itself.
12. ***In-the-money option:*** An in-the-money (ITM) option is an option that would lead to a positive cash flow to the holder if it were exercised immediately.
13. ***At-the-money option:*** An at-the-money (ATM) option is an option that would lead

to zero cash flow if it were exercised immediately.

14. ***Out-of-the-money option**:* An out-of-the-money (OTM) option is an option that would lead to a negative cash flow if it were exercised immediately.

15. ***Intrinsic value of an option**:* The intrinsic value of an option is the gain to the holder of an option on immediate exercise *(Gupta, 2017)*. The intrinsic value of a call is $Max\ [(S_t — K),\ 0]$. Similarly, the intrinsic value of a put is $Max\ [(K — S_t),0]$.

16. ***Time value of an option:*** The time value of an option is the difference between its premium and its intrinsic value.

3.16.2. Options Payoff

The 'right without obligation' characteristic of options results in a non-linear payoff for options. In simple words, it means that the losses for the buyer of an option are limited; however, the profits are potentially unlimited. For a writer (seller), the payoff is exactly the opposite. His profits are limited to the option premium; however, his losses are potentially unlimited. These non-linear payoffs are fascinating as they lend themselves to be used to generate various payoffs by using combinations of options and the underlying. The formula for calculating payoffs from positions in European options is given below:

1. The payoff from a long position in a call option is: $Max[(S_t — K),0]$
2. The payoff from a short position in a call option is: $Min[(K — S_t),0]$
3. The payoff from a long position in a put option is: $Max[(K — S_t),0]$
4. The payoff from a short position in a put option is: $Min[(S_t — K),0]$

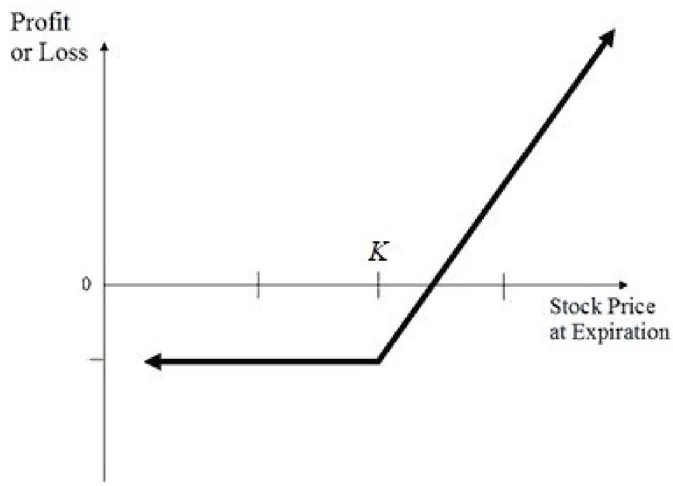
3.16.3. Options Strategies

The choice an options trader makes depends on his judgement about how the price will move and how much risk he is willing to take. If a trader is not willing to take the risk, he can choose a covered call or protective puts. If a trader is willing to take a little more risk, he could choose a bull or bear spread. Suppose a trader feels there will be a big move in the price of an asset, but does not know whether this will be up or down, there are a number of alternative strategies available for them. A risk-averse trader may choose a reverse butterfly spread and a more aggressive investor might choose a straddle or strangle. Popular option trading strategies are discussed below:

1. **Long Call:** Buying a call is the most basic of all options strategies. It constitutes the first options trade for someone already familiar with buying/selling stocks and who would now want to trade options. Buying a call is an easy strategy to understand. When you buy it means you are bullish. Buying a Call means you are very bullish and expect the underlying stock /index to rise in future *(NSE, 2009)*.

Figure 3.2

Payoff Chart-Long Call

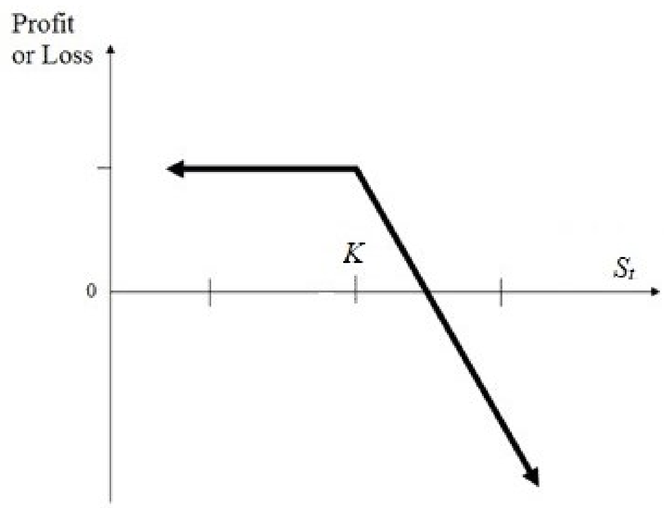


Source: https://www.theoptionsguide.com/long-call.aspx

2. **Short Call:** When an investor is very bearish about a stock/index and expects the prices to fall, he can sell Call options. This position offers limited profit potential and the possibility of large losses on bigadvances in underlying prices. Although easy to execute, it is a risky strategy since the seller of the Call is exposed to unlimited risk *(NSE, 2009)*.

Figure 3.3

Payoff Chart-Short Call

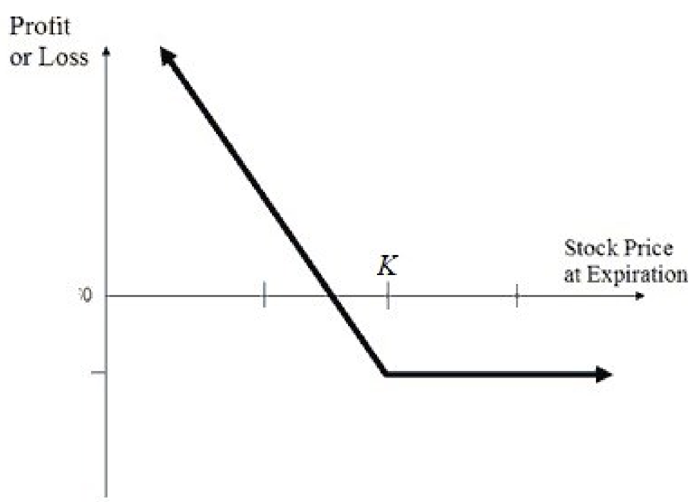


Source: https://www.theoptionsguide.com/short-call.aspx

3. **Long Put:** Buying a Put is the opposite of buying a Call. When an investor is bearish, he can buy a Put option. A Put Option gives the buyer of the Put a right to sell the stock (to the Put seller) at a pre-specified price and thereby limit his risk. A long Put is a **Bearish** strategy. To take advantage of a falling market an investor can buy Put options *(NSE, 2009)*.

Figure 3.4

Payoff Chart-Long Put

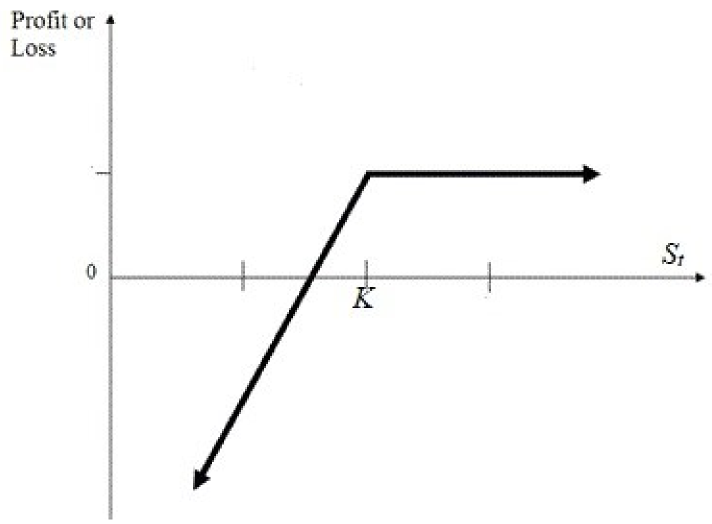


Source: https://www.theoptionsguide.com/long-put.aspx

4. **Short Put:** Selling a Put is opposite of buying a Put. An investor buys Put when he is bearish on a stock. An investor Sells Put when he is **Bullish** about the stock – expects the stock price to rise or stay sideways at the minimum. In this strategy, the maximum profit is limited to the amount of premium received, but the potential loss is unlimited (until the stock price fall to zero) *(NSE, 2009)*.

Figure 3.5

Payoff Chart-Short Put

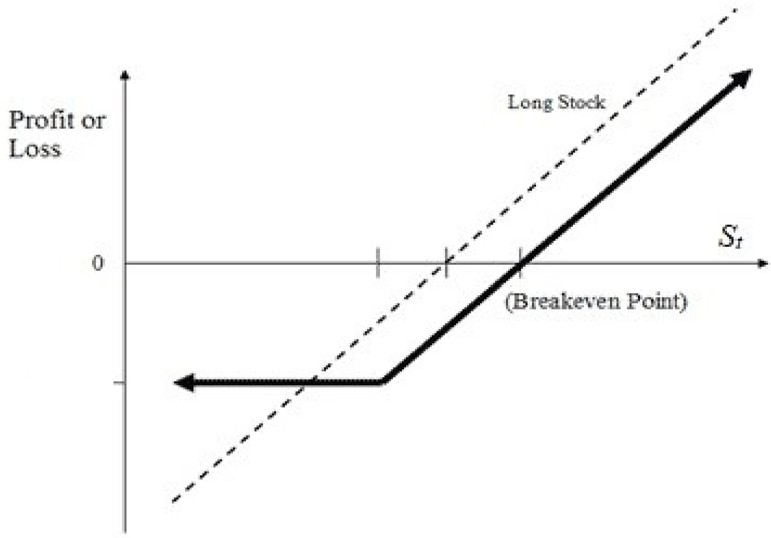


Source: https://www.theoptionsguide.com/short-put.aspx

5. **Synthetic Long Call / Protective Put (Buy Stock, Buy Put):** This strategy involves buying a put option along with a long position in the stock. This strategy ensures a minimum value for the portfolio in case of a decline in the stock price. If the stock price declines sharply below the strike price, he will not suffer any losses because the put option becomes in-the-money and the portfolio will gain; but if the stock price moves up significantly, he will retain all the profits that are associated with the long stock position and the portfolio gain will be equal to the stock gain less premium paid. Protective put to act as an insurance policy by providing downside protection from an asset price decline. It is a strategy with a limited loss and (after subtracting the Put premium) unlimited profit (from the stock price rise). The result of this strategy looks like a Call Option Buy strategy and therefore is called a Synthetic Call *(NSE, 2009)*.

Figure 3.6

The payoff chart-Synthetic Long Call

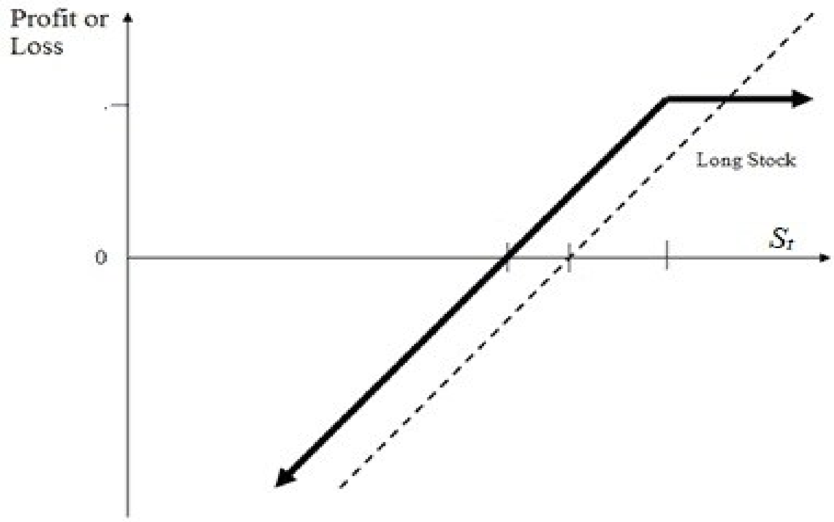


Source: https://www.theoptionsguide.com/synthetic-long-call.aspx

6. **Covered call writing (Buy Stock, Buy Call):** This is a conservative strategy and involves writing a call option and simultaneously buying the underlying stock. The long position in stock 'covers' or protects the investor from the payoff on the short call if there is a sharp rise in the stock price. A covered call is a popular option strategy used to generate income in the form of options premiums. A covered call is a less risky strategy compared with either uncovered call writing or buying a stock alone *(NSE, 2009)*.

Figure 3.7

Payoff Chart-Coved call writing

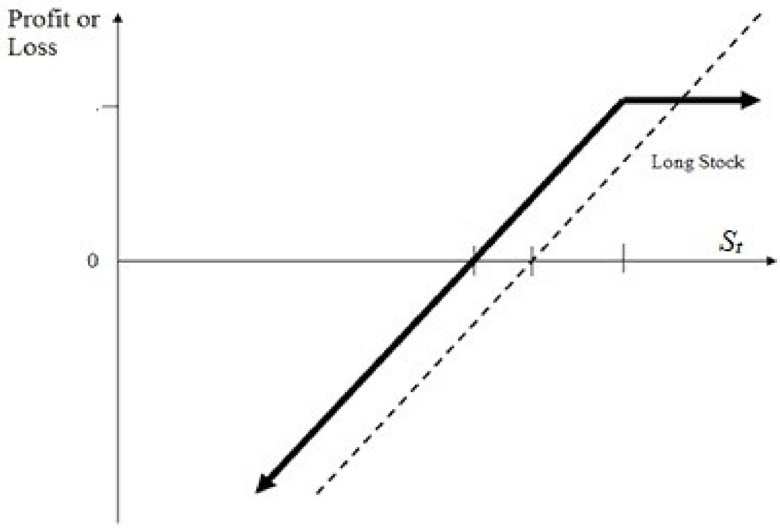


Source: https://www.theoptionsguide.com/synthetic-covered-call.aspx

7. **Covered Put (Sell Stock, Sell Put):** In this investment strategy, a short position in a put option is combined with a short position in the stock. This strategy is the reverse of the protective put strategy. The investor shorts a stock because he is bearish about it, but does not mind buying it back if the price decreases to a target price. This target price is the price at which the investor shorts the Put (Put strike price). Selling a Put means, buying the stock at the strike price if exercised. If the stock falls below the Put strike, the investor will be exercised and will have to buy the stock at the strike price which is any way his target price to repurchase the stock at the strike price *(NSE, 2009)*.

Figure 3.8

Pay-off Chart- Covered Put

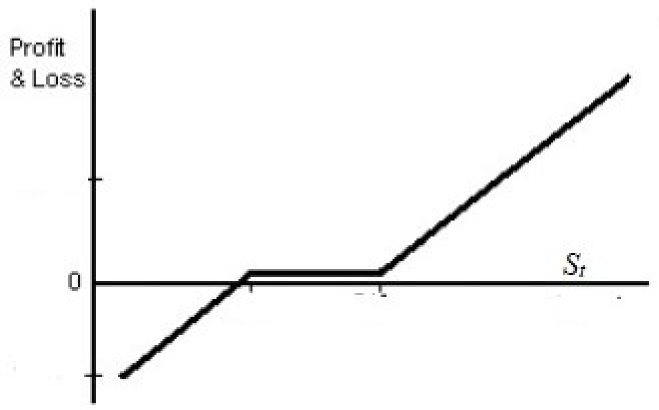


Source: https://www.theoptionsguide.com/covered-put.aspx

8. **Long Combo (Sell Put, Buy Call):** A Long Combo is a Bullish strategy. If an investor is expecting the price of a stock to move up he can do a Long Combo strategy. It involves selling an OTM (lower strike) Put and buying an OTM (higher strike) Call. This strategy simulates the action of buying a stock (or futures) but at a fraction of the stock price. It is an inexpensive trade, similar in pay-off to Long Stock, except there is a gap between the strikes. As the stock price rises the strategy starts making profits *(NSE, 2009)*.

Figure 3.9

Pay-off Chart-Long Combo

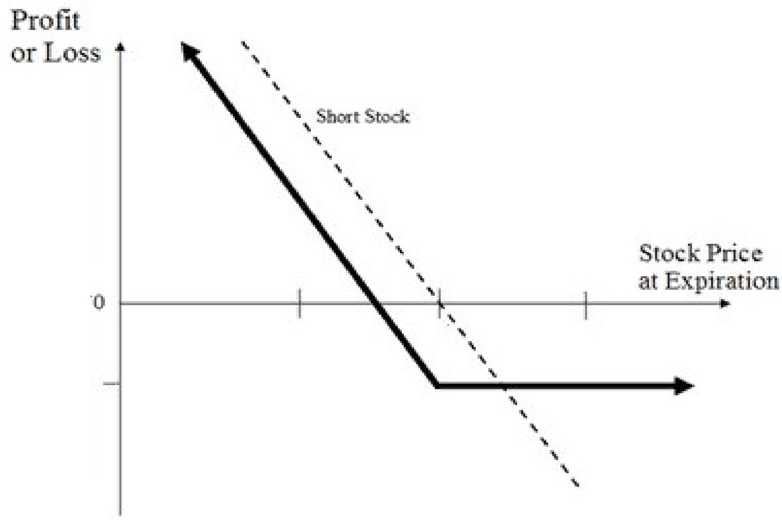


Source: https://www.chittorgarh.com/options-trading-strategy/long-combo/

9. **Protective Call (Synthetic Long Put):** This is a strategy wherein an investor has gone short on a stock and buys a call to hedge. This is the opposite of a Synthetic Call. An investor shorts a stock and buys an ATM or slightly OTM Call. The net effect of this is that the investor creates a pay-off like a Long Put, but instead of having a net debit (paying premium) for a Long Put, he creates a net credit (receives money on shorting the stock). In case the stock price falls the investor gains in the downward fall in the price. However, in case there is an unexpected rise in the price of the stock the loss is limited. The pay-off from the Long Call will increase thereby compensating for the loss in value of the short stock position. This strategy hedges the upside in the stock position while retaining downside profit potential *(NSE, 2009)*.

Figure 3.10

Payoff Chart-Synthetic Long Put

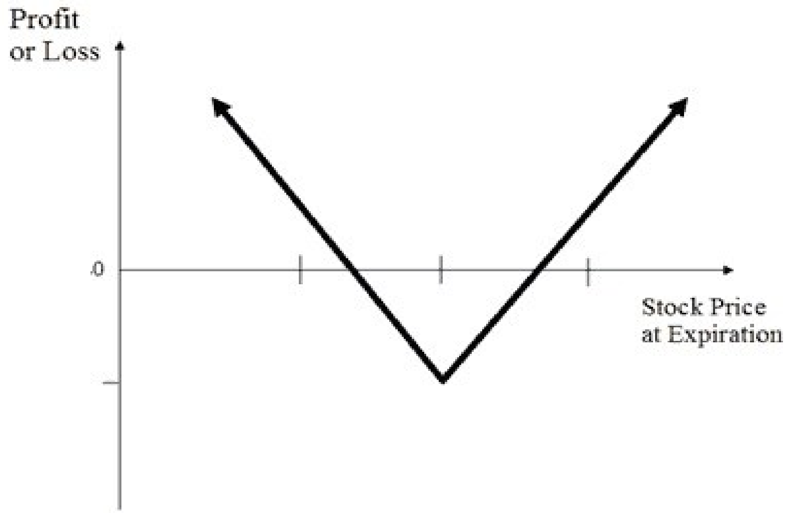


Source: https://www.theoptionsguide.com/syntheticlong-put.aspx

10. **Long Straddle:** This is a most popular combination strategy which involves buying a call option and put option on the same underlying with the same strike price, and the expiration date. Straddle is an appropriate strategy for an investor who expects a large move in the price but does not know in which direction the move will be. Straddle is usually constructed with ATM options that have the highest time value. A Straddle is a volatility strategy and is used when the stock price/index is expected to show large movements. In order to profit from a shift in either direction a rising or falling stock/index value, this technique entails purchasing both a call and a put on the same stock or index with the same maturity and strike price. If the price of the stock/index increases, the call is exercised while the put expires worthless and if the price of the stock/index decreases, the put is exercised, the call expires worthless. Either way, if the stock/index shows volatility to cover the cost of the trade, profits are to be made. With Straddles, the investor is direction neutral. All that he is looking out for is the stock/index to break out exponentially in either direction *(NSE, 2009)*.

Figure 3.11

Payoff Chart-Long Straddle

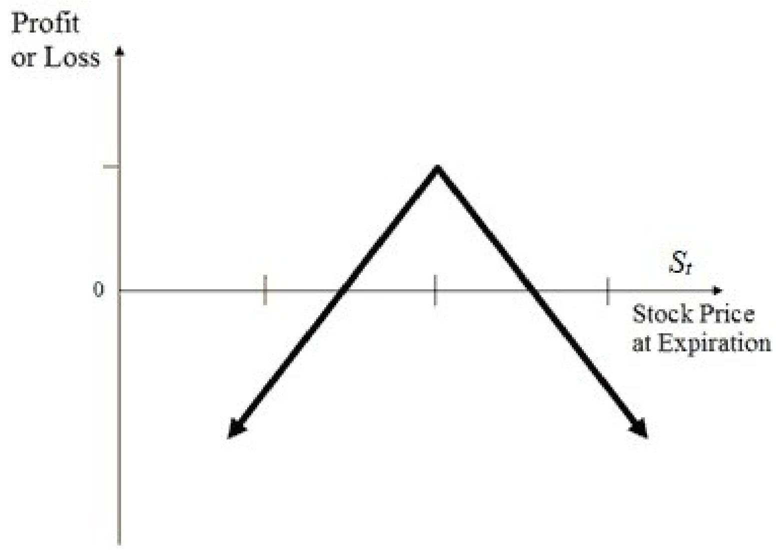


Source: https://www.theoptionsguide.com/long-straddle.aspx

11. **Short Straddle:** A Short Straddle is the opposite of Long Straddle. It is a strategy to be adopted when the investor feels the market will not show much movement. He sells a Call and a Put on the same stock/index for the same maturity and strike price. It creates a net income for the investor. If the stock/index does not move much in either direction, the investor retains the Premium as neither the Call nor the Put will be exercised. However, in case the stock/index moves in either direction, up or down significantly, the investor's losses can be significant. So, this is a risky strategy and should be carefully adopted only when the expected volatility in the market is limited *(NSE, 2009)*.

Figure 3.12

Payoff Chart-Short Straddle

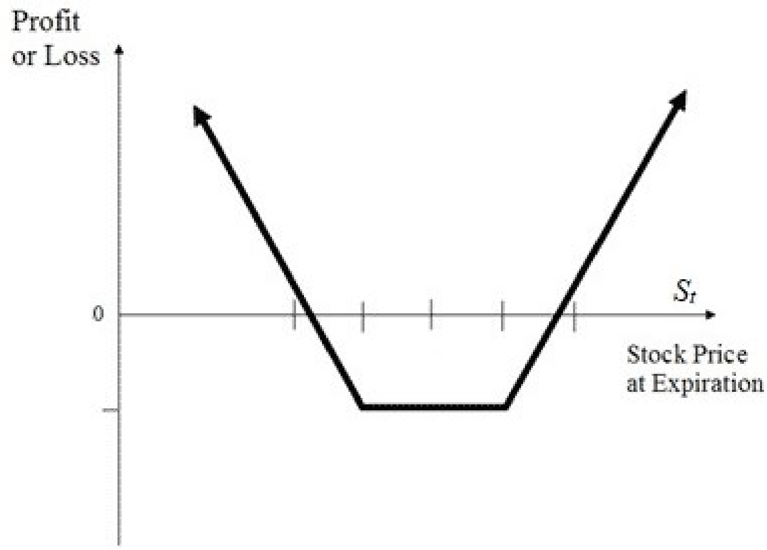


Source: https://www.theoptionsguide.com/short-straddle.aspx

12. Long Strangle: A Strangle is a slight modification to the Straddle to make it cheaper to execute. This strategy involves the simultaneous buying of a slightly out-of-the-money (OTM) put and a slightly out-of-the-money (OTM) call of the same underlying stock/index and expiration date. Here again, the investor is directional neutral but is looking for increased volatilityin the stock/index and the prices moving significantly in either direction. Since OTM options are purchased for both Calls and Puts it makes the cost of executing a Strangle cheaper as compared to a Straddle, where generally ATM strikes are purchased. Since the initial cost of a Strangle is cheaper than a Straddle, the returns could potentially be higher. However, for a Strangle to make money, it would require greater movement on the upsideor downside for the stock/index than it would for a Straddle. As with a Straddle, the strategy has a limited downside (i.e. the Call and the Put premium) and unlimited upside potential *(NSE, 2009)*.

Figure 3.13

Payoff chart –Long Strangle

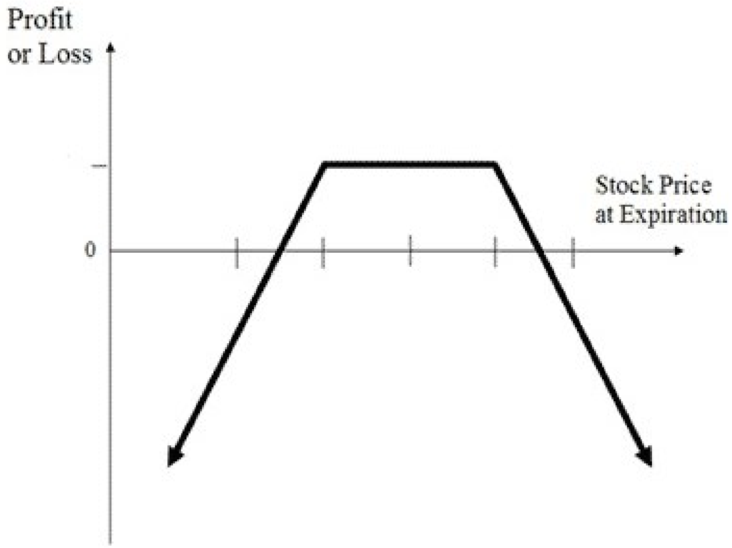


Source: https://www.theoptionsguide.com/long-strangle.aspx

13. Short Strangle: A Short Strangle is a slight modification to the Short Straddle. It tries to improve the profitability of the trade for the Seller of the options by widening the breakeven points so that there is a much greater movement required in the underlying stock/index, for the Call and Put option to be worth exercising. This strategy involves the simultaneous selling of a slightly out-of-the-money (OTM) put and a slightly out-of-the-money (OTM) call of the same underlying stock and expiration date. This typically means that since OTM call and put are sold, the net credit received by the seller is less as compared to a Short Straddle, but the break even points are also widened. The underlying stock has to move significantly for the Call and the Put to be worth exercising. If the underlying stock does not show much of a movement, the seller of the Strangle gets to keep the Premium *(NSE, 2009)*.

Figure 3.14

Payoff Chart-Short Strangle

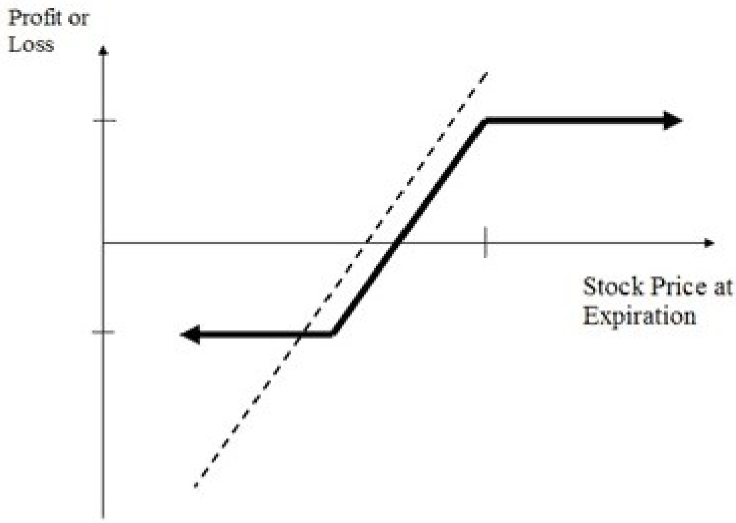


Source: https://www.theoptionsguide.com/short-strangle.aspx

14. Collar: A Collar is similar to Covered Call but involves another leg, buying a Put to insure against the fall in the price of the stock. It is a Covered Call with limited risk. So a Collar is buying a stock, insuring against the downside by buying a Put and then financing (partly) the Put by selling a Call. The put generally is ATM and the call is OTM having the same expiration month and must be equal in number of shares. This is a low-risk strategy since the Put prevents downside risk. However, do not expect unlimited rewards since the Call prevents that. It is a strategy to be adopted when the investor is conservatively bullish *(NSE, 2009)*.

Figure 3.15

Payoff Chart-Collar

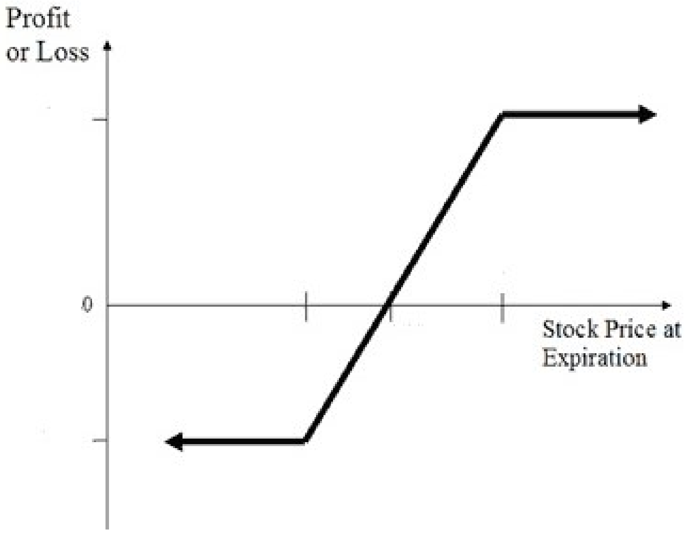


Source: https://www.theoptionsguide.com/the-collar-strategy.aspx

15. **Bull Call Spread (Buy Call, Sell Call):** A bull call spread is constructed by buying an in-the-money (ITM) call option, and selling another out-of-the-money (OTM) call option. Often the call with the lower strike price will be in-the-money while the Call with the higher strike price is out-of-the-money. Both calls must have the same underlying security and expiration month. The net effect of the strategy is to bring down the cost and breakeven on a Buy Call (Long Call) Strategy. This strategy is exercised when an investor is moderately bullish to bullish because the investor will make a profit only when the stock price/index rises. If the stock price falls to the lower (bought) strike, the investor makes the maximum loss (cost of the trade) and if the stock price rises to the higher (sold) strike, the investor makes the maximum profit *(NSE, 2009)*.

Figure 3.16

Payoff chart-Bull Call Spread

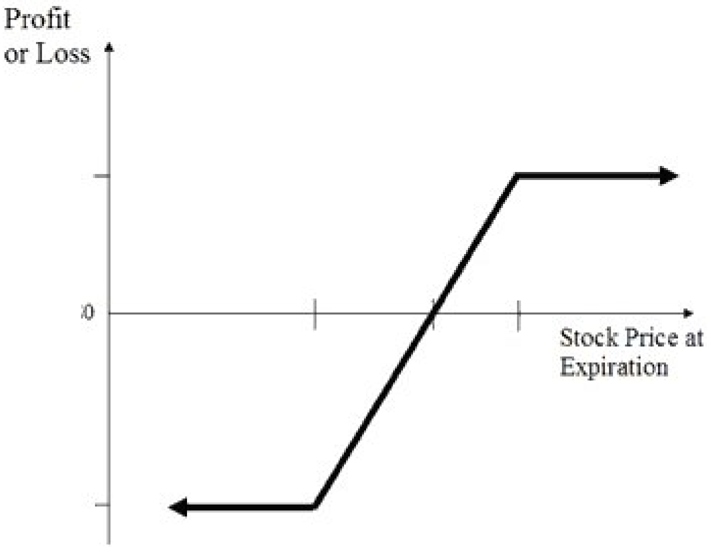


Source: https://www.theoptionsguide.com/bull-call-spread.aspx

16. **Bull Put Spread (Sell Put, Buy Put):** A bull put spread can be profitable when the stock/index is either range bound or rising. The concept is to protect the downside of a Put sold by buying a lower strike Put, which acts as insurance for the Put sold. The lower strike Put purchased is further OTM than the higher strike Put sold ensuring that the investor receives a net credit because the Put purchased (further OTM) is cheaper than the Put sold. This strategy is equivalent to the Bull Call Spread but is done to earn a net credit (premium) and collect an income. If the stock/index rises, both Puts expire worthless and the investor can retain the Premium. If the stock/index falls, then the investor is breakeven is the higher strike less the net credit received. Provided the stock remains above that level, the investor makes a profit. Otherwise, he could make a loss. The maximum loss is the difference in strikes less the net credit received. This strategy should be adopted when the stock/index trend is upward or range bound *(NSE, 2009)*.

Figure 3.17

Payoff Chart-Bull Put Spread

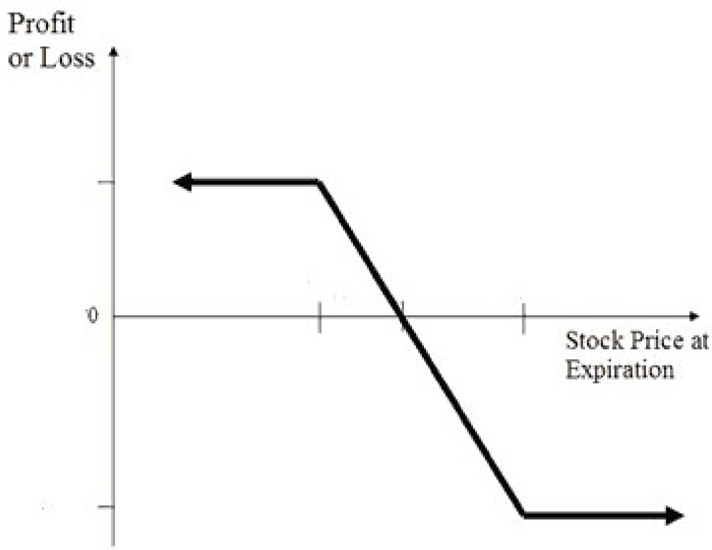


Source: https://www.theoptionsguide.com/bull-put-spread.aspx

17. **Bear Call Spread (Sell ITM Call, Buy OTM Call):** The Bear Call Spread strategy can be adopted when the investor feels that the stock/index is either range bound or falling. The concept is to protect the downside of a Call Sold by buying a Call with a higher strike price to insure the Call sold. In this strategy, the investor receives a net credit because the Call he buys is of a higher strike price than the Call sold. The strategy requires the investor to buy out-of-the-money (OTM) call options while simultaneously selling in-the-money (ITM) call options on the same underlying stock index. This strategy can also be done with both OTM calls with the Call purchased being higher OTM strike than the Call sold. If the stock / index falls both Calls will expire worthless and the investor can retain the net credit. If the stock/index rises then the breakeven is the lower strike plus the net credit. Provided the stock remains below that level, the investor makes a profit. Otherwise he could make a loss. The maximum loss is the difference in strikes less the net credit received *(NSE, 2009)*.

Figure 3.18

Payoff Chart-Bear Call Spread

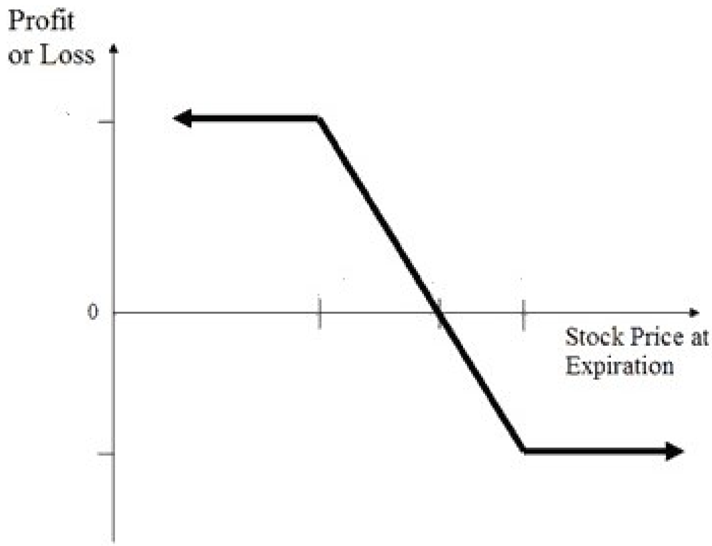


Source: https://www.theoptionsguide.com/bear-call-spread.aspx

18. **Bear Put Spread (Buy ITM Put, Sell OTM Put):** This strategy requires the investor to buy an ITM put option and sell an OTM put option on the same stock with the same expiration date. This strategy creates a net debit for the investor. The net effect of the strategy is to bring down the cost and raise the breakeven on buying a Put (Long Put). The strategy needs a Bearish outlook since the investor will make money only when the stock price/index falls. The bought Puts will have the effect of capping the investor's downside. While the Puts sold will reduce the investors costs, risk and raise breakeven point (from Put exercise point of view). If the stock price closes below the out-of-the-money (lower) put option strike price on the expiration date, then the investor reaches maximum profits. If the stock price increases above the in-the-money (higher) put option strike price at the expiration date, then the investor has a maximum loss potential of the net debit *(NSE, 2009)*.

Figure 3.19

Payoff Chart-Bear Put Spread

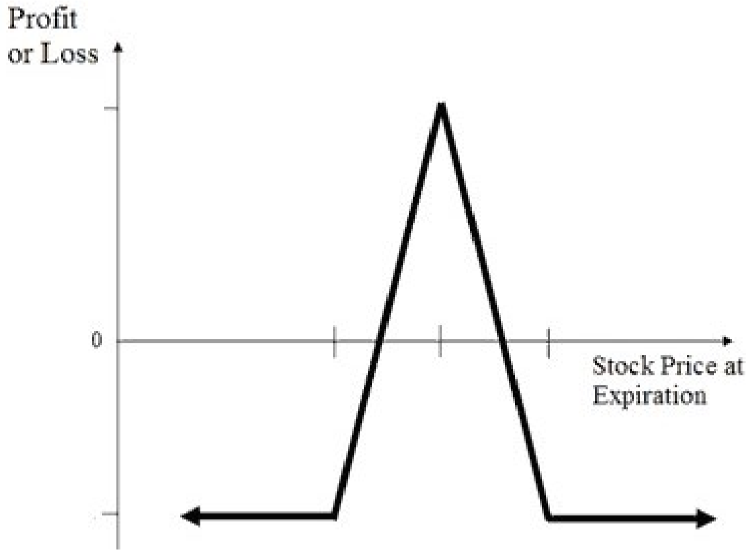


Source: https://www.theoptionsguide.com/bear-put-spread.aspx

19. **Long Call Butterfly:** A Long Call Butterfly is to be adopted when the investor is expecting very little movement in the stock price/index. The investor is looking to gain from low volatility at a low cost. The strategy offers a good risk/reward ratio, together with low cost. A long butterfly is similar to a Short Straddle except your losses are limited. The strategy can be done by selling 2 ATM Calls, buying 1 ITM Call, and buying 1 OTM Call options (there should be equidistance between the strike prices). The result is positive in case the stock/index remains range bound. The maximum reward in this strategy is, however, restricted and takes place when the stock/index is at the middle strike at expiration. The maximum losses are also limited*(NSE, 2009)*.

Figure 3.20

Payoff Chart-Long Call Butterfly

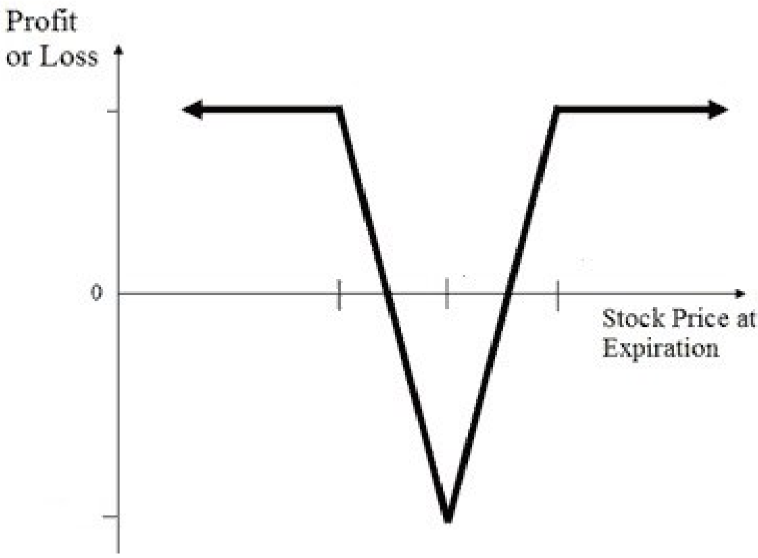


Source: https://www.theoptionsguide.com/butterfly-spread.aspx

20. Short Call Butterfly: A Short Call Butterfly is a strategy for volatile markets. It is the opposite of Long Call Butterfly, which is a range-bound strategy. The Short Call Butterfly can be constructed by Selling one lower striking in-the-money Call, buying two at-the-money Calls and selling another higher strike out-of-the-money Call, giving the investor a net credit (therefore it is an income strategy). There should be an equal distance between each strike. The resulting position will be profitable in case there is a big move in the stock/index. The maximum risk occurs if the stock/index is at the middle strike at expiration. The maximum profit occurs if the stock finishes on either side of the upper and lower strike prices at expiration. However, this strategy offers very small returns when compared to straddles, strangles with only slightly less risk *(NSE, 2009)*.

Figure 3.21

Payoff Chart-Short Call Butterfly

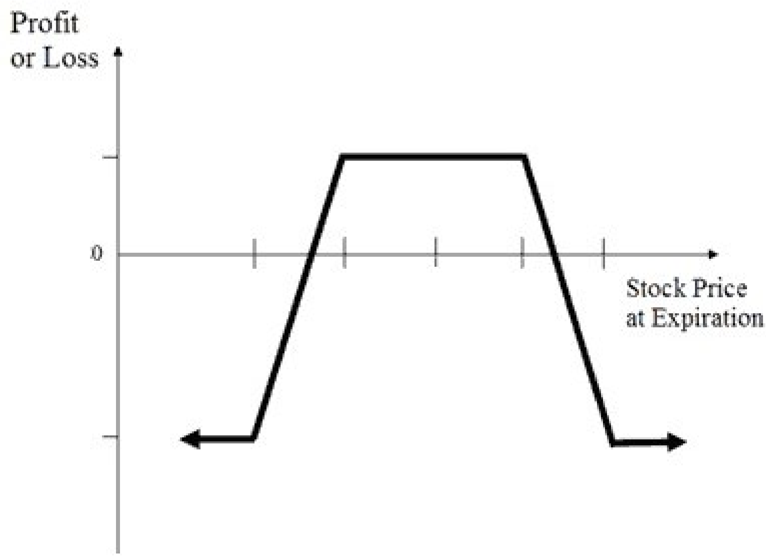


Source: https://www.theoptionsguide.com/short-butterfly.aspx

21. **Long Call Condor:** A Long Call Condor is very similar to a long butterfly strategy. The difference is that the two middle-sold options have different strikes. The profitable area of the payoff profile is wider than that of the Long Butterfly. The strategy is suitable in a range-bound market. The Long Call Condor involves buying 1 ITM Call (lower strike), selling 1 ITM Call (lower middle), selling 1 OTM call (higher middle) and buying 1 OTM Call (higher strike). The long options at the outside strikes ensure thatthe risk is capped on both sides. The resulting position is profitable if the stock/index remains range bound and shows very little volatility. The maximum profits occur if the stockfinishes between the middle strike prices at expiration *(NSE, 2009)*.

Figure 3.22

Payoff Chart-Long Call Condor

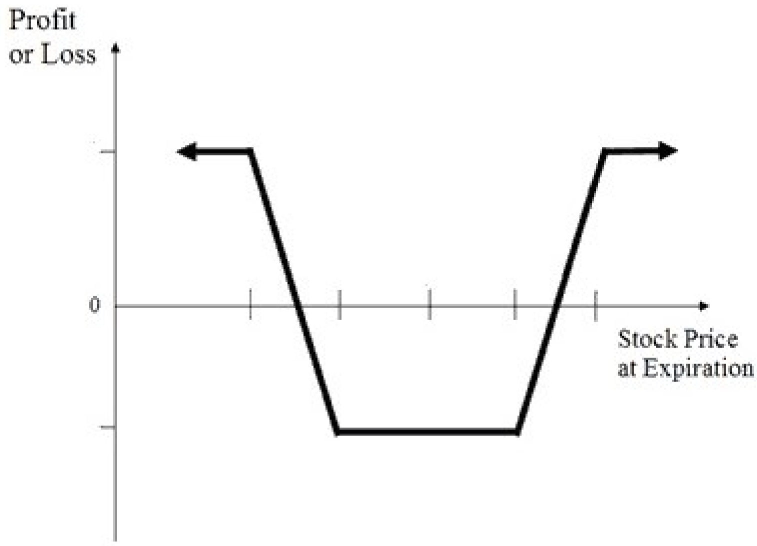


Source: https://www.theoptionsguide.com/condor.aspx

22. **Short Call Condor:** A Short Call Condor is very similar to a short butterfly strategy. The difference is that the two middle bought options have different strikes. The strategy is suitable in a volatile market. The Short Call Condor involves selling 1 ITM Call (lower strike), buying 1 ITM Call (lower middle), buying 1 OTM call (higher middle) and selling 1 OTM Call (higher strike). The resulting position is profitable if the stock/index shows very high volatility and there is a big move in the stock/index. The maximum profits occur if the stock/index finish on either side of the upper or lower strike prices at expiration *(NSE, 2009)*.

Figure 3.23

Payoff Chart-Short Call Condor

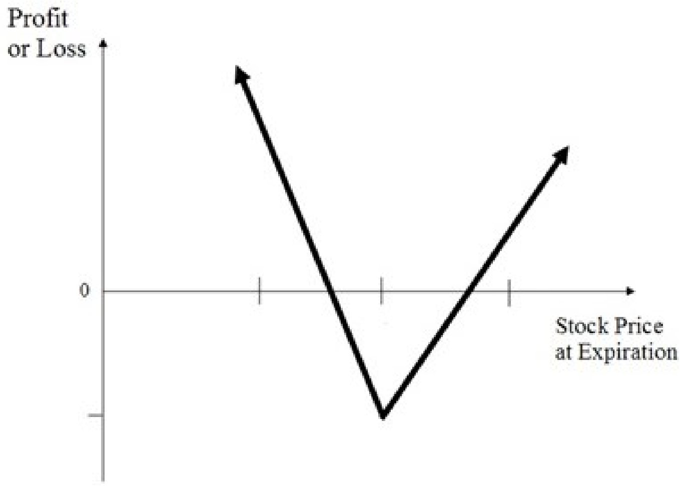


Source: https://www.theoptionsguide.com/short-condor.aspx

23. **Strip:** The strip is a modified, more bearish version of the common straddle. It involves buying a number of at-the-money calls and twice the number of puts of the same underlying stock, striking price and expiration date. A strip involves buying one ATM call and two ATM puts with the same expiry date and same strike price. This strategy may be adopted when the chances of prices going down are more than the chances of going up. If the price moves downwards, then this strategy will make more profits because of the double quantity of put options. Strips are unlimited profit, limited risk options trading strategies that are used when the options trader thinks that the underlying stock price will experience significant volatility in the near term and is more likely to plunge downwards instead of rallying *(NSE, 2009)*.

Figure 3.24

Payoff Chart-Strips

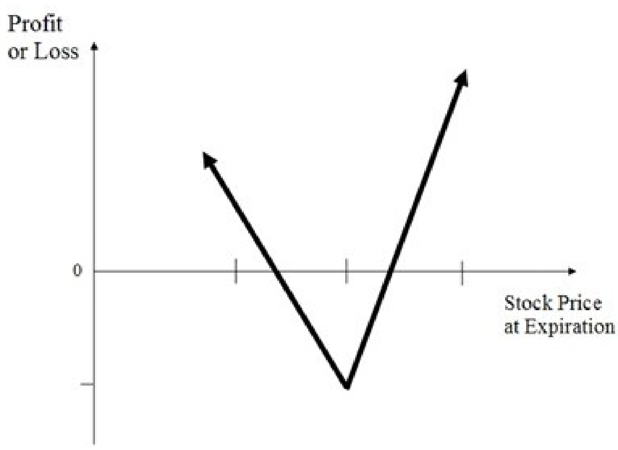


Source: *https://www.theoptionsguide.com/strip.aspx*

24. Strap: Strap is the reverse of strip. It involves buying a number of at-the-money puts and twice the number of calls of the same underlying stock, striking price and expiration date. In strap the trader buys two ATM call option and one ATM put option with the same strike price and the maturity. This strategy is used when the chances of price going up are more than the chances of going down. In case of two calls for one put the gain from an upside movement would be double, as two calls will become in-the-money *(NSE, 2009)*.

Figure 3.25

Payoff Chart-Straps



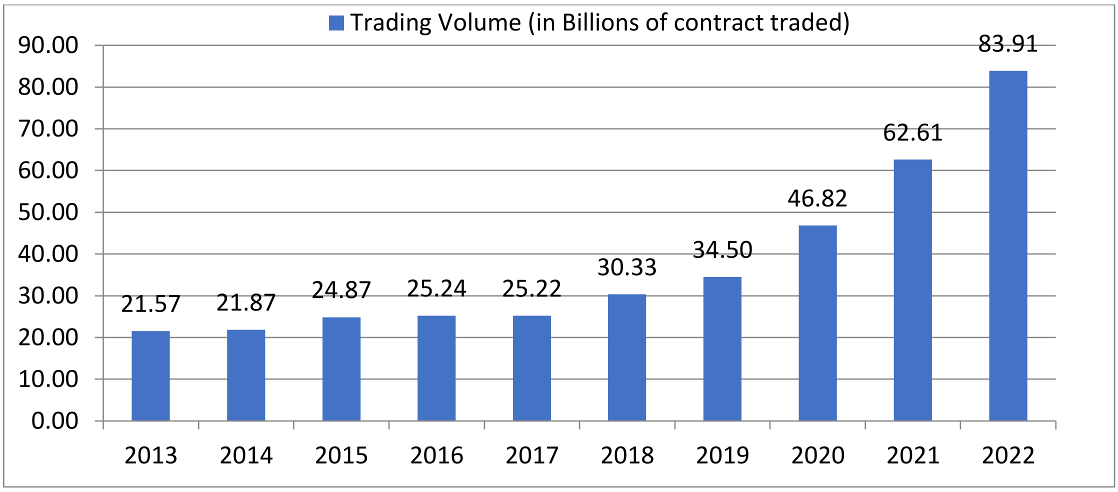
Source: *https://www.theoptionsguide.com/strap.aspx*

3.17 Current Status of the Global Derivatives Market

The largest market category in the financial industry is the derivatives market. The worldwide stock market saw a noticeable decrease in 2022, both in terms of market capitalization (-20%) and value traded (-10%), breaking the upward trend seen in the two years prior (*World Federation of Exchanges*, 2022). A number of distinguishing themes and forces are revealed. First, the conflict in Ukraine and the sanctions against Russia drove up energy costs, notably for European countries, accelerating the inflationary dynamics that were already in motion due to strong consumer demand and supply constraints following the pandemic (*WFE*, 2022). The volume of global Exchange Traded Derivative contracts for the last ten years is exhibited in Figure 3.26.

Figure 3.26

Global trading volume of exchange-traded derivatives



Source: Futures Industry Association (https://www.fia.org/fia/etd-tracker)

Global futures and options contracts show tremendous growth over the last ten years. Since 2013 there is an increasing trend in the number of trades. In almost all the years there is an increase in the number of trades carried out, except in 2017 where there is a slight decrease. Growth has reached 83.91 billion contracts in 2022. In 2013 the number of contracts traded is only 21.57 billion. The volumes of exchange-traded derivatives continued with their positive trend, with a pronounced increase in the case of options. Table 3.5 shows the total volume of options and futures contracts traded in 2022.

Table 3.5

Total Volumes of Exchange-Traded Futures and Options in 2022

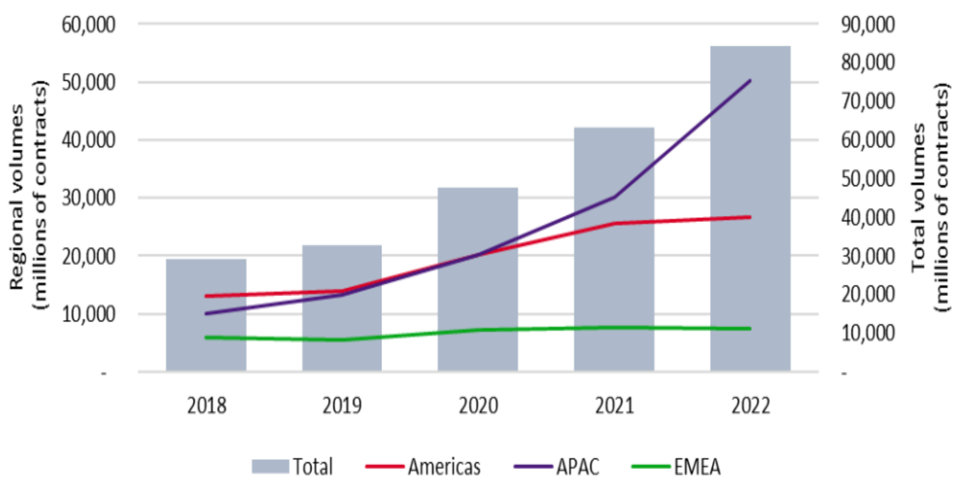
Type of Contract	Jan-Dec 2022 Volume	Change vs. Last Year	Dec 2022 Open Interest	% Change vs. Last Year
Options	54,532,241,710	63.70%	810,418,461	0.00%
Futures	29,315,455,762	0.10%	275,245,814	3.80%
Total	83,847,697,472	34.00%	1,085,664,275	0.90%

Source: Futures Industry Association (https://www.fia.org/fia/etd-tracker)

Exchange-traded derivatives contracts, which include both options and futures, increased to their greatest level in the last ten years, totalling 54.53 billion for options and 29.32 billion for futures (83.85 billion derivatives contracts traded). This represents a 34.00% increase compared to 2021. This increase was driven mostly by options, which rose 63.7% (and account for 65% of all derivatives contracts traded), while futures had a 0.10% uptick. Such an increase in option trading volume could be due to the increasing need to hedge against (or even speculation on) market uncertainty (*WFE*, 2022). Region wise total volume of exchange traded derivatives during the last five years is illustrated in Figure 3.27.

Figure 3.27

Volumes of Exchange-Traded Derivatives by region



Source: World Federation of Exchanges (https://www.world-exchanges.org/our-work/statistics)

Figure 3.27 show that all three regions recorded their peak over the last five years in 2022: the Americas region 25.43 billion, Asia Pacific (APAC) region 50.63 billion, and EMEA region (Europe Middle East and Africa) 7.78 billion contracts traded. However, the growth varied significantly between regions. While APAC grew 65.7%, EMEA and Americas region recorded only a nominal increase in trading volume as compared to last year. The region-wise volumes of exchange traded derivatives are illustrated in Table 3.6.

Table 3.6

Region-wise Volume of Exchange Traded Derivative contracts in 2022

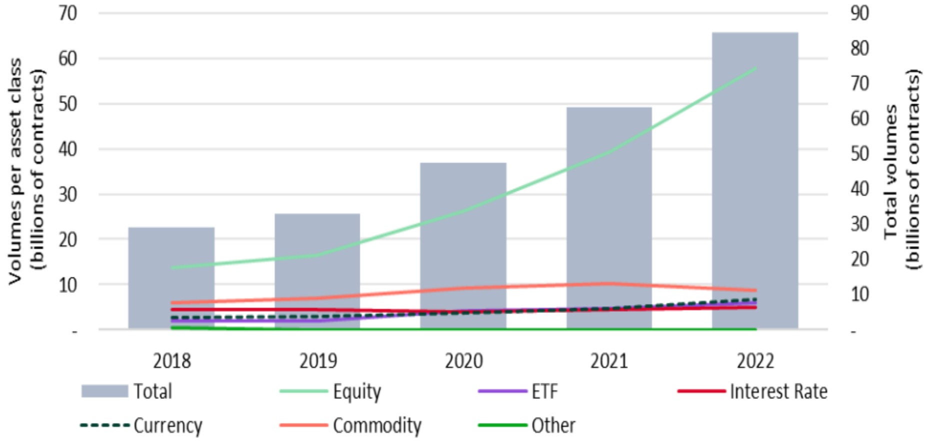
Region	Jan-Dec 2022 Volume	Change vs. Last Year	Dec 2022 Open Interest	% Change vs. Last Year
Asia-Pacific	50,634,253,866	65.7%	104,975,311	14.1%
North America	16,807,149,751	9.3%	607,576,745	2.2%
Latin America	8,624,373,629	-3.0%	130,579,901	-10.1%
Europe	4,802,600,636	-11.9%	205,920,731	-5.8%
Other	2,979,319,590	29.1%	36,611,587	45.2%
Grand Total	83,847,697,472	34.0%	1,085,664,275	0.9%

Source: Futures Industry Association (https://www.fia.org/fia/etd-tracker)

Table 3.6 shows that worldwide volume of exchange-traded derivatives reached 83.85 billion contracts in Dec. 2022. Options continue to gain in popularity and global trading of options reached 54.53 billion contracts in Dec. 2022, up by more than 63% from last year, with most of that trading taking place in the Asia-Pacific region followed by the Americas region. Global trading of futures reached 29.32 billion contracts in Dec. 2022, up by 0.1% from the last year (*Futures Industry Association*, 2023). The underlying asset-wise growth in trading volume of Exchange Traded Derivatives is exhibited in Figure 3.28.

Figure 3.28

Volumes of Exchange-Traded Derivatives by Asset Class



Source: World Federation of Exchanges (https://www.world-exchanges.org/our-work/statistics)

Figure 3.28 shows that, trading volumes across all underlying asset classes increased, with the exception of commodity derivatives, where volumes declined after 2021 (*World Federation of Exchanges*, 2022). The total trading volume of equity derivatives crossed 50 billion contracts in 2022, which shows the popularity and increased acceptance of equity derivatives over other assets. The asset-wise volumes of exchange traded derivatives in 2022 are illustrated in Table 3.7.

Table 3.7

Asset-wise Volume of Exchange Traded Derivative contracts in 2022

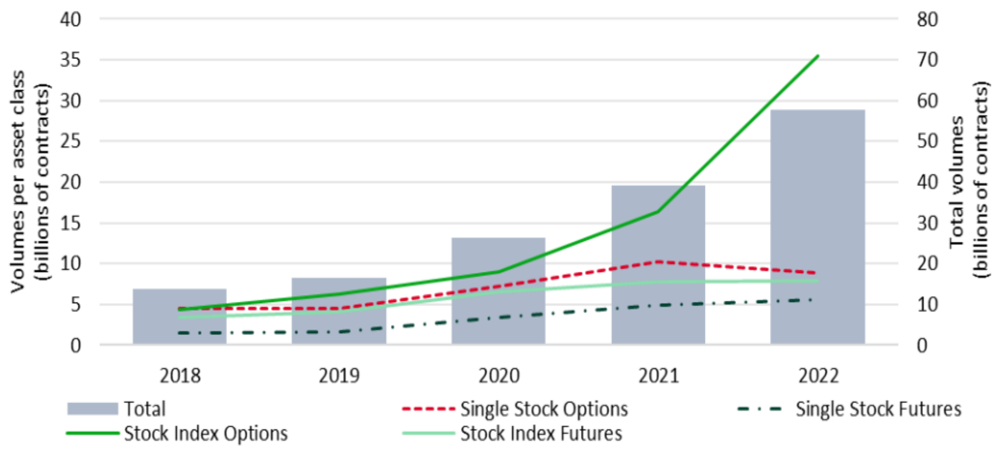
Asset Category	Jan-Dec 2022 Volume	Change vs. Last Year	Dec 2022 Open Interest	% Change vs. Last Year
Equity	61,624,125,974	48.00%	7675,06,432	2.50%
Currencies	7,676,796,067	38.50%	419,81,709	17.90%
Interest Rates	5,146,742,735	12.40%	1489,23,268	-13.80%
Other	2,756,750,897	9.10%	242,38,334	34.80%
Agriculture	2,394,485,575	-15.10%	232,86,699	-1.40%
Metals	2,194,431,384	-20.70%	161,58,155	6.10%
Energy	2,054,364,840	-24.20%	635,69,678	3.50%
Total	83,847,697,472	34%	1,085,664,275	0.90%

Source: Futures Industry Association (https://www.fia.org/fia/etd-tracker)

Table 3.7 shows that commodity derivatives were the only product line whose overall volumes (that is, considering both futures and options) declined in 2022, while equity, currency, and interest rates derivatives volumes witnessed double digit increases (48%, 38.5%, and 12.4%, respectively). Agricultural derivatives volumes decreased 15.10% year-on-year. While the equity, currency and interest rate derivatives increased their share in volumes traded, commodity and interest rate derivatives decreased their share. An analysis of trading volume of equity derivatives over the last five years is also done in this study and Figure 3.29 shows the growth pattern of different equity derivatives contracts.

Figure 3.29

Volumes of Equity Derivatives over five years



Source: World Federation of Exchanges (https://www.world-exchanges.org/our-work/statistics)

Figure 3.29 shows the explosive growth of stock index options during the last five years. Single stock futures, stock index options and stock index futures reached their highest level in volumes in the last five years. In case of single stock options, there is a declining trend in the volume after 2021. Stock index options, which account for the highest share (41.8%) of derivatives contracts, recorded the highest increase in volumes (117.4%) of all product lines relative to 2021. Notably, stock index options traded at the National Stock Exchange of India increased 134.5% compared to 2021, amounting to 32.57 billion contracts, by far their highest annual figure in the last five years. Table 3.8 shows the ranking of exchanges based on the volume of derivatives trading.

Table 3.8

Exchange Ranking by Derivatives Trading Volumes

Rank	Exchange	Jan-Dec 2022 Volume#	Change vs. 2021
1	National Stock Exchange of India	38,113,511,047	120.90%
2	B3 Stock Exchange, Brazil	8,313,793,640	-5.00%
3	CME Group, US	5,846,331,689	18.30%
4	CBOE Global Markets, US	3,476,174,099	12.30%
5	Intercontinental Exchange, US	3,435,073,009	3.50%
6	NASDAQ, US	3,147,540,772	-4.40%
7	Borsa Istanbul, Turkey	2,726,889,885	31.00%
8	Zhengzhou Commodity Exchange	2,397,600,933	-7.10%
9	Dalian Commodity Exchange, China	2,275,200,779	-3.80%
10	Korea Exchange	2,058,222,218	-9.80%
11	Eurex	1,955,730,332	14.80%
12	Shanghai Futures Exchange	1,943,444,607	-20.50%
13	BSE	1,609,192,944	0.10%
14	Miami International Holdings, US	1,302,642,100	-2.90%
15	Moscow Exchange	1,268,386,020	-39.60%

#Volume is measured in terms of the number of futures and options contracts traded and/or cleared per month
Source: Futures Industry Association (https://www.fia.org/fia/etd-tracker)

Table 3.8 shows that the National Stock Exchange (NSE) has emerged as the world's largest derivatives exchange in 2022 by the number of contracts traded based on statistics maintained by the Futures Industry Association (FIA), a derivatives trade body. The calendar year 2022 witnessed the benchmark equity index – the Nifty 50 touching lifetime high of 18,887.60. Significant strengthening in liquidity was witnessed in most of the product categories including equity, equity derivatives and currency derivatives. The total trading volume of NSE is 38.11 billion derivatives contracts, with an annual growth rate of 121 per cent. B3 stock exchange of Brazil ranked second in the list with 8.31 billion contracts traded, but its growth rate in 2022 is negative 5 per cent. CME, CBOE, ICE and NASDAQ were ranked 3, 4, 5 and 6 respectively with an annual growth rate of 18 percent, 12 percent, 3.5 per cent and -

4.4 percent. Borsa Istanbul Stock Exchange, Turkey, the second fastest growing derivatives exchange after the National Stock Exchange of India, ranked 7th in the list of top derivative exchanges with a year-to-year growth rate of 31 per cent. The top-ranked equity index derivatives based on trading volume are illustrated in following Table 3.9.

Table 3.9

Equity Index Top Contracts by Trading Volume

Rank	Index, Exchange	Jan-Dec 2022 Volume#	Change vs. 2021
1	Bank Nifty Index Options, NSE India	17,779,731,636	108.3%
2	CNX Nifty Index Options, NSE India	13,672,844,647	148.7%
3	Mini Ibovespa Index (WIN) Futures, B3	4,095,005,435	-11.4%
4	SPDR S&P 500 ETF Options*	1,839,648,935	60.4%
5	Nifty Financial Services Index Options, NSE India	1,118,457,216	15472.4%
6	Powershares QQQ ETF Options*	671,075,221	92.2%
7	S&P 500 Index (SPX) Options, CBOE Options Exchange	558,418,890	62.0%
8	S&P Sensex Index (BSX) Options, BSE	526,191,077	-14.4%
9	Kospi 200 Options, Korea Exchange	523,026,110	-2.3%
10	E-mini S&P 500 Futures, Chicago Mercantile Exchange	503,953,011	24.9%
11	Micro E-mini Nasdaq 100 Futures, Chicago Mercantile Exch.	364,950,140	52.6%
12	Micro E-mini S&P 500 Futures, Chicago Mercantile Exchange	343,974,047	57.4%
13	Euro Stoxx 50 Index Futures, Eurex	285,374,104	27.5%
14	Nikkei 225 Mini Futures, Osaka Exchange	275,463,005	23.0%
15	Kospi 200 Weekly Options, Korea Exchange	248,700,237	32.3%

**Traded on multiple US Options Exchanges*

#Volume is measured in terms of the number of futures and options contracts traded and/or cleared per month

Source: Futures Industry Association (https://www.fia.org/fia/etd-tracker)

From table 3.9, it can be inferred that Bank Nifty Index Options of NSE India is the highly traded (17.78 bn) equity derivative product globally with more than 100 percent growth in trade as compared to 2021. The second most traded derivative is Nifty Index Options (13.67 bn), which is also from NSE. The trading volume of NSE Nifty index options grows around 150 per cent as compared to 2021. Another notable fact is that NSE's Nifty Financial Service Index Options is the fastest growing derivative product globally. It grows at a rate of 15472.4 per cent as compared to the last year's trading volume.

3.18 Current Status of Indian Derivatives Market

In India, there are two national level exchanges, NSE and BSE. The performance of Indian stock market can be evaluated on the basis of performance of two exchanges NSE and BSE. The most notable development in the history of the secondary segment of the Indian stock market is the commencement of derivatives trading in June 2000, the Securities and Exchange Board of India (SEBI) approved derivatives trading based on futures contract at NSE and BSE in accordance with the rules and regulations of the stock exchanges. Subsequently, the derivatives products range had been increased by including options and futures on the indices and several highly traded stocks. In an estimate, the product-wise turnover of derivatives on the Indian stock markets as on July 6 2002 is stock futures-50 percent, index futures-21 per cent, stock options-25 per cent and index options-4 per cent *(Gupta, 2017).* The preferences of Indian investors have shifted from stock futures to index options. NSE is the largest derivative trading exchange in India both in terms of number of contracts trades and notional value of contracts traded. The business growths in F&O segment of NSE and BSE, in the last 10 years are given below.

Table 3.10

NSE's Business Growth in FO Segment-Turnover

Year	**Index Futures** Turnover **(Rs.cr.)**	**Stock Futures** Turnover **(Rs.cr.)**	**Index Options** Notional Turnover **(Rs.cr.)**	**Stock Options** Notional Turnover **(Rs.cr.)**	**Total** Turnover **(Rs.cr.)**
2022-23	9520737.97	19072304.37	3734521994.34	59207744.62	3822322781.30
2021-22	8429378.27	21038937.56	1609497197.31	56267621.33	1695233134.47
2020-21	9047645.65	18098365.39	590099062.75	26373034.47	643618108.26
2019-20	6701072.45	14919550.78	311447325.44	12323406.79	345391355.46
2018-19	5568914.47	16147010.86	203302404.91	12582374.84	237600705.08
2017-18	4810454.34	15597519.71	134921876.45	9655008.56	164984859.06
2016-17	4335940.78	11129587.14	72797287.69	6107485.87	94370301.48
2015-16	4557113.64	7828606.00	48951930.60	3488173.75	64825823.99
2014-15	4107215.20	8291766.27	39922663.48	3282552.18	55604197.13
2013-14	3083103.23	4949281.72	27767341.25	2409488.61	38209214.81

Source: NSE (https://www.nseindia.com/market-data/business-growth-fo-segment)

F&Os total turnover at stood at Rs. 3822322781.30 crore as on March 31, 2023 .Of the total turnover, index futures contributed Rs 9520737.97 crore, stock futures Rs 19072304.37 crore , index options Rs 3734521994.34 crore and stock options Rs 59207744.62 crore. For the last 10 years the total turnover of NSE derivatives trade grows at an average annual growth rate of 72 per cent. Year 2021-22 registered a highest growth rate of 163 per cent in derivatives trading turnover, whereas in 2022-23 the growth rate is 125 per cent. Index options were primarily responsible for the sharp increase in turnover. In last two years, the turnover of index options grows at 173 and 132 per cent respectively. The business growth in terms of number of contracts is exhibited in Table 3.11.

Table 3.11

NSE's Business Growth in FO Segment-Number of Contracts

No. of contracts in Million

Year	Index Futures	Stock Futures	Index Options	Stock Options	Total
2022-23	104.74	284.13	40541.93	834.97	41765.77
2021-22	93.66	265.61	17623.36	677.51	18660.14
2020-21	127.60	252.83	7824.04	330.39	8534.86
2019-20	94.78	257.38	4586.69	198.38	5137.23
2018-19	69.82	255.53	2652.46	186.99	3164.8
2017-18	57.67	214.76	1515.03	126.41	1913.87
2016-17	66.54	173.86	1067.24	92.11	1399.75
2015-16	140.54	234.24	1623.53	100.30	2098.61
2014-15	129.30	237.60	1378.64	91.48	1837.02
2013-14	105.25	170.41	928.57	80.17	1284.4

Source: NSE (https://www.nseindia.com/market-data/business-growth-fo-segment)

From Table 3.11, it is clear that there is an increase in the trading of stock and index options at NSE from 2013 to 2023. The total number of contracts has increased from 1284.4 million to 41765.77 million contracts, but in case of index future and stock futures the trend is almost stable. The following Table shows the growth in F&O trading at BSE in last 10 years.

Table 3.12

BSE's Business Growth in FO Segment- Turnover

Year	**Index Futures** Turnover **(Rs.cr.)**	**Stock Futures** Turnover **(Rs.cr.)**	**Index Options** Turnover **(Rs.cr.)**	**Stock Options** Turnover **(Rs.cr.)**	**Total Turnover (Rs.cr.)**
2022-23	58.65	0	34315254.32	0.05	34315313.02
2021-22	493.52	0	66077834.33	0	66078327.85
2020-21	5,010.27	0	35055158.8	0	35060169.07
2019-20	14,933.69	163	2,45,962.57	1209.36	262268.62
2018-19	39.13	17.77	2,193.13	0.08	2250.11
2017-18	3,217.51	36.76	8.21	0.18	3262.66

Year	**Index Futures** Turnover **(Rs.cr.)**	**Stock Futures** Turnover **(Rs.cr.)**	**Index Options** Turnover **(Rs.cr.)**	**Stock Options** Turnover **(Rs.cr.)**	**Total Turnover (Rs.cr.)**
2016-17	2,266.86	203.08	4,469.35	0	6939.29
2015-16	13,097.16	1,349.59	43,86,248.88	74312.69	4475008.32
2014-15	48,632.35	9,794.26	20129226.47	1,75,088	20362741.08
2013-14	63,493.84	54,599.42	90,55,200.61	46,131	9219424.87

Source: BSE (https://www.bseindia.com/markets/keystatics/Keystat_turnover_deri.aspx)

From the above table it can be noted that the F&O segment of BSE showed a high decrease in 2016-17, 2017-18 and 2018-19 financial years. In 2021-22 it has regained all-time high turnover of Rs. 66078327.85 crore. From Table 3.12, it can be inferred that the derivative trading turnover of the Bombay Stock Exchange is not consistently growing like NSE.

As of March 31, 2023, the BSE's derivatives segment has a total turnover of Rs. 34315313 crore. Index options represent 99.9% of the total turnover (Rs 34315254.32 crore). Stock futures, index futures, and stock options all have very low turnover. The total turnover of the BSE derivatives trade has been fluctuating over the past ten years. Table 3.13 shows the increase in business activity as measured by the volume of contracts.

Table 3.13

BSE's Business Growth in FO Segment-Number of Contracts

Year	Index Futures	Stock Futures	Index Options	Stock Options	**Total** No. of Contracts
2022-23	651	-	37,25,84,451	1	37,25,85,103
2021-22	4,454	-	67,05,16,570	0	67,05,21,024
2020-21	53,629	-	33,81,07,329	0	33,81,60,958
2019-20	1,50,212	2,983	25,12,339	16349	26,81,883
2018-19	438	271	30,456	2	31,167
2017-18	44,117	467	114	3	44,701
2016-17	32,288	2,901	88,349	0	1,23,538

Year	Index Futures	Stock Futures	Index Options	Stock Options	Total No. of Contracts
2015-16	3,06,712	51,815	10,34,27,976	2422891	10,62,09,394
2014-15	12,27,926	3,05,714	49,82,34,687	57,10,542	50,54,78,869
2013-14	21,36,269	19,01,877	29,63,59,575	15,44,720	30,19,42,441

Source: BSE (https://www.bseindia.com/markets/keystatics/Keystat_turnover_deri.aspx)

From Table 3.13, it is clear that there is a decrease in the trading of all classes of derivatives at BSE from 2013 to 2023. The total number of contracts has decreased from 670521024 to 372585103 contracts in 2023 as compared to 2022, in the case of index futures and stock futures the trend is almost the same and the trading activity is very less. Unlike in the case of NSE, there is no increasing trend in the trading volume of derivatives in BSE. This evident that the majority trader prefers NSE for trading equity derivatives.

3.18.1 Number of Retail Investors in the Indian Secondary Market

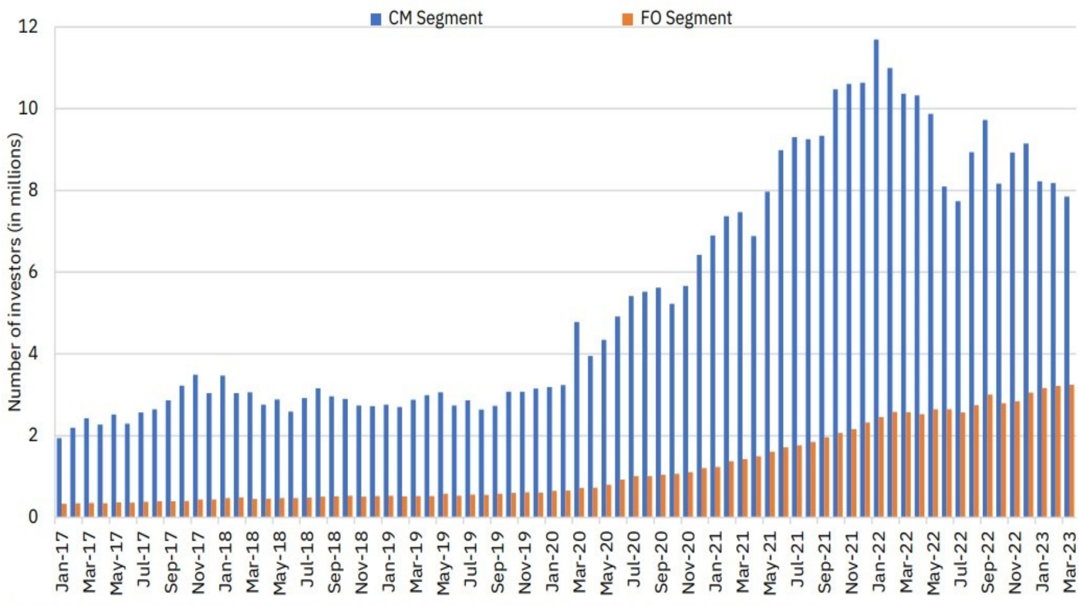
The Indian stock market seems to be maturing day by day and so are the investors. The corrections after the 2021 rally did not deter retail investors to invest in the market *(ICICI Direct, 2022)*. Post the market crash of March 2020 retail investor participation in the stock market has been witnessing explosive growth. In March 2020 the number of demat accounts in India stood at 4.09 crore. Since then, the number of demat accounts has been steadily rising and reached 10 crore in August 2022. Retail investors now account for 52 per cent of daily transactions in the market with DIIs and FIIs accounting for 29 per cent and 19 per cent respectively *(Vijayakumar, 2022)*.

Retail investor participation in the equity market is essential. It promotes the financialisation of savings which, in turn, channelizes savings from idle assets like gold into productive investment, thereby contributing to higher capital formation and economic growth. It enables investors to participate in wealth creation happening through the capital market. However, some unhealthy developments have emerged which deserve serious attention. Large numbers of newbie retail investors have taken to speculation in the stock market in hopes of becoming rich quickly *(Vijayakumar, 2022)*.

The number of retail investors that traded in secondary markets rose sequentially for three months of 2023 sequentially to touch 8 Million in capital markets segment and 3.1 Million in the equity derivatives segment. Figure 3.5 shows the trend of retail trading activity at NSE.

Figure 3.30

Retail trading activity in cash and equity derivative segments of NSE



Source: (NSE, 2023) https://www.nseindia.com/resources/publications-reports-nse-market-pulse#href-1

According to Figure 3.30, the number of retail investors participating in secondary markets has increased significantly from January 2020, rising from 3 million investors to around 8 million in March 2023 in the NSE's CM segment, before peaking in January 2022 at 11.7 million. This is consistent with the recent registrations of new investors. Despite the decline in 2022, the number of active investors remained higher than it was before the pandemic. In the FO segment, the number of retail investors remained consistent at 3.2 million in March 2023 for three consecutive months, marginally higher than the monthly average of 2.8 million for the fiscal year. The monthly average for the CM segment during this period touched 8.8 million.

3.19 Behavioural Finance

Behavioural finance is a relatively new paradigm of finance, which seeks to supplement the standard theories of finance by introducing behavioural aspects to the decision-making process. It attempts to explain why and how markets might be inefficient, and how emotions and mental errors can cause stocks and bonds to be over or undervalued. Behavioural finance is a rapidly growing discipline that deals with the influence of psychology on investment decisions and its subsequent effect on the markets *(Sulphey, 2014)*.

'Behavioural finance is the study of how psychological phenomena impact financial behaviour' *(Shefrin, 2005)*. *W. DeBondt et al., (2004)* define behavioural finance as a theory which explores financial issues with the help of ideas borrowed from cognitive psychology. *Shleifer, (2000)* defines behavioural finance as 'a study of human fallibility in competitive markets' this human fallibility often tends to base decisions on non-rational motivations. It can thus be seen that behavioural finance interferes with rational beliefs and decisions.

3.19.1 Assumptions of Behavioural Finance

The main assumptions of behavioural finance *(Sulphey, 2014)* are as follows:

1. Investors are normal, and not necessarily rational,
2. Markets are not efficient, even if they are difficult to beat,
3. Portfolios are designed according to the rules of behavioural portfolio thinking and not based on the Mean-Variance portfolio theory,
4. The expected returns follow a path in which risk is not measured by beta, and returns are determined not just by risk, and
5. Investors are normally oriented towards the past while making financial decisions. This orientation takes place by fixing certain reference points which includes return generated in the past, and basing future returns on those points.

3.19.2 Behavioural Biases

Any decision-making process requires the appropriate use of mental and financial resources to acquire and process information. In an attempt to make quick and easy decisions, individuals tend to deviate from rationality, or what is required for a standard decision-making process when he or she is rational. These decisions are termed biases. Thus, biases are systematic errors or offshoots of constraints that individuals themselves place on resources, like time, cost or capacity to process the available information about his or her surroundings *(Sulphey, 2014)*. Biases can be internal or external. Internal biases include overconfidence, over-optimism, etc. These biases are controllable if they are aware of the decision-maker. External biases include information overload, insufficient information etc. These biases are not controllable. Another way to classify bias is according to mental processes- intentional and unintentional. A bias is intentional when it use purposefully. Those biases that occur accidentally are termed unintentional biases. Biases can also be classified according to perception. Based on this, biases are classified as emotional bias and cognitive bias.

According to *Ritter, (2003)*, behavioural finance is based on psychology which suggests that human decision processes are subject to several cognitive illusions. These illusions are divided into two groups: illusions caused by heuristic decision process and illusions rooted in the adoption of mental frames grouped in the prospect theory *(Waweru et al., 2008).* These two categories of biases as well as the herding, emotional and market factors are also described in the following section.

3.19.3 Heuristic Theory

Heuristic is of Greek origin and its meaning is serving to find out or discover. It is a process by which individuals find out and establish things for themselves, usually through trial and error, and guesswork. Heuristics are defined as the rules of thumb, which make decision-making easier, especially in complex and uncertain environments. However, they can sometimes lead to biases, especially when things change and can lead to suboptimal investment decisions *(Ritter, 2003). Kahneman and Tversky* seem to be one of the first writers to study the factors belonging to heuristics when introducing three factors namely *representativeness, availability bias,* *and anchoring (Tversky & Kahneman*, 1974). *Waweru et al., (2014)* also list two factors named *Gambler's fallacy and Overconfidence* in heuristic theory. There are a number of heuristics that investors resort to. Some of them are described below:

1. **Representativeness:** Representativeness occurs when the similarity of objects or events confuses people's thinking regarding the probability of an outcome. People frequently make the mistake of believing that two similar things or events are more closely correlated than they actually are. Representativeness refers to the degree of similarity that an event has with its parent population *(W. F. M. DeBondt & Richard H. Thaler, 1995),* or the degree to which an event resembles its population *(Tversky & Kahneman, 1974).* Representativeness may result in some biases such as people putting too much weight on recent experience and ignoring the average long-term rate *(Ritter, 2003)*. For example, share prices often rise when a company reports increased earnings several quarters in a row because investors tend to infer a high long-term earnings growth rate *(Waweru et al., 2008)*.

2. **Availability:** Availability refers to how easily an event comes to mind. *Tversky & Kahneman, (1974)* opine that people rely on availability while judging the frequencies of events. The availability heuristic tends to give higher weights to events that may come to mind more easily. In the availability heuristic more recent and salient events will weigh more heavily and distort the thought process. Thus, in availability bias, people tend to be influenced by 'attention-grabbing information' and make decisions based on associations that facilitate easy recall.

3. **Anchoring:** Anchoring is a phenomenon used in the situation when people use some initial values to make estimations, which are biased toward the initial ones as different starting points yield different estimates *(Tversky & Kahneman, 1974)*. In the financial market, anchoring arises when a value scale is fixed by recent observations. Investors always refer to the initial purchase price when selling or analyzing. Thus, today's prices are often determined by those of the past. Anchoring makes investors define a range for a share price or company's income based on historical trends, resulting in under-reaction to unexpected changes. Anchoring has some connection with representativeness as it also reflects that people often focus on recent experiences and tend to be more optimistic when the market rises and more pessimistic when the market falls *(Waweru et al., 2008)*.

Anchoring arises when investors place too much weight on recent performance. Investors assume that current prices are right and usually use their purchase price as a reference point *(Kahneman & Riepe, 1998).*

4. **Overconfidence Bias:** When people overestimate the reliability of their knowledge and skills, it is the manifestation of overconfidence *(De Bondt & Richard H. Thaler, 1995)*). Many studies show that excessive trading is one effect of overconfidence on investors. There is evidence showing that financial analysts revise their assessment of a company slowly, even in case there is a strong indication proving that the assessment is no longer correct. Investors and analysts are often overconfident in areas in which they have knowledge *(Evans, 2006).* Overconfidence is believed to improve persistence and determination, mental facility, and risk tolerance. In other words, overconfidence can help to promote professional performance. It is also noted that overconfidence can enhance others' perception of one's abilities, which may help to achieve faster promotion and greater investment duration *(Oberlechner & Osler, 2008).*

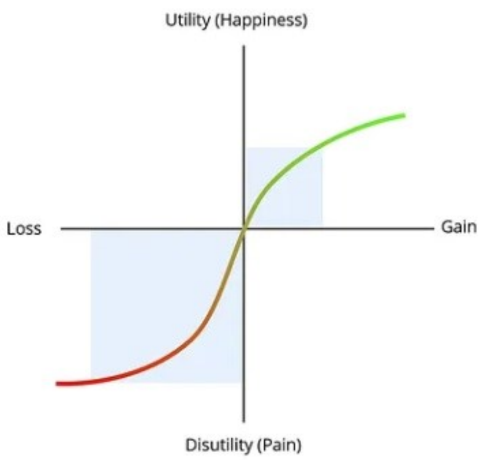
5. **Gamblers' Fallacy:** Gamblers' fallacy is associated with the situation where investors tend to predict a reversal of a particular trend. In most situations, it leads investors to anticipate the end of good or bad market performance. Thus investors who are biased toward a status tend to choose an alternative regardless of whether or not the choice is optimal *(Kempf & Ruenzi, 2006).* The belief that a small sample can resemble the parent population from which it is drawn is known as the "law of small numbers"*(Statman, 1999)* which may lead to a Gamblers' fallacy *(Barberis & Thaler, 2003).* More specifically, in the stock market, Gamblers' fallacy arises when people predict inaccurately the reverse points which are considered the end of good (or poor) market returns *(Waweru et al., 2008).*

3.19.4 Prospect Theory

Prospect theory and Expected Utility Theory (EUT) are viewed as two distinct decision-making methodologies. While EUT focuses on investors' rational expectations, prospect theory emphasizes subjective decision-making affected by the investors' value system *(Filbeck et al., 2005).* People tend to under-weigh probable outcomes compared with certain ones and people respond differently to similar situations depending on the context of losses or gains in which they are presented *(Kahneman & Tversky, 1979)*. Prospect theory describes some states of mind-affecting an individual's decision-making processes including Regret aversion, Loss aversion, and Mental accounting *(Waweru et al., 2008)*. The main contention of the theory is that people assign values to gains and losses and not to assets. This value is assigned through the replacement of probabilities with decision weights. Further, decisions are based on perceived gains rather than perceived losses and are often asymmetric. According to prospect theory, the decision process consists of two specific phases: editing and evaluation. The editing phase organises possible options for simplifying the next phase and makes it easier for the decision-maker to select the option that may provide the highest value. In the evaluation phase, actions related to contingencies and outcomes for each decision choice are evaluated. The edited prospects or decisions are evaluated and those which could deliver the highest values are selected. Further, certain reference points are assigned on a relative basis, wherein appraisal of gains and losses is done. This is followed by assigning a value function that passes through the reference point for each positive or negative outcome. The value function is 'S; shaped with convex below the reference point, and concave above it. This shows that people are risk-seeking with respect to the domain of losses, and risk-averse in the domain of gains. Figure 3.31 shows the value function of prospect theory.

Figure 3.31

Prospect theory



Source: https://sidharthwagle.medium.com/prospect-theory-behavioural-economics

There are a number of prospect variables that influence investors' decisions. Some of them are described below*:*

1. **Regret Aversion:** Regret refers to people's emotional reaction to making a mistake (Plous, 1993). Investors consistently engage in behaviour that they regret later (Hvide, 2002). They avoid selling shares that have decreased in value and readily sell shares that have increased in value (R. Shiller, 1999). Fogel & Berry, (2006) found that investors reported regrets about holding a losing stock too long than about selling a winning stock too soon. Statman, (1999) argued that people tend to feel sorrow and grief after having made an error in judgment. Investors deciding whether to sell a security are typically emotionally affected by whether the security was bought for more or less than the current price.

2. **Loss Aversion:** Loss aversion recognizes that the mental penalty associated with a loss is greater than the mental reward from a similar size gain *(R. J. Shiller, 2000)* There is evidence showing that people are more distressed at the prospect of losses than they are pleased by equivalent gains *(Barberis & Thaler, 2003)*. Moreover, a loss coming after a prior gain is proved less painful than usual while a loss arriving after a loss seems to be more painful than usual *(Barberis & Huang, 2001)*. In addition, *Lehenkari & Perttunen, (2004)* find that both positive and negative returns in the past can boost the negative relationship between the selling trend and capital losses of investors, suggesting that investors are loss averse. Risk aversion can be understood as a common behaviour of investors, nevertheless, it may result in bad decisions affecting investors' wealth *(Odean, 1998).*

3. **Mental Accounting:** Mental accounting is a term referring to "the process by which people think about and evaluate their financial transactions" *(Barberis & Huang, 2001).* Mental accounting allows investors to organize their portfolios into separate accounts *(Barberis & Thaler, 2003). Ritter, (2003)* explained mental accounting with an example: 'People sometimes separate decisions that should, in principle, be combined. For instance, many people have a household budget for food and a household budget for entertainment. At home, where the food budget is present, they will not eat lobster or shrimp because they are much more

expensive than a fish casserole. In a restaurant, however, they will order lobster and shrimp even though the cost is much higher than a simple fish dinner. If they instead ate lobster and shrimp at home, and the simple fish in a restaurant, they could save money. However, because they are thinking separately about restaurant meals and food at home, they choose to limit their food at home.

3.19.5 Herd Behaviour

In the financial market, the herding effect is defined as the propensity of investor behaviour to imitate that of other investors. Since investors tend to depend more on communal knowledge than on private information, the occurrence of herding is typically carefully considered by professionals. As a result, many promising investment opportunities at the moment may be negatively impacted. Academic researchers also pay attention to herding; because its impacts on stock price changes can influence the attributes of risk and return models and this has impacts on the viewpoints of asset pricing theories *(Tan et al., 2008)*.

Herding can lead to several emotional biases in terms of behaviour, such as conformity, congruity, and cognitive conflict, home bias, and gossip. In the security market, herding investors base their investment decisions on the masses' decisions of buying or selling stocks. In contrast, informed and rational investors usually ignore following the flow of the masses, and this makes the market efficient. Herding, on the other hand, results in an inefficient market situation that is typically identified by speculative bubbles. In general, herding investors act the same way as prehistoric men who had little knowledge and information of the surrounding environment and gathered in groups to support each other and get safety *(Caparrelli et al., 2010).*

There are several elements that impact the herding behaviour of an investor, for example, *general market trend*, *the volume of investment*, *news about companies*, *analyst's recommendations* and so on. The more confident the investors are, the more they rely on their private information for investment decisions. In this case, investors seem to be less interested in herding behaviours. When investors put a large amount of capital into their investment, they tend to follow others' actions to reduce the risks, at least in the way they feel. Besides, the preference for herding also depends on types of investors, for example, individual investors have a tendency to follow the crowds in making investment decision more than institutional investors *(Goodfellow et al., 2009).*

(Waweru et al., (2008) propose that herding can drive stock trading and create momentum for stock trading. However, the impact of herding can break down when it reaches a certain level because the cost to follow the herd may increase to get the increasing abnormal returns. *Waweru et al.,(2008)* conclude that buying and selling decisions of an investor are significantly impacted by others' decisions, and herding behaviour helps investors to have a sense of regret aversion for their decisions. For other decisions: choice of stock, length of time to hold stock, and volume of stock to trade, investors seem to be less impacted by herding behaviour. However, these conclusions are given to the case of institutional investors; thus, the result can be different in the case of individual investors because, as mentioned above, individuals tend to herd in their investment more than institutional investors.

3.19.6 Emotional Bias

Emotions are complex mental processes and a varied collection of responses. It is a state of psychic or physical reaction that is subjectively experienced as a strong feeling and involves physiological changes that prepare the body for immediate action *(Sulphey, 2014).* Emotions such as fear, hope greed, attitude, anger, pride, worry, excitement, guilt and mood may also influence investment decision-making. These emotions determine the risk tolerance level of an investor. Further, emotions exert both positive, as well as negative effects on the decision-making process *(Peters & Slovic, 2000).* According to *Nofsinger (2005),* the influence of emotions on trading decisions is larger for more complex and uncertain situations. *Damasio (1994),* even finds that without emotions reasonable decisions are impossible. Emotional investors normally follow their intuition or blindly follow their beliefs, and act in accordance with their beliefs about prices *(Sulphey, 2014).* The emotions most commonly identified as contributing to financial fragility and irrational exuberance include *greed, hope* and *fear (Shefrin, 2002)*. Emotional investors are not concerned with the existence of other market players. They either underweight or over weight the available information. Thus, based on their individual personality traits these investors act either impulsively or conservatively.

3.19.7 Market Impact Bias

DeBondt & Richard H. Thaler, (1995) state that financial markets can be affected by investors' behaviours in the way of behavioural finance. *Waweru et al., (2008)* identified the factors of the market that have an impact on investors' decision-making: Price changes, market information, past trends of stocks, customer preference, overreaction to price changes, and fundamentals of underlying stocks. Normally, changes in market information, fundamentals of the underlying stock and stock price can cause over/under-reaction to the price change. These changes are empirically proven to have a high influence on the decision-making behaviour of investors. Researchers convince that over-reaction *(W. F. M. DeBondt & Thaler, 1985)* or under-reaction *(Lai et al., 2001)* to news may result in different trading strategies by investors and hence influence their investment decisions. According to *(Waweru et al., 2008),* market information has a significant influence on investors' decisions, and as a result, investors tend to focus on well-known stocks and other newsworthy events that are based on stock market information. Moreover, *Barber & Odean, (2000)* emphasize that investors are impacted by events in the stock market which grab their attention, even when they do not know if these events can result in good future investment performance. These investors totally rely on the information quality of the market or stocks that they have when making decisions of investment.

Change in the stock price in this context can be considered an attention-grabbing occurrence in the market by investors. Many investors tend to focus on popular stocks or hot stocks in the market *(Waweru et al., 2008)*. *Odean, (1999)* proposes that investors usually choose the stocks that attract their attention. Besides, the stock selection also depends on the investors' preferences. Momentum investors may prefer stocks that have good recent performance while rational investors tend to sell the past losers and this may help them to postpone taxes. In contrast, behavioural investors prefer selling their past winners to postpone the regret related to a loss that they can meet for their stock trading decisions *(Shefrin & Statman, 1985).*

In general, market factors are not included in behavioural factors because they are external factors influencing investors' behaviours. However, the market factors influence behavioural investors (as mentioned above) and rational investors in different ways, so it is not adequate if market factors are not listed when considering the behavioural factors impacting investment decisions.

3.20 Conclusion

This chapter gives a theoretical framework and a brief description of theories and concepts relating to this research. The first part of this chapter explains the concepts of derivatives, the basics of futures and options trading strategies, and the current status of the global and Indian derivative markets. The second part of this chapter gives a brief outline about behavioural finance and various behavioural biases that influence the decisions of equity investors. The next chapter explains the research methodology applied to achieve the objectives of this research.

REFERENCES

137/2022, C. R. N. (2022). *NSE Circular, Revision in NIFTY Weekly Expiry Options Contract Cycle: Vol. 137/2022* (pp. 1–2). National Stock Exchange of India Limited. https://archives.nseindia.com/content/circulars/FAOP54334.pdf

Annual Review of 2022 ETD Trading Trends- Futures Industry Association. (2023). https://www.fia.org/fia/etd-tracker

Barber, B. M., & Odean, T. (2000). Trading Is Hazardous to Your Wealth : The Common Stock Investment Performance of Individual Investors. *The Journal of Finance*, *55*(2), 773–806. https://doi.org/10.2139/ssrn.219228

Barberis, N., & Huang, M. (2001). Mental Accounting, Loss Aversion, and Individual Stock Returns. *The Journal of Finance*, *56*(4), 1247–1292. https://doi.org/10.2307/2697796

Barberis, N., & Thaler, R. (2003). A survey of Behavioral Finance. In M. H. and R. S. G.M. Constantinides (Ed.), *Handbook of the Economics of Finance* (pp. 1052–1114). Elsevier Science B.V. http://houdekpetr.cz/!data/public_html/papers/economics_psychology/Barberis Thaler 2003.pdf

Bomfin, A. N. (2005). *Understanding Credit Derivatives and Related Instruments*. ElsevierAcademic Press.

Caparrelli, F., Arcangelis, A. M. D., Cassuto, A., Caparrelli, F., Arcangelis, A. M. D., & Cassuto, A. (2010). Herding in the Italian Stock Market : A Case of Behavioral Finance. *Journal of Behavioral Finance*, *5*(4), 222–230. https://doi.org/10.1207/s15427579jpfm0504

Circular NSE. (2023). *Revision in NIFTY BANK (BANKNIFTY) Expiry Futures and Options Contract Cycle In* (pp. 1–2). National Stock Exchange of India Limited. https://archives.nseindia.com/content/circulars/FAOP56967.pdf

Damasio, A. R. (1994). *Descartes' Error: Emotion, Reason and the Human Brain*. Avon Books, New York.

DeBondt, W. F. M., & Richard H. Thaler. (1995). Chapter 13 Financial Decision-Making in Markets and Firms : A Behavioral Perspective. In *Handbooks in Operations Research and Management Science* (Vol. 9, pp. 385–410). Elsevier Science B.V. https://doi.org///doi.org/10.1016/S0927-0507(05)80057-X.

DeBondt, W. F. M., & Thaler, R. (1985). Does the Stock Market Overreact ? *The Journal of Finance*, *40*(3), 793–805. https://doi.org/10.2307/2327804

DeBondt, W., Palm, F., & Wolff, C. (2004). Introduction to the special issue on behavioural finance. *Journal of Empirical Finance*, *11*(4), 423–427. https://doi.org/10.1016/j.jempfin.2004.05.001

Dubofksy, D. A. (2003). *Derivatives- Valuation and Risk Management*. Oxford University Press.

Edwards, F. R., & Maa, C. W. (1992). *Futures & Options*. Mcgraw-Hill Inc.

Evans, D. A. (2006). Subject Perceptions of Confidence and Predictive Validity in Financial Information Cues Subject Perceptions of Confidence and Predictive Validity in Financial Information Cues. *Journal of Behavioral Finance*, *7*(1), 12–28. https://doi.org/10.1207/s15427579jpfm0701

Filbeck, G., Hatfield, P., & Horvath, P. (2005). Risk Aversion and Personality Type. *The Journal of Behavioral Finance*, *6*(4), 170–180. https://doi.org/10.1207/s15427579jpfm0604

Fogel, S. O. C., & Berry, T. (2006). The Disposition Effect and Individual Investor Decisions: The Roles of Regret and Counterfactual Alternatives. *Journal of Behavioral Finance*, *7*(2), 107–116. https://doi.org/10.1207/s15427579 jpfm0702

Fridson, M. S. (1997). Against the Gods: The Remarkable Story of Risk (a review). In *Financial Analysts Journal* (Vol. 53, Issue 2). John Wiley & Sons, Inc. https://doi.org/10.2469/faj.v53.n2.2075

FY 2022 Market Highlights - World Federation of Exchanges. (2022). https://www.world-exchanges.org/our-work/statistics

Goodfellow, C., Bohl, M. T., & Gebka, B. (2009). International Review of Financial Analysis Together we invest ? Individual and institutional investors ' trading behaviour in Poland. *International Review of Financial Analysis*, *18*(4), 212–221. https://doi.org/10.1016/j.irfa.2009.03.002

Gupta, S. L. (2017). *Financial Derivatives - Theory Concepts and Problems* (Second Edi). PHI Learning Private Limited.

https://www.nseindia.com/. (2023). National Stock Exchange of India Limited. https://www.nseindia.com/products-services/equity-derivatives-products

Hull, J. c, & Basu, S. (2017). *Options, Futures, and Other Derivatives* (9th Editio). Pearson India Education Services Pvt. Ltd.

Hvide, H. K. (2002). Pragmatic beliefs and overconfidence. *Journal of Economic Behavior and Organization*, *48*(1), 15–28. https://doi.org/10.1016/S0167-2681(01)00221-9

ICICI. (2022). *Retail Investors Ruling The Indian Stock Market*. ICICI Securities Ltd. https://www.icicidirect.com/ilearn/stocks/articles/retail-investors-ruling-the-indian-stock

IMF. (1998). *IMF Report on Financial Derivatives*. https://www.imf.org/external/bopage/pdf/98-1-20.pdf

Juneja, P. (2020). *The Need for Derivatives*. Management Study Guide. https://www.managementstudyguide.com/types-of-derivatives.htm

Kahneman, D., & Riepe, M. W. (1998). Aspects of Investor Psychology. *The Journal of Portfolio Management*, *24*(4), 52–65. https://doi.org/DOI: https://doi.org/10.3905/jpm.1998.409643

Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, *47*(2), 263–292. https://doi.org/10.2307/1914185

Kempf, A., & Ruenzi, S. (2006). Status Quo Bias and the Number of Alternatives : An Empirical Illustration from the Mutual Fund Industry. *Journal of Behavioral Finance*, *7*(4), 204–213. https://doi.org/10.1207/s15427579 jpfm0704

Kolb, R. W., & Overdahl, J. A. (2007). *Futures, Options and Swaps* (Fifth Edit). Blackwell Publishing, U.K.

Kumar, S. S. S. (2015). *Financial Derivatives*. PHI Learning Private Limited.

Lai, M., Low, K. L. T., & Lai, M. (2001). Are Malaysian Investors Rational ? *The Journal of Psychology and Financial Markets*, *2*(4), 210–215. https://doi.org/ 10.1207/S15327760JPFM0204_5

Lehenkari, M., & Perttunen, J. (2004). Holding on to the Losers : Finnish Evidence Holding on to the Losers : Finnish Evidence. *Journal of Behavioral Finance*, *5*(2), 116–126. https://doi.org/10.1207/s15427579jpfm0502

Mallory, M. L. (2023). Introduction to Option Contracts. In *Price Analysis: A Fundamental Approach to the Study of Commodity Prices*. Bookdown. http://mindymallory.com/PriceAnalysis/introduction-to-option-contracts.html

Market Pulse: A monthly review of Indian Economy and Markets. (2023). *Economic Policy and Research, National Stock Exchange of India Ltd . (NSE)*, *5*(3), 1–192. https://www.nseindia.com/resources/publications-reports-nse-market-pulse#href-1

McDonald, R. L. (2014). Derivative Markets. In *Paper Knowledge. Toward a Media History of Documents* (Third Edit, Vol. 7, Issue 2). Pearson India Education Inc.

National Stock Exchange of India Ltd. (2009). *Options trading strategies: Module workbook*. https://www1.nseindia.com/content/ncfm/sm_otsm.pdf

Nofsinger, J. R. (2005). Social Mood and Financial Economics. *Journal of Behavioral Finance*, *6*(3), 144–160. https://doi.org/10.1207/s15427579jpfm0603_4

Oberlechner, T., & Osler, C. (2008). Overconfidence in Currency Markets. *SSRN Electronic Journal*, 1–39. https://doi.org/10.2139/ssrn.1108787

Odean, T. (1998). Are Investors Reluctant to Realize Their Losses ? *The Journal of Finance*, *53*(5), 1775–1798. https://doi.org/10.1111/0022-1082.00072

Odean, T. (1999). Do Investors Trade Too Much ? *The American Economic Review*, *89*(5), 1279–1298.

Palathara, D. J. S., & Yadukrishnan, V. (2020). A Study on Recent Trends in Derivative Markets in India. *International Journal of Advance Research and Innovative Ideas in Education*, *6*(3), 1743–1751. https://doi.org/10.31142 /ijtsrd23902

Peters, E., & Slovic, P. (2000). The Springs of Action: Affective and Analytical Information Processing in Choice. *Personality and Social Psychology Bulletin2*, *26*(12), 1465–1475. https://doi.org/10.1177/01461672002612002

Plous, S. (1993). *The Psychology of Judgment and Decision Making*. Mcgraw-Hill Book Company.

Ritter, J. R. (2003). Behavioural finance. *Pacific Basin Finance Journal*, *11*, 429–437. https://doi.org/10.1016/S0927-538X(03)00048-9

Shalini, H., & Raveendra, P. (2014). A Study of Derivatives Market in India and its Current Position in Global Financial Derivatives Markets. *IOSR Journal of Economics and Finance*, *3*(3), 25–42. https://doi.org/10.9790/5933-0332542

Shefrin, H. (2002). *Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing*. Oxford University Press. https://doi.org/ 10.1093/0195161211.001.0001

Shefrin, H. (2005). *A Behavioral Approach to Asset Pricing*. Elsevier Academic Press.

Shefrin, H., & Statman, M. (1985). The Disposition to Sell Winners Too Early and Ride Losers Too Long : Theory and Evidence. *The Journal of Finance*, *40*(3), 777–790. https://doi.org/10.1111/j.1540-6261.1985.tb05002.x

Shiller, R. (1999). Human Behavior and the Efficiency of the Financial System. *Handbook of Macroeconomics*, *1*(1), 1305–1340.

Shiller, R. J. (2000). *Irrational Exuberance*. Princeton University Press.

Shleifer, A. (2000). *Inefficient Markets: An Introduction to Behavioural Finance*. Oxford University Press.

Sing, M. (2022). Evolution of Derivatives Market in India. *International Journal for Research in Applied Science & Engineering Technology (IJRASET)*, *10*(1), 1–10. https://doi.org/10.22214/ijraset.2022.39657

Srivastava, R. (2014). *Derivatives and Risk Management*. Oxford University Press.

Statman, M. (1999). Behavioural Finance : Past Battles and Future Engagements. *Financial Analysts Journal*, *55*(6), 18–27. https://doi.org/10.2469/faj.v55.

n6.2311

Sulphey, M. M. (2014). *Behavioural Finance* (First). PHI Learning Private Limited.

Tan, L., Chiang, T. C., Mason, J. R., & Nelling, E. (2008). Herding behaviour in Chinese stock markets : An examination of A and B shares. *Pacific Basin Finance Journal*, *16*, 61–77. https://doi.org/10.1016/j.pacfin.2007.04.004

The Options Guide. (n.d.). The Options Guide.Com. Retrieved April 10, 2023, from https://www.theoptionsguide.com/strip.aspx

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, *185*(4157), 1124–1131. https://doi.org/10.4324/9781912 282562

Varghese, J. (2011). Regulation of Financial Derivatives: Some Policy Considerations. *The IUP Law Review*, *1*(3), 27–42. https://ssrn.com/abstract =2063695

Varma, J. R. (2008). *Derivatives and Risk Management*. Tata McGraw Hill Education Private Limited.

Vijayakumar, V. (2022). Newbie retail investors flocking to the stock market: Who will gain & who will lose? *The Economic Times*. https://economictimes. indiatimes.com/markets/stocks/news/

Waweru, N. M., Munyoki, E., & Uliana, E. (2008). The effects of behavioural factors in investment decision-making : a survey of institutional investors operating at the Nairobi Stock Exchange. *International Journal of Business and Emerging Markets*, *1*(1), 24–41. https://doi.org/DOI:10.1504/IJBEM. 2008.019243

Waweru, N. M., Mwangi, G. G., & Parkinson, J. M. (2014). Behavioural factors influencing investment decisions in the Kenyan property market. *Afro-Asian Journal of Finance and Accounting*, *4*(1), 26–49. https://doi.org/10.1504/ AAJFA.2014.059500

4.1 Introduction

This chapter presents the design and methodology of this research. The validation of measurement scales used in this study is also one of the objectives of this chapter. It describes the research design, data sources, sampling design, instrument development and pilot study, data collection methods, scale validation, and methods of data analysis.

4.2 Research Design

Research design provides the framework for data collection and analysis. To understand the common behaviour of individual derivative traders, a *cross-sectional-descriptive* design is more suitable. When a cross-sectional design is employed, data from more than one case at one single time are collected and analysed *(Carlson & Morrison, 2009).* The relationship between variables is then examined by using the collected data. Cross-sectional studies are particularly useful for studying the prevalence of a particular phenomenon, whether it is assumed to be the cause or the consequence, or both, in a defined population *(Zangirolami-Raimundo et al., 2018)*. This feature is relevant to this study, the first because it fits the nature of this study to describe a common trend of investors' behaviours rather than one specific case, and the second because the data in this study have not been collected in stages but carried out in a single time period. In a descriptive design, a researcher is solely interested in describing the situation or case under their research study. It is a theory-based design method which is created by gathering, analysing, and presenting collected data. Based on the above facts *this study is designed as cross-sectional descriptive and analytical research.*

4.3 Research Methodology

This research is conducted based on a quantitative research strategy. Quantitative is usually associated with studying behaviours rather than meanings, which is in line with the topic of behavioural finance. Furthermore, the main aim is exploring the factors that affect trading decisions which may be only done effectively by employing quantitative research since quantitative research is designed for the identification and description of variables in order to establish the relationship between them *(Wagner et al., 2011)*. In order to achieve the valid results, the reliable and adequate sample size is chosen through the questionnaire. Moreover, quantitative strategy allows us to analyze the result by using statistical methods especially with computer aids. In this study, as hypotheses can be built based on the existing behavioral finance theories, quantitative method is used to test these hypotheses and then qualitative method is made used to analyze the result deeper. Since behavioral finance is a quite complicated field, the findings of this filed need to employ the involvement of financial experts to have appropriate explanations.

4.3.1 Sources of Data

This is empirical research based on both primary and secondary data. The methodology of collecting primary and secondary data described below.

4.3.1.1 Primary Data

Primary data were collected from a sample of equity derivative traders in Kerala by using self-completion questionnaire. Self-completion questionnaire seems to be one of the most common methods of quantitative researches. With a self-completion questionnaire, respondents answer questions by completing the questionnaire themselves.

The primary data were used for drawing inference about trading behaviour, trading strategies, level of knowledge, etc. of Investors in Derivative products in Kerala. Primary Data were collected from 300 sample respondents throughout the State of Kerala during the month of January - May 2022.

4.3.1.2 Secondary Data

Secondary data required for the study were compiled from the websites of NSE, BSE, FIA, WFE, journals, books, magazines and other websites.

4.3.2 Sampling Design

The process by which the sampling units for the study are chosen from the population's sampling frame is discussed below.

4.3.2.1 Target Population

The entire collection of elements that are chosen for analysis in accordance with the research's goals makes up the target population for the study. All equity derivatives traders in the state of Kerala are included in the study's target population.

4.3.2.2 Sampling Frame

The complete list of active equity derivatives traders in the state of Kerala constitutes the sampling frame for this study.

4.3.2.3 Sampling Unit

The individual equity derivative trader who resides in the state of Kerala is the sampling unit for this study.

4.3.2.4 Sampling Technique

The population for the study is quite large and spread throughout the state of Kerala. It is not possible to conduct a census survey. Hence a sample study will be planned. Since the sampling frame is not available and sampling units are identified from the population selectively, purposive sampling method is adopted in this study (*Panneerselvam, 2016*). In this study two methods are used to reach respondents; direct interview method and online data collection method. In direct interview method equity derivative traders were identified with the help of stock brokers and using personal contacts and by using interview schedule necessary data were collected. In the online data collection method, the questionnaire in Google form was distributed among equity derivative traders through Stock Broking firms, dealers, traders and social media groups of derivative traders. The social media groups like Telegram groups, Facebook group and WhatsApp group of derivative traders were used to reach the respondents for this study.

4.3.2.5 Sample Size

Sample sizes of 300 traders were determined based on pilot study data analysis.

4.3.2.6 Determination of Sample Size

In order to determine sample size for the study, the standard deviation of the main variables used in this study were calculated from the data obtained from the pilot study. Among these standard deviations, the highest standard deviation was taken to calculate the sample size *(Aday & Cornelius, 2006).* The following table shows the descriptive statistics of the variables used in the Pilot survey.

Table 4.1

Descriptive Statistics of Pilot Survey

Sl. No.	Purpose of Measurement	No. of Variables used	No. of respondents	Mean Score	Standard Deviation
1	Level of knowledge about Derivative market and Trading strategies	15	75	3.37	0.58
2	Trading Preferences and Strategies	11	75	3.29	0.71
3	Behavioural Biases of Derivative Traders	15	75	3.45	0.50
4	Trading Performance and satisfaction	7	75	3.46	**0.86**

Source: Pilot survey

The following formula was used to determine the sample size

$$n = \frac{Z_{1-\alpha/2}^{2} \times \sigma^{2}}{e^{2}}$$

n= Sample size

α = Level of significance

σ = Standard Deviation

e = Acceptable error (10%)

$$n = \frac{1.96^2 \times 0.86^2}{0.1^2} = 283.89 \text{ ,}$$

The minimum number of samples required for the study is found as 284. Total 324 responses have been obtained and after screening of the data 300 responses (sample) were selected for the main study.

4.3.3 Instruments Used for Data Collection

Structured questionnaire is used for collecting data from selected respondents. Tools like observation, interviews, etc. were also used to collect data.

4.3.3.1 Questionnaire Design

The questionnaire is structured into five parts:

1. Level of Knowledge about derivative market and trading strategies,
2. Trading preferences and strategies,
3. Behavioral factors influencing trading decisions,
4. Trading performance and
5. Demography General Information.

This research is based on the theories of behavioral finance: Heuristic theory, Prospect theory, and other theories about impacts of behavioral factors on investors' decision making, which are mentioned by *Waweru et al., (2008)* and many other authors cited in the literature review, to synthesize a set of questions related to behavioral factors influencing investment decisions and investment performance. In these parts, the 5-point Likert scales, which are rating scales widely used for asking respondents' opinions and attitudes *(Fisher, 2010)*, are utilized to ask the individual investors to evaluate the degrees of their agreement with the statements relating to knowledge level, trading strategies, influence of behavioural factors and trading performance. The 5 points in the scale are respectively from 1 to 5: Strongly disagree, Disagree, Neutral, Agree and Strongly Agree. The types of measurements used in the questionnaire are presented in Table 4.2.

Table 4.2

Measurement scales used in the questionnaire

Part	Purpose of measurement	Question Number	Types of Measurements
1	Level of Knowledge	1-15	5-point Likert Scale
2	Trading Preferences and Strategies	16-24	Nominal Scale
		25-35	5-point Likert Scale
3	Behaviour Factors Influencing Trading Decisions	36-50	5-point Likert Scale
4	Trading Performance	51-56	5-point Likert Scale
		57-59	Ratio scale
		60-62	Nominal Scale
5	Demographic variables and General information	63-65, 67, 68, 72, 74, 78	Nominal Scale
		66, 69-71, 73, 75, 76, 77	Ratio scale

Source: Author

4.3.4 Data Processing and Analysis

The online responses collected from 300 equity derivative traders in Kerala were automatically stored as Excel (CSV) file in Google forms which is exported to SPSS Version 22 for further coding. The labels and values and scales are entered in the variable view of the SPSS file. The 5-point Likert scale item responses are accordingly coded as values 5 for Strongly Agree, 4 for Agree, 3 for Neutral, 2 for Disagree and 1 for Strongly Disagree.

Descriptive statistics including frequencies, mean and standard deviation are used to identify the pattern of responses apart from the basic profile of the respondent. But in order to achieve the research objectives mentioned in Chapter 1, various hypotheses stated are tested using the statistical tools such as mean, standard deviation, correlation, one sample t-test, two sample t-test, one-way ANOVA, Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA) and Structural Equation Modelling. The statistical software SPSS Version 22 and SPSS AMOS Version 23 are used for the analysis.

1. **Mean:** Mean is the measured "centre" value of a group of numbers. It is the average of a collection of values.

2. **Standard Deviation:** Standard deviation is a measure of the amount of variation or dispersion of a set of values. A low standard deviation indicates that the values tend to be close to the mean of the set, while high standard deviation indicates that values are spread out over a wide range.

3. **Percentages:** Percentages express a ratio as a fraction of 100. Percentages are a valuable tool in descriptive statistics. As a relative frequency, they provide a way to understand and summarize the distribution of data.

4. **Correlation Analysis:** Correlation is the degree of association between two variables and is represented in terms of a coefficient known as correlation coefficient.

5. **One Sample t-test:** The one-sample t-test is a statistical hypothesis test used to determine whether an unknown population mean is different from a specific value (Mean of response scale).

6. **Independent Sample t-test:** The two-sample t-test (also known as the independent samples t-test) is a method used to test whether the unknown population means of two groups are equal or not.

7. **One-way ANOVA:** One-way analysis of variance (ANOVA) is a statistical method for testing for differences in the means of three or more groups.

8. **Tukey's HSD test:** Tukey's Honest Significant Difference (HSD) test is a post hoc test commonly used to assess the significance of differences between pairs of group means. Tukey HSD is often a follow up to one-way ANOVA, when the F-test has revealed the existence of a significant difference between some of the tested groups.

9. **LSD test:** The least significant difference (LSD) test is used in the context of the analysis of variance, when the F-ratio suggests rejection of the null hypothesis, that is, when the difference between the population means is significant. This test helps to identify the populations whose means are statistically different.

10. **Exploratory Factor Analysis (EFA):** In multivariate statistics, exploratory factor analysis (EFA) is a statistical method used to uncover the underlying structure of a relatively large set of variables.

11. **Confirmatory Factor Analysis (CFA):** Confirmatory Factor Analysis (CFA) is a multivariate statistical method used to check the relationship between measured variables and its constructs. It is a special form of factor analysis to specify the pattern of factor loadings based on the theoretical and empirical data. It is applied to test the fitness of predetermined factors to an observed data. It demonstrates the number of factors required in the sample data in which measured variables influence the latent variables. The Structural Equation Modelling (SEM) is used to construct a proposed model and measurement model to define factor structure of observed variables.

12. **Structural Equation Modelling (SEM):** SEM is a multivariate statistical technique used to analyse the causal relationship between dependent and independent variables with the help of structural models. It is the combination of confirmatory factor analysis and multiple regressions between the variables of the study. It also demonstrates the hypothesized path of directional linkage among set of observed variables. Accordingly, SEM is designed to define the linearity of the

latent constructs by computing the value of regression co-efficient to exhibit the explanatory power of the independent variables to the dependent variables. Therefore, it has used to solving a set of questions formed between the constructs of the model before analysing the validity through the specified values of Model Fit Indices.

4.4 Pilot Study

In order to test the measurement scale and to check the reliability and validity of the questionnaire a pilot study with 75 respondents was conducted from October - December 2021. Based on the data collected in the pilot study, the reliability and validity of the questionnaire were determined, and necessary modifications were done in the questionnaire.

4.5 Development of Measurement Scales

Measurement is a crucial scientific activity because it helps researchers to learn about individuals, things, events, and systems. Measurement scales can be used to provide scores in a numerical dimension to phenomena that cannot be directly quantified *(Morgado et al., 2017).* They consist of sets of items revealing levels of theoretical variables otherwise unobservable by direct means *(Robert F. Devellis, 2017).*

In this study the measurement scales were developed in three phases that span nine steps *(Boateng et al., 2018).*

1. In the first phase, items are generated through literature review and the validity of their content is assessed through discussion with experts in derivative market.

2. In the second phase, the scale is constructed. Steps in scale construction include pre-testing the questions, administering the survey, reducing the number of items through Exploratory Factor Analysis (EFA), and understanding how many factors the scale captures.

3. In the third phase, scale evaluation, the number of dimensions is tested, reliability is tested, and validity is assessed through Confirmatory Factor Analysis.

4.6 Determination of Validity of Measurement Scale

Validity explains how well the collected data covers the actual area of investigation *(Ghauri & Gronhaug, 2010)*. Validity basically means "measure what is intended to be measured" *(Field, 2005)*. Validity can be classified in to two: Content validity and Construct validity.

4.6.1 Content Validity

Content validity is defined as "the degree to which items in an instrument reflect the content universe to which the instrument will be generalized" *(Straub et al., 2004)*. The judgmental approach to establish content validity involves literature reviews and then follow-ups with the evaluation by expert judges or panels. *To ensure content validity of the questionnaire, in this study, the researcher conducted discussions with five experts in derivative market.* The list of experts is presented in Table 4.3.

Table 4.3

List of experts interviewed to ensure content validity

Sl. No.	Name	Profile
1	T. S. Anantharaman	Chairman, Leo Pharma; Former Member, Executive Committee of NSE, Former Chairman, Catholic Syrian Bank; Member of Board of Director, Motilal Oswal
2	Akshay Agarwal	Managing Director, Acumen Capital Markets India Ltd.
3	Dr. V K Vijayakumar	Chief Investment strategist, Geojit Financial Services Ltd.
4	Uthara Ramakrishnan	Proprietor, Artha Financial Services; Stock Broker, Business Associate, Motilal Oswal
5	Sarath Lal	Full time Options trader, Bulls Moves, Calicut

Source: Author Compiled Data

4.6.2 Construct Validity

Construct validity refers to how well you translated or transformed a concept, idea, or behaviour that is a construct into a functioning and operating reality, the operationalization. Construct validity has two components: *Discriminant* validity *Convergent Validity (Taherdoost, 2016).*

4.6.2.1 Discriminant Validity

Discriminant Validity is the extent to which latent variable A discriminates from other latent variables (e.g., B, C, D). Discriminant validity means that a latent variable is able to account for more variance in the observed variables associated with it than; a) measurement error or similar external, unmeasured influences; or b) other constructs within the conceptual framework. If this is not the case, then the validity of the individual indicators and of the construct is questionable *(Fornell & Larcker, 1981)*. In brief, Discriminant validity (or divergent validity) tests that constructs that should have no relationship do, in fact, not have any relationship.

4.6.2.2 Convergent Validity

Convergent validity refers a parameter often used in sociology, psychology, and other behavioural sciences, refers to the degree to which two measures of constructs that theoretically should be related, are in fact related. In brief, convergent validity tests that constructs that are expected to be related are, in fact, related.

With the purpose of verifying the construct validity (*Discriminant and Convergent validity*), a factor analysis was performed on a sample of 75 respondents included in the pilot study, using principal component analysis (PCA) with varimax rotation method *(Koh & Nam, 2005).* Items loaded above 0.40, which is the minimum recommended value in research are considered for further analysis. Also, items cross loading above 0.40 should be deleted. Therefore, the factor analysis results will satisfy the criteria of construct validity including both the *discriminant validity* (loading of at least 0.40, no cross-loading of items above 0.40) and *convergent validity* (eigen values of 1, loading of at least 0.40, items that load on posited constructs) *(Straub et al., 2004).*

After the completion of data collection from 300 respondents, in order to evaluate the scale, the number of dimensions is tested, reliability is tested, and validity is assessed through Confirmatory Factor Analysis (CFA). The result of Exploratory Factor

Analysis and Confirmatory Factor Analysis was presented in the following sections of this chapter.

4.7 Validation of Measurement Scale – Level of Knowledge of Equity Derivative Traders

The scale used to measure the construct 'Knowledge level' of equity derivative traders is validated in two steps. Firstly, an exploratory factor (EFA) is performed on a sample of 75 responses obtained in the pilot study. Finally, a confirmatory factor analysis (CFA) is applied to assess the quality of the factor structure by statistically testing the significance of the overall model, as well as the relationships among items and scales based on 300 sample data.

a) **Exploratory Factor Analysis (EFA)** technique is primarily used to identify the factors that are latent in nature and hence difficult to observe. It is used to determine the degree to which the items are related to the construct. The EFA is performed on a data set of 75 responses (Pilot study data). Three sets of EFA are respectively done on each section of the study namely, Level of Knowledge, Trading Strategy and Influence of Behavioural factors. This has effectively generated sub-constructs (Factors) for each these constructs. In each stage, the factors derived from exploratory factor analysis were confirmed by applying confirmatory factor analysis (CFA) and then check its reliability and construct validity by using appropriate methods.

   Exploratory factor analysis requires certain basic assumptions to be satisfied namely correlation and sampling adequacy. The KMO Bartlett test include Bartlett test of sphericity that measures the multivariate normality of variables in addition to analyzing whether the correlation matrix is an identity matrix (i.e., a spherical set of multivariate data). The Kaiser-Meyer-Olkin (KMO) test can measure whether the sample size is adequate for conducting factor analysis, *(George & Paul Mallery, 1999).* EFA is only a technique for grouping items under one construct and does not support any hypothesis. Reliability of the factors was calculated using the Cronbach's alpha. A Cronbach's alpha value of greater than or equal to 0.7 is considered acceptable for the factor to be reliable *(Hair et. al. 2010).*

b) Confirmatory Factor Analysis (CFA) is a multivariate statistical procedure that is used to test how well the measured variables represent the number of constructs. Confirmatory Factor Analysis (CFA) is a covariance structure analysis, that represents a set of techniques for theory testing with co relational data *(Bentler & Bonett, 1980).* CFA and EFA are similar techniques, but in EFA, data are simply explored and provides information about the numbers of factors required to represent the data. In EFA, all measured variables are related to every latent variable. But in CFA, researchers can specify the number of factors required in the data and which measured variable is related to which latent variable. Confirmatory factor analysis is a tool that is used to confirm or reject the measurement theory. The researcher can use CFA to test the hypothesis that a relationship between the observed variables and their underlying latent constructs exist. The researcher uses knowledge of the theory, empirical research, or both, postulates the relationship pattern of a priori and then tests the hypothesis statistically.

In this research CFA is used to confirm the validity of the scales used for measuring the *Knowledge level about Derivative trading*, *Trading techniques and strategies of equity derivative traders*, *Influence of behavioural factors on trading decisions* and *trading performance* of equity derivative traders in Kerala. CFA is a measurement model of Structural Equation Modeling (SEM), which deals with the relationship between observed measures or indicator. This statistical technique tells us the suitability of theoretical specification of factors to the reality. It is used to confirm the factor structure of a set of observed variables. Measurement models of four constructs used in the study is tested by a Confirmatory Factor Analysis by using IBM SPSS Amos-23. These measurement models were developed to test the with regard to different socioeconomic variables. Reliability of the scale developed for the study was also tested by using Cronbach's alpha value method.

4.7.1 Exploratory Factor Analysis - Level of Knowledge

Exploratory factor analysis using principal component method with varimax rotation is used for analyzing factor structure and correlation between 20 statements included in the scale for measuring the level of knowledge about derivative market. Since some of the items were cross loaded, and these items were removed. The factor analysis was repeated using the same procedure, which gives the following results.

Table 4.4

KMO and Bartlett's Test –Level of Knowledge

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.872
Bartlett's Test of Sphericity	Approx. Chi-Square	932.558
	Df	105
	Sig.	.000

Source: Pilot survey

The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, KMO which is improved after reducing the number of statements and above the acceptable limit of 0.5 Bartlett's test of sphericity χ^2 =932.55, p<0. 001 indicated that correlations between items were sufficiently large for PCA. An initial analysis was run to obtain eigen values for each component in the data. 4 components had eigen values of above 1 and in combination explained 70.182% of the variance. The result of EFA is presented in Table 4.5 below.

Table 4.5

Result of EFA- Level of Knowledge

Factors	Knowledge variables	Factor Loadings	Eigen Value	Variance Explained	Cronbach's Alpha
Trading Knowledge	KW8-Basic futures/option strategies	.528	5.710	35.685	0.891
	KW9 - Option Greeks	.833			
	KW10 -Technical charts	.887			
	KW11- Delta neutral trading	.743			
	KW15 -Options trading strategies like Straddle, Strangle, etc	.673			

Factors	Knowledge variables	Factor Loadings	Eigen Value	Variance Explained	Cronbach's Alpha
Market Knowledge	KW3 -SEBI regulations	.714	2.471	15.445	0.885
	KW4 - Leverage risk	.822			
	KW5-NSE margin requirements	.787			
	KW6-Brokerage other charges	.789			
	KW7- Tax treatment of F&O gain/loss	.648			
Conceptual Knowledge	KW1- Basic concepts of Derivatives	.837	1.811	11.320	0.893
	KW2-Derivative products trading in India	.888			
Advanced Knowledge	KW12- Option strategy builder software and its uses	.609	1.237	7.732	0.756
	KW13- Algo trading and its benefits	.761			
	KW14-Pair Trading Strategies	.750			
Total Variance Explained				**70.182%**	

Source: Pilot survey

The results of revised exploratory factor analysis (Table 4.5) shows that the solution is based on 4 factors and all items are loading on their own. The four-factor solution is explaining 70.182% of the total variance. Five items are about trading knowledge explaining over 35.66 per cent of variance, five items are about market knowledge explaining over 15.45 per cent of variance, two items are about conceptual knowledge explaining over 11.32 per cent of variance and finally three items are about advanced trading knowledge explaining over 7.73 per cent of variance. In total, the four factors together explain over 70.18 per cent of variance.

Construct Validity: Table 4.5 shows that all the items have factor loadings of 0.40, and also, there are no items with cross loading above 0.40. Therefore, the factor analysis results satisfy the criteria of construct validity including both the *discriminant* *validity* (loading of at least 0.40, no cross-loading of items above 0.40) and *convergent validity* (eigen values of 1, loading of at least 0.40, items that load on posited constructs) *(Straub et al., 2004)*. The result of exploratory factor analysis shows that the selected factors have good level of validity.

Reliability of the factors was calculated using the Cronbach's alpha. The Cronbach's alpha value of all factors are greater than 0.7. A Cronbach's alpha value of greater than or equal to 0.7 is considered acceptable for the factor to be reliable *(Hair, et. al. 2010).*

The Table 4.5 shown above provides names of the four factors along with items, factor loadings and percentage of variance explained by each factor. Compared with the intended measurement scales, the factor analysis results met the theory very well.

The items that cluster on the same components suggest that component 1 represents "Trading *Knowledge"*, component 2 "*Market Knowledge,* component 3 "*Conceptual Knowledge"* and component 4 "*Advanced Knowledge.*

The next step is to conduct a confirmatory factor analysis (CFA) for the Knowledge level sub constructs identified from the exploratory factor analysis to assess whether the factors generated from exploratory factor analysis have the same underlying structure as the intended measurement structure.

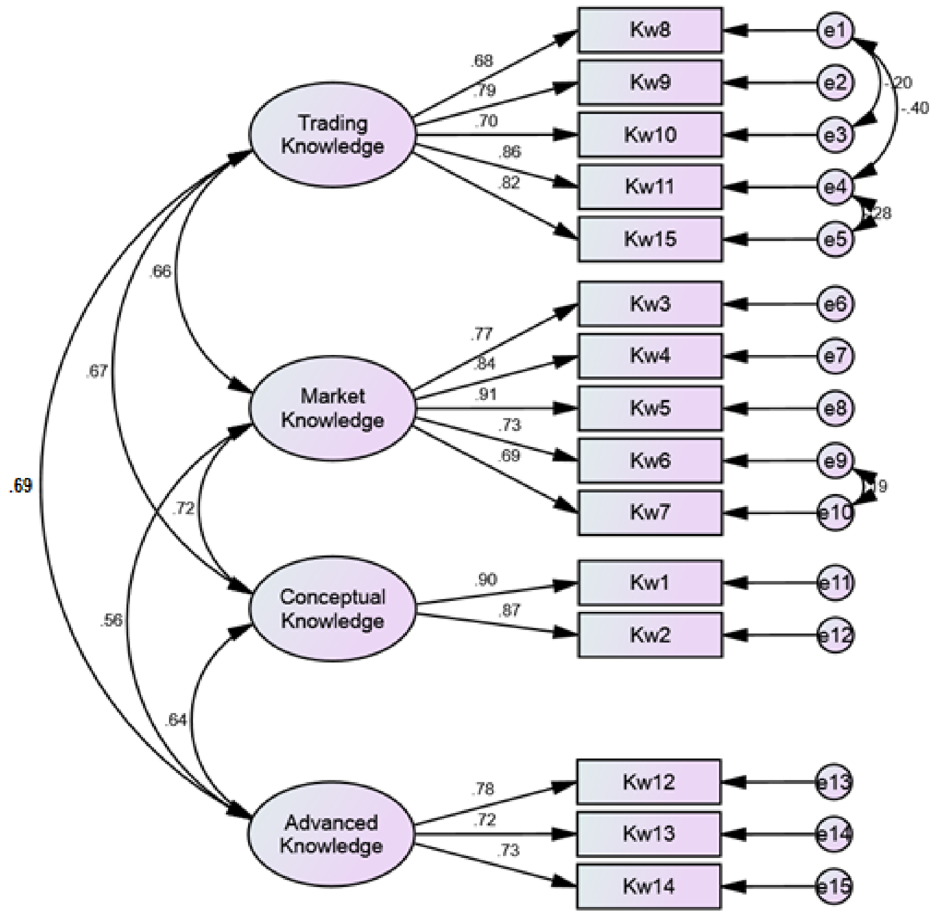
4.7.2 Confirmatory Factor Analysis – Level of Knowledge (First Order CFA)

After identifying four factors through exploratory factor analysis, the next stage is to confirm the factor structure on data collected from total sample. Structural equation modeling (SEM) using AMOS 23 was used to perform the confirmatory factor analysis. Confirmatory factor analysis revealed that the measurement items loaded in accordance with the pattern revealed in the exploratory factor analysis. In order to examine the factor structure of knowledge about derivative market the researcher has formulated the hypothesis that *there is relationship between observed variables and their underlying latent constructs*. The main objective of CFA is to test whether the sample data fit for a hypothesized measurement model regarding the level of knowledge. This study, using a sample (N = 300), tested the fit of first-order model via maximum likelihood. The proposed model of Knowledge about derivative market consists of four factors, namely trading knowledge, market knowledge, conceptual knowledge and advanced trading knowledge. These factors have been identified based on exploratory factor analysis.

The CFA on the construct Level of Knowledge about Derivative trading consisted of *four factors* and *fifteen items/statements*. Figure 4.1 shows the result of CFA measurement model.

Figure 4.1

CFA Measurement model –Level of Knowledge about Derivative trading



Source: Primary Data

The above measurement model comprised four sub-factors of trading knowledge of equity derivative traders *(Trading knowledge, Market knowledge, Conceptual knowledge and Advanced knowledge*). The path estimates between constructs and items are illustrated in Table 4.6.

Table 4.6

Path estimates and Regression Weights of CFA measurement model - Level of Knowledge about Derivative Trading

Sl. No.	Path	Estimate	S.E.	C.R.	P	Standardized Loadings
1	KW8 ← Trading knowledge	1.000				.678
2	KW9 ← Trading knowledge	1.538	.130	11.870	<.01***	.788
3	KW10 ← Trading knowledge	1.259	.126	9.988	<.01***	.700
4	KW11 ← Trading knowledge	1.659	.148	11.221	<.01***	**.861**
5	KW15 ← Trading knowledge	1.654	.137	12.081	<.01***	.817
6	KW3 ← Market knowledge	1.000				.766
7	KW4 ← Market knowledge	1.172	.076	15.374	<.01***	.840
8	KW5 ← Market knowledge	1.334	.079	16.786	<.01***	**.911**
9	KW6 ← Market knowledge	.959	.074	12.994	<.01***	.729
10	KW7 ← Market knowledge	1.102	.090	12.273	<.01***	.694
11	KW1 ← Conceptual knowledge	1.000				**.898**
12	KW2 ← Conceptual knowledge	.938	.055	17.142	<.01***	.866
13	KW12 ← Advanced knowledge	1.000				**.781**
14	KW13 ← Advanced knowledge	.884	.073	12.159	<.01***	.720
15	KW14 ← Advanced knowledge	.871	.071	12.250	<.01***	.725

Source: Primary data *** *Significant at 1% level*

The table 4.6 shows the regression weights of each path included in the measurement model of Knowledge about derivative trading. The standardised regression weights of all the statements are satisfactory and standardised loadings of all the statements are above 0.5, which indicates that all the variables are satisfactorily contributes to the variance of the construct. The *p*-values of all the variables included in the construct are highly significant and indicates the desirability of respective variables. An item with highest loading in a construct contributes more to the variance of the construct. The variable *Knowledge about delta neutral trading (kw11)* is the highest loading item (0.861) which contributes more to the factor '*Trading Knowledge'*. The item *Knowledge about NSE margin requirements (kw5)* contributes more to the factor

'Market Knowledge' (with loading of 0.911), *Knowledge about basic concepts of derivative* contributes more to the '*Conceptual Knowledge',* and the statement *Knowledge about option strategy builder* contributes more to *'Advanced trading Knowledge.*

Model validity estimates for convergent and discriminate validity are analysed and discussed in the following section. Table 4.7 illustrates the result of model validity estimation.

Table 4.7

Validity and Reliability of CFA measurement model - Level of Knowledge about Derivative Trading

Construct	Items	Statements on Level of Knowledge	Factor Loadings	CR	AVE	MSV
Trading knowledge	KW8	Knowledge about Basic futures/Options strategies	.678	0.880	0.596	0.476
	KW9	Trading based on Option Greeks	.788			
	KW10	Trading based on technical charts	.700			
	KW11	Knowledge about Delta neutral trading	.861			
	KW15	Knowledge about Complex trading strategies like straddle, strangle etc. and its uses	.817			
Market knowledge	KW3	SEBI regulations & guidelines relating to derivative trading	.766	0.893	0.627	0.514
	KW4	Leverage Risks in F&O trading	.840			
	KW5	NSE's new Margin requirements for F&O trading	.911			
	KW6	Brokerage and other charges relating to F&O trade	.729			

Construct	Items	Statements on Level of Knowledge	Factor Loadings	CR	AVE	MSV
	KW7	Tax treatment of F&O trading gain/loss	.694			
Conceptual knowledge	KW1	Knowledge about the basic concepts of Derivatives	.898	0.875	0.778	0.514
	KW2	Derivative products trading in India	.866			
Advanced Trading knowledge	KW12	Option strategy builder software and its uses	.781	0.787	0.552	0.476
	KW13	Knowledge about Algo trading and its benefits	.720			
	KW14	Knowledge about Pair Trading Strategies	.725			

Source: Primary data

Table 4.7 shows the Standardised Factor Loadings (SFL) of each item included in the measurement model of Knowledge about derivative trading. The standardised loadings of all the statements are above 0.5, which indicates that all the variables satisfactorily contribute to the variance of the construct. The *Composite Reliability* (CR) values and Average Variance Extracted (AVE) values of all the constructs are greater than 0.5. Hence, we can confirm the *convergent validity* of the scale and it also established that each of the variable used for the measurement correlate strongly with its construct '*Level of Knowledge about derivative marke*t'.

The *discriminant validity* of the scale is tested by comparing the Maximum Shared Variance (MSV) with Average Variance Extracted (AVE) for each construct. For all factors the values of AVE are greater than MSV (AVE>MSV), which empirically proves the discriminant validity of the scale used to measure the construct '*Level of Knowledge about derivative marke*t'.

Since the model validity estimates for convergent and discriminate validity are satisfactory the next step is to check the model fitness. The structural equation model using Amos produces several indices of fit like measure of goodness of fit, badness of fit, incremental fit, comparative fit and parsimony fit etc. The result of model fit analysis is illustrated in Table 4.8.

Table 4.8

Model Fit Indices- Level of Knowledge about Derivative Trading

Sl. No.	Indices	Value Obtained	Suggested Value
1	**CMIN/DF**	2.781	< 5.00 *(Hair, et al., 2010)*
2	**GFI** (Goodness of Fit Index)	0.915	> 0.90 *(Hair, et al., 2010)*
3	**AGFI** (Adjusted Goodness of Fit Index)	0.828	> 0.80 *(Hair, et al., 2010)*
4	**RMR** (Root Mean Square Residuals)	0.072	< 0.08 *(Hu & Bentler, 1999)*
5	**RMSEA** (Root Mean Square Error of Approximation)	0.076	< 0.08 *(Hair, et al., 2010)*
6	**NFI** (Normed Fit Index)	0.989	>0.90 *(Hair, et al., 2010)*
7	**CFI** (Comparative Fit Index)	0.922	> 0.90 *(Hu & Bentler, 1999)*
8	**TLI** (Tucker Lewis Index)	0.988	>0.90 *(Hair, et al., 2010)*

Source: Primary Data

Analysis revealed acceptable fit for the four-factor solution as the value CMIN/DF of 2.781 is less than 5, GFI (0.915) is greater than 0.90, and AGFI (0.828) is greater than 0.80. The two badness of fit indices also produces lesser result than acceptable limit of 0.08, since RMSEA = 0.076, RMR=0.072, which indicates that the discrepancy between actual and predicted covariances are less. The values of incremental fit indices NFI (0.989), CFI (0.922) and TLI (0.988) are greater than the acceptable value of 0.90. The result of analysis shows that there is adequate fit for the measurement model, there for we can confirm the result of exploratory factor analysis of the construct Knowledge about derivative trading.

4.8 Validation of Measurement Scale – Trading Strategies of Equity Derivative Traders

The scale used to measure the construct 'Trading Strategies' of equity derivative traders is validated in two steps. Firstly, an Exploratory Factor Analysis (EFA) is performed on a sample of 75 responses obtained in the pilot study. Finally, a Confirmatory Factor Analysis (CFA) is applied to assess the quality of the factor structure by statistically testing the significance of the overall model, as well as the relationships among items and scales based on 300 sample data.

4.8.1 Exploratory Factor Analysis – Trading Strategies

Exploratory factor analysis using principal component method with varimax rotation is used for analyzing factor structure and correlation between 11 statements included in the scale for measuring trading strategies of derivative traders. The results are presented below.

Table 4.9

KMO and Bartlett's Test- Trading strategies

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.794
Bartlett's Test of Sphericity	Approx. Chi-Square	259.931
	Df	55
	Sig.	.000

Source: Pilot Survey

A principal component analysis was conducted on the 11 items with varimax rotation. The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, KMO value is 0.794, which is above the acceptable limit of 0.50. Bartlett's test of sphericity $\chi^2 = 259.931$, $p<0.001$ indicated that correlations between items were sufficiently large for PCA.

An initial analysis was run to obtain eigenvalues for each component in the data. 3 components had eigenvalues over Kaiser's criterion of 1 and in combination explained 59.132% of the variance. The result of EFA is presented in Table 4.10.

Table 4.10

Result of EFA- Trading strategies

Factors	Trading strategy variables	Factor Loadings	Eigen Value	Variance Explained	Cronbach's Alpha
Advanced strategy	TS2- Trading based on option strategy builder software	.651	3.303	30.023	0.712
	TS3 – Use of Algo trading	.502			
	TS8 – Trading based on Option Greeks	.771			
Basic strategy	TS1 –Stop-loss trading strategy	.593	2.141	19.466	0.762
	TS5 – Trading index derivatives	.719			
	TS6- Trading based on risk-reward ratio	.697			
	TS7-Option writing strategy	.764			
Moderate strategy	TS4- Trading based on foreign stock index	.665	1.061	9.643	0.867
	TS9- Trading based on PCR	.606			
	TS10-Trading based on Volatility Index	.796			
	TS11- Always consider cost of strategy while trading	.686			
	Total Variance Explained			**59.132%**	

Source: Pilot Survey

The results of exploratory factor analysis (Table 4.10) shows that the solution is based on 3 factors and all items are loaded on their own. The three-factor solution is explaining 59.132% of the total variance. Three items are included in the factor 'Advanced Strategy', explaining over 30.02 per cent of variance, four items are included in 'Basic Strategy', explaining over 19.466 per cent of variance, and finally four items are included in Moderate strategy which explains over 9.643 per cent of variance. In total, the three factors together explain over 59.132 per cent of variance.

Construct Validity: Table 4.11 shows that all the items have factor loadings of above 0.40, and also, there are no items with cross loadings. Therefore, the factor analysis results satisfy the criteria of construct validity including both the *discriminant validity* (loading of at least 0.40, no cross-loading of items above 0.40) and *convergent validity* (eigen values of 1, loading of at least 0.40, items that load on posited constructs) *(Straub et al., 2004)*. The result of exploratory factor analysis shows that the selected factors under the construct 'trading strategy' have good level of validity.

Reliability of the factors was calculated using the Cronbach's alpha. The Cronbach's alpha value of all factors are greater than 0.7. A Cronbach's alpha value of greater than or equal to 0.7 is considered acceptable for the factor to be reliable *(Hair, et al., 2010).*

The Table 4.10 shown above provides names of the three factors along with items, factor loadings and percentage of variance explained by each factor. Compared with the intended measurement scales, the factor analysis results met the theory very well.

The items that cluster on the same components suggest that component 1 represents "Advanced strategy", component 2 "Basic strategy", and component 3 "Moderate strategy".

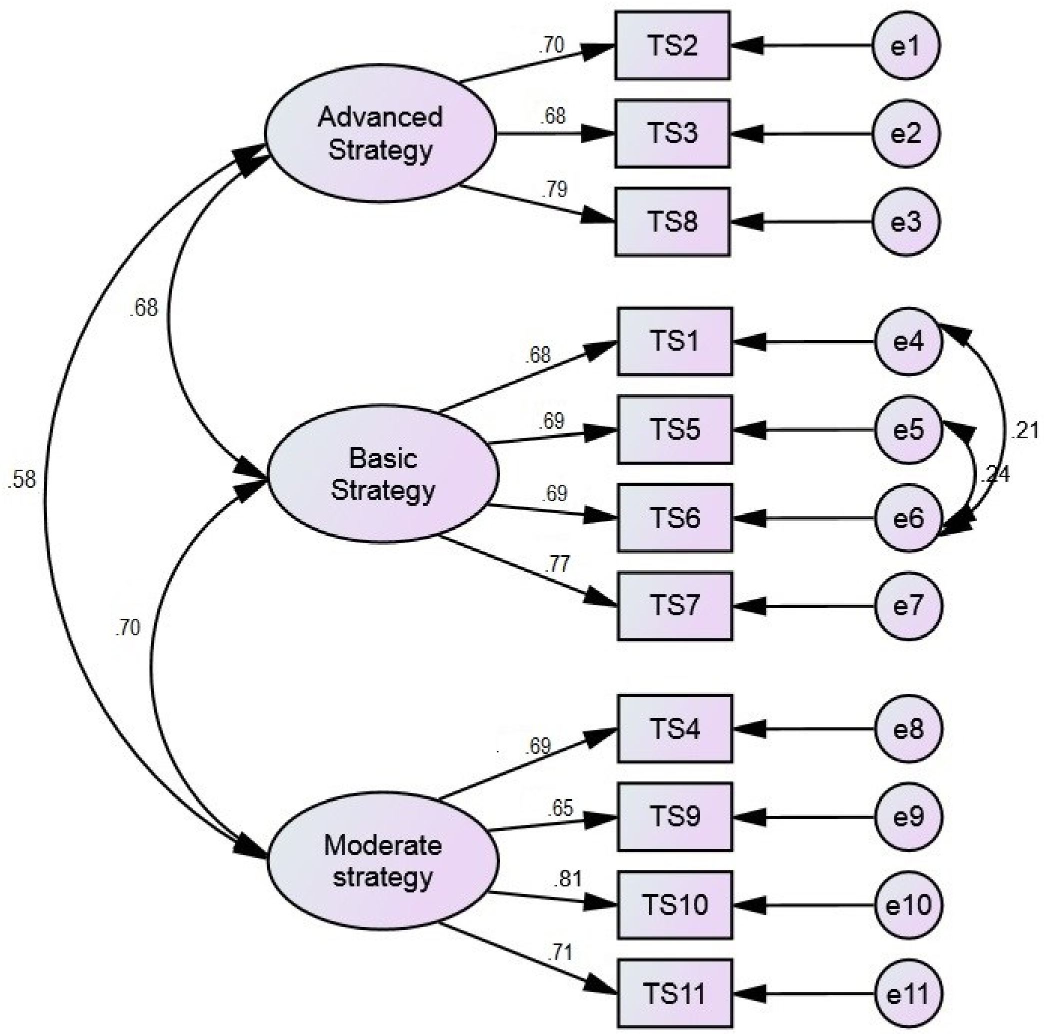
The next step is to conduct a Confirmatory Factor Analysis (CFA) for the trading strategy level sub constructs identified from the exploratory factor analysis to assess whether the factors generated from exploratory factor analysis have the same underlying structure as the intended measurement structure.

4.8.2 Confirmatory Factor Analysis – Trading Strategies of Equity Derivative Traders (First Order CFA)

After identifying three factors under the construct 'trading strategies' through exploratory factor analysis, the next stage is to confirm the factor structure on data collected from total sample. Structural Equation Modelling (SEM) using AMOS 23 was used to perform the confirmatory factor analysis. Confirmatory factor analysis revealed that the measurement items were loaded in accordance with the pattern revealed in the exploratory factor analysis. The proposed model of trading strategies of equity derivative traders consists of three factors, namely advanced trading strategy, Basic trading strategy and Moderate trading strategy. The CFA on the construct trading strategies of equity derivative traders consisted of *three factors* and *eleven items/statements*. Figure 4.2 shows the result of CFA measurement model.

Figure 4.2

CFA Measurement model – First Order: Trading strategies of Equity derivative traders



Source: Primary Data

The above measurement model comprised three sub-factors of trading strategies of equity derivative traders *(Advanced strategy, Basic strategy, and Moderate strategy)*. The path estimates between constructs and items are illustrated in Table 4.11.

Table 4.11

Path estimates and Regression Weights of CFA measurement model - Trading strategies of equity derivative traders

Sl. No.	Path	Estimate	S.E.	C.R.	P	Standardized Loadings
1	TS2 ← Advanced Strategy	1				.699
2	TS3 ← Advanced Strategy	0.337	0.086	3.93	<.01***	.682
3	TS8 ← Advanced Strategy	1.122	0.139	8.082	<.01***	.795
4	TS1 ← Basic Strategy	1				.684
5	TS5 ← Basic Strategy	1.661	0.798	2.082	0.037	.693
6	TS6 ←Basic Strategy	2.863	1.211	2.363	0.018	.695
7	TS7 ←Basic Strategy	4.721	2.074	2.277	0.023	.772
8	TS4 ← Moderate Strategy	1				.692
9	TS9 ← Moderate Strategy	0.841	0.129	6.509	<.01***	.652
10	TS10 ← Moderate Strategy	1.343	0.171	7.856	<.01***	.806
11	TS11 ← Moderate Strategy	0.696	0.128	5.449	<.01***	.705

Source: Primary data ****Significant at 1% level*

Table 4.11 shows the regression weights of each path included in the measurement model of trading strategies of equity derivative traders. The standardised regression weights of all the statements are satisfactory and standardised loadings of all the statements are more than 0.5, which indicates that all the variables are satisfactorily contributes to the variance of the construct. The *p*-values of all the variables included in the construct are highly significant and indicates the desirability of respective variables. An item with highest loading in a construct contributes more to the variance of the construct. The variable *Trading based on option Greeks (TS8)* is the highest loading item (0.795) which contributes more to the factor 'Advanced strategy'. The item *Preference to option writing strategy (TS7)* contributes more to the factor *'Basic strategy'* (with loading of 0.772), and *Trading based on Volatility Index (TS10)* contributes more to the factor '*Moderate strategy* (with loading of 0.806).

Model validity estimates for convergent and discriminate validity of the construct 'trading strategy' are analysed and discussed in the following section. Table 4.12 illustrates the result of model validity estimation.

Table 4.12

Validity and Reliability of CFA measurement model – Trading Strategies of Equity derivative traders

Construct	Items	Statements on Level of Knowledge	Factor Loadings	CR	AVE	MSV
Advanced strategy	TS2	Trading using option strategy builder	.699	0.770	0.529	.462
	TS3	Use of Algorithmic trading	.682			
	TS8	Trading based on option greeks	.795			
Basic Strategy	TS1	Stop-loss trading strategy	.684	0.804	0.507	.490
	TS5	Always prefer index futures and option	.693			
	TS6	Trading based on Risk-reward ration	.695			
	TS7	Always prefer option writing than buying	.772			
Moderate Strategy	TS4	Trading based on movement of foreign stock indices	.692	0.807	0.513	0.490
	TS9	Trading based on PCR ratio	.652			
	TS10	Trading based on Volatility Index	.806			
	TS11	Always consider cost of strategy while trading	.705			

Source: Primary data

Table 4.12 shows the Standardised Factor Loadings (SFL) of each item included in the measurement model of trading strategies of equity derivative traders. The standardised loadings of all the statements are above 0.5, which indicates that all the variables satisfactorily contribute to the variance of the construct. The *Composite*

Reliability (CR) values and Average Variance Extracted (AVE) values of all the constructs are greater than 0.5. Hence, we can confirm the *convergent validity* of the scale and it also established that each of the variable used for the measurement correlate strongly with its construct '*Trading strategy*'.

The *discriminate validity* of the scale is tested by comparing the Maximum Shared Variance (MSV) with Average Variance Extracted (AVE) for each construct. For all factors the values of AVE are greater than MSV (AVE>MSV), which empirically proves the discriminant validity of the scale used to measure the construct '*Trading strategy'*.

Since the model validity estimates for convergent and discriminate validity are satisfactory the next step is to check the model fitness. The result of model fit analysis is illustrated in Table 4.13.

Table 4.13

Model Fit Indices- Trading strategies

Sl. No.	Indices	Value Obtained	Suggested Value
1	**CMIN/DF**	2.036	< 5.00 *(Hair, et al., 2010)*
2	**GFI** (Goodness of Fit Index)	0.955	> 0.90 *(Hair, et al., 2010)*
3	**AGFI** (Adjusted Goodness of Fit Index)	0.924	> 0.80 *(Hair, et al., 2010)*
4	**RMR** (Root Mean Square Residuals)	0.080	< 0.08 *(Hu & Bentler, 1999)*
5	**RMSEA** (Root Mean Square Error of Approximation)	0.059	< 0.08 *(Hair, et al., 2010)*
6	**NFI** (Normed Fit Index)	0.892	>0.90 *(Hair, et al., 2010)*
7	**CFI** (Comparative Fit Index)	0.935	> 0.90 *(Hu & Bentler, 1999)*
8	**TLI** (Tucker Lewis Index)	0.908	>0.90 *(Hair, et al., 2010)*

Source: Primary Data

Analysis revealed acceptable fit for the three-factor solution as the value CMIN/DF of 2.036 is less than 5, GFI (0.955) is greater than 0.90, and AGFI (0.924) is greater than 0.80. The two badness of fit indices also produces lesser result than acceptable limit of 0.08, since RMSEA = 0.059, RMR=0.08, which indicates that the discrepancy between actual and predicted covariances are less. The values of incremental fit indices NFI (0.892), CFI (0.935) and TLI (0.908) are greater than the acceptable value of 0.90. The result of analysis shows that there is adequate fit for the measurement model, there for we can confirm the result of exploratory factor analysis of the construct 'Trading strategy'.

4.9 Validation of Measurement Scale – Behavioural Biases

The scale used to measure the construct 'Behavioural Biases' of equity derivative traders is validated in two steps. Firstly, an Exploratory Factor Analysis (EFA) is performed on a sample of 75 responses obtained in the pilot study. Finally, a Confirmatory Factor Analysis (CFA) is applied to assess the quality of the factor structure by statistically testing the significance of the overall model, as well as the relationships among items and scales based on 300 sample data.

4.9.1 Exploratory Factor Analysis (EFA) – Behavioural Biases

Exploratory factor analysis using principal component method with varimax rotation is used for analyzing factor structure and correlation between 15 statements included in the scale for measuring behavioural biases equity derivative traders. The results are presented below.

Table 4.14

KMO and Bartlett's Test- Behavioural Biases

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.652
Bartlett's Test of Sphericity	Approx. Chi-Square	396.952
	df	105
	Sig.	.000

Source: Pilot Survey

A principal component analysis was conducted on the 15 items with varimax rotation. The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, KMO value is 0.652, which is above the acceptable limit of 0.50. Bartlett's test of sphericity χ^2 = 396.952, p<0. 001 indicated that correlations between items were sufficiently large for PCA.

An initial analysis was run to obtain eigen values for each component in the data. Five components had eigenvalues over Kaiser's criterion of 1 and in combination explained 67.058% of the variance. The result of EFA is presented in Table 4.15.

Table 4.15

Result of EFA- Behavioural biases

Factors	Behavioural bias variables	Factor Loadings	Eigen Value	Variance Explained	Cronbach's Alpha
Heuristics	TB1-Once I win a strategy, then I try more similar strategy next time	.840	3.038	15.487	0.797
	TB2- I have a tendency to trade Based on the technical charts	.800			
	TB3-I always believe that my skills and knowledge can help me to make profit	.670			
	TB4When a trade results in a loss, I always believe that my next trade will be a gain	.772			
Prospect	TB5-I always prefers trading in low-risk strategy	.762	2.756	15.283	0.729
	TB6-I am always focusing on avoiding loss more than on making gain	.553			
	TB7-I generally gives different weight to different income.	.926			

Factors	Behavioural bias variables	Factor Loadings	Eigen Value	Variance Explained	Cronbach's Alpha
Herding	TB8-I consider open interest, volume, etc., to identify market trend	.695	1.726	12.520	0.744
	TB9-I consider analyst's recommendations	.849			
	TB10-I always considers news about the companies/events	.812			
Emotional bias	TB11-I prefer to trade in F&O as it generates quick profit	.862	1.436	11.957	0.791
	TB12-I sometimes tends to hold on a losing position with the hope of recovery	.699			
	TB13-Usually I square off a profitable position too early due to fear of loss	.542			
Market impact	TB14-I consider market sentiments	.742	1.102	11.811	0.721
	TB15-I consider past trends of stocks	.741			
Total Variance Explained				**67.058%**	

Source: Pilot Survey

The results of exploratory factor analysis (Table 4.15) shows that the solution is based on 5 factors and all items are loaded on their own factors. The five-factor solution is explaining 67.058% of variance of the total variance. Four items are included in the factor 'Heuristics', explaining over 15.49 per cent of variance, three items are included in the factor 'Prospect', explaining over 15.28 per cent of variance, three items are included in the factor 'Herding', explaining over 12.52 per cent of variance, three items are included in the factor 'Emotional bias', explaining over 11.96 per cent of variance and finally two items are included in the factor 'Market Impact' which explains over 11.81 per cent of variance. . In total, the three factors together explain over 67.06 per cent of variance.

Construct Validity: Table 4.15 shows that all the items have factor loadings of above 0.40, and also there are no items with cross loadings. Therefore, the factor analysis results satisfy the criteria of construct validity including both the *discriminant validity* (loading of at least 0.40, no cross-loading of items above 0.40) and *convergent validity* (eigen values of 1, loading of at least 0.40, items that load on posited constructs) *(Straub et al., 2004)*. The result of exploratory factor analysis shows that the selected factors under the construct 'Behavioural bias' have good level of validity.

Reliability of the factors was calculated using the Cronbach's alpha. The Cronbach's alpha value of all factors are greater than 0.7. A Cronbach's alpha value of greater than or equal to 0.7 is considered acceptable for the factor to be reliable *(Hair, et al., 2010).*

The Table 4.16 shown above provides names of the three factors along with items, factor loadings and percentage of variance explained by each factor. Compared with the intended measurement scales, the factor analysis results met the theory very well.

The items that cluster on the same components suggest that component 1 represents "Heuristics*"*, component 2 "Prospect variable"*,* component 3 "Herding*", component 4 "Emotional bias", and* component 5 "Market impact".

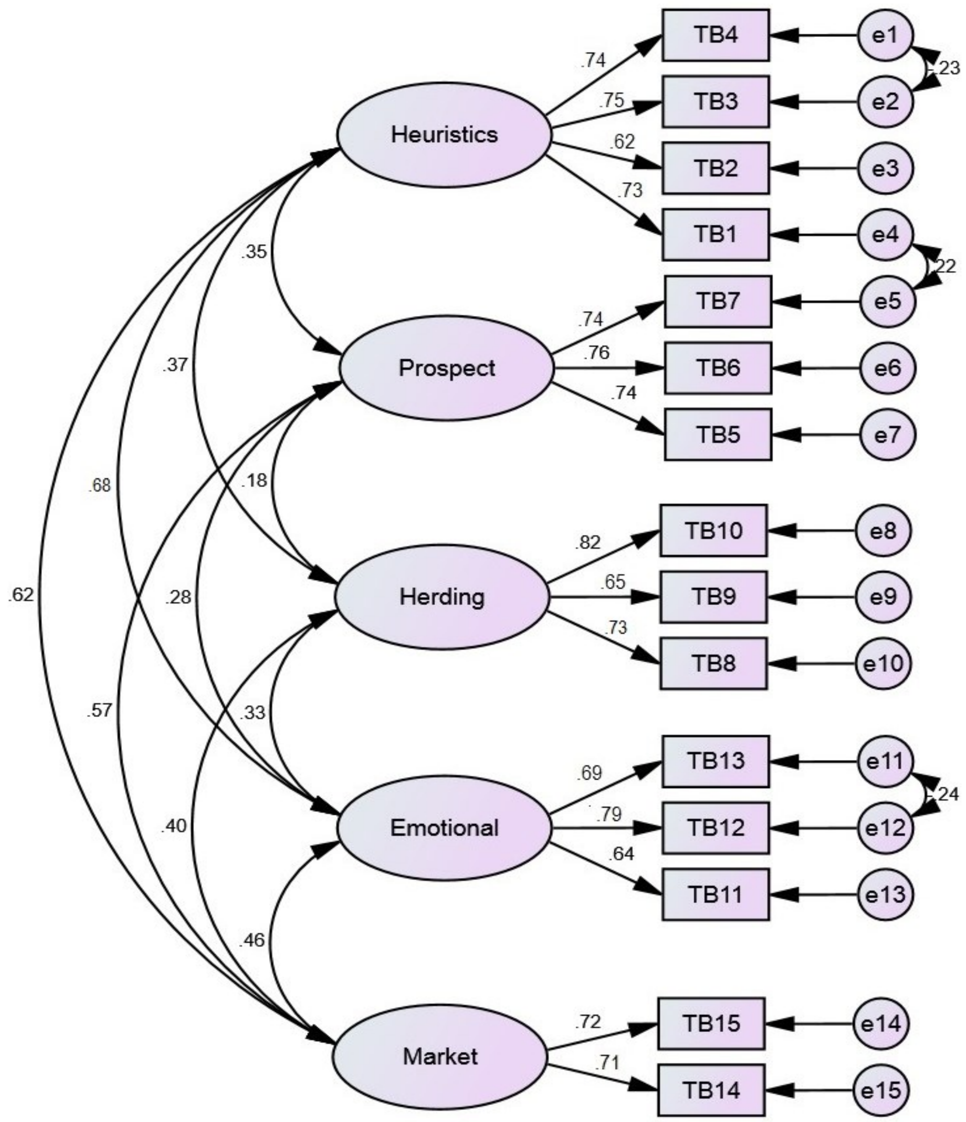
The next step is to conduct a Confirmatory Factor Analysis (CFA) for the Behavioural bias level sub constructs identified from the exploratory factor analysis to assess whether the factors generated from exploratory factor analysis have the same underlying structure as the intended measurement structure.

4.9.2 Confirmatory Factor Analysis – Influence of Behavioural Factors

After identifying five factors under the construct 'emotional bias', through exploratory factor analysis, the next stage is to confirm the factor structure on data collected from total sample. Structural Equation Modelling (SEM) using AMOS 23 was used to perform the confirmatory factor analysis. Confirmatory factor analysis revealed that the measurement items loaded in accordance with the pattern revealed in the exploratory factor analysis. The proposed model of behavioural biases of equity derivative traders consists of five factors, namely Heuristics, Prospect, Herding, Emotional and Market impact. The CFA on the construct Behavioural biases of equity derivative traders consisted of *five factors* and *fifteen statements*. Figure 4.3 shows the result of CFA measurement model.

Figure 4.3

CFA Measurement model –First order: Behavioural biases



Source: Primary Data

The above measurement model comprised five sub-factors of behavioural biases of equity derivative traders *(Heuristics, Prospect, Herding, Emotional bias and Market impact)*. The path estimates between constructs and items are illustrated in Table 4.16.

Table 4.16

Path estimates and Regression Weights of CFA measurement model – Behavioural biases of equity derivative traders

Sl. No.	Path	Estimate	S.E.	C.R.	P	Standardized Loadings
1	TB1 ← Heuristics Bias	1.057	.282	3.746	<.01***	.732
2	TB2 ← Heuristics Bias	0.978	.265	3.693	<.01***	.621
3	TB3 ← Heuristics Bias	1.286	.337	3.814	<.01***	**.751**
4	TB4 ← Heuristics Bias	1.00				.741
5	TB5 ← Prospect Bias	1.75	.274	6.377	<.01***	.743
6	TB6 ← Prospect Bias	1.689	.265	6.362	<.01***	**.759**
7	TB7 ← Prospect Bias	1.00				.743
8	TB8 ← Herding Bias	0.226	.087	2.598	<.01***	.726
9	TB9 ← Herding Bias	0.724	.168	4.312	.009	.646
10	TB10 ← Herding Bias	1.00				**.829**
11	TB11 ← Emotional Bias	1.551	.354	4.381	<.01***	.640
12	TB12 ← Emotional Bias	1.469	.337	4.365	<.01***	**.792**
13	TB13 ← Emotional Bias	1.00				**.**689
14	TB14 ← Market Impact bias	0.81	.116	6.975	<.01***	.712
15	TB15 ← Market Impact bias	1.00				**.722**

Source: Primary data *** *Significant at 1% level*

Table 4.16 shows the regression weights of each path included in the measurement model of behavioural bias. The standardised regression weights of all the statements are satisfactory and standardised loadings of all the statements are above 0.5, which indicates that all the variables are satisfactorily contributes to the variance of the construct. The *p*-values of all the variables included in the construct are highly significant and indicate the desirability of respective variables. An item with highest loading in a construct contributes more to the variance of the construct. The statement '*I always believe that my skills and knowledge can help me to make profit' (TB3)* is the highest loading item (0.751) which contributes more to the factor 'Heuristics*'*. The item '*Always focusing on avoiding loss more than on making gain' (TB6)* contributes more to the factor *'Prospect'* (with loading of 0.759). The statement '*I always consider news about the companies/events' (TB10)* contributes more to the factor 'Herding' (0.829), The statement *'I sometimes tend to hold on a losing position with the hope of recovery' (TB12)* contributes more to the factor *'Emotional bias'* (Loading 0.792), and the statement *'I consider past trends of stocks',* contributes more to the factor *'Market Impact'* with factor loadings of 0.722.

Model validity estimates for convergent and discriminate validity are analysed and discussed in the following section. Table 4.17 illustrates the result of model validity estimation.

Table 4.17

Validity and Reliability of CFA measurement model – Behavioural Bias

Construct	Items	Statements	Factor Loadings	CR	AVE	MSV
Heuristics	TB1	Once I win a strategy, then I try more similar strategy next time	.732	0.805	0.509	0.462
	TB2	I have a tendency to trade Based on the technical charts	.621			
	TB3	I always believe that my skills and knowledge can help me to make profit	.751			
	TB4	When a trade results in a loss, I always believe that my next trade will be a gain	.741			
Prospect	TB5	I always prefer trading in low-risk strategy	.743	0.792	0.561	0.325
	TB6	I am always focusing on avoiding loss more than on making gain	.759			
	TB7	I generally give different weight to different income.	.743			
Herding	TB8	I consider open interest, volume, etc, to identify market trend	.726	0.780	0.544	0.160
	TB9	I consider analyst's recommendations	.646			
	TB10	I always consider news about the companies/events	.829			

Construct	Items	Statements	Factor Loadings	CR	AVE	MSV
Emotional	TB11	I prefer to trade in F&O as it generates quick profit	.640	0.751	0.504	0.462
	TB12	I sometimes tend to hold on a losing position with the hope of recovery	.792			
	TB13	Usually I square off a profitable position too early due to fear of loss	.689			
Market	TB14	I consider market sentiments	.712	0.679	0.519	0.384
	TB15	I consider past trends of stocks	.722			

Source: Primary data

Table 4.17 shows the Standardised Factor Loadings (SFL) of each item included in the measurement model of behavioural biases. The standardised loadings of all the statements are above 0.5, which indicates that all the variables satisfactorily contribute to the variance of the construct. The *Composite Reliability* (CR) values and Average Variance Extracted (AVE) values of all the constructs are greater than 0.5. Hence, we can confirm the *convergent validity* of the scale and it also established that each of the variable used for the measurement correlate strongly with its construct 'Behavioural bias'.

The *discriminant validity* of the scale is tested by comparing the Maximum Shared Variance (MSV) with Average Variance Extracted (AVE) for each construct. For all factors the values of AVE are greater than MSV (AVE>MSV), which empirically proves the discriminant validity of the scale used to measure the construct 'Behavioural bias'.

Since the model validity estimates for convergent and discriminate validity are satisfactory the next step is to check the model fitness. The structural equation model using Amos produces several indices of fit like measure of goodness of fit, badness of fit, incremental fit, comparative fit and parsimony fit etc. The result of model fit analysis is illustrated in Table 4.18.

Table 4.18

Model Fit Indices- Behavioural biases

Sl. No.	Indices	Value Obtained	Suggested Value
1	**CMIN/DF**	4.38	< 5.00 *(Hair, et al., 2010)*
2	**GFI** (Goodness of Fit Index)	.968	> 0.90 *(Hair, et al., 2010)*
3	**AGFI** (Adjusted Goodness of Fit Index)	.879	> 0.80 *(Hair, et al., 2010)*
4	**RMR** (Root Mean Square Residuals)	.079	< 0.08 *(Hu & Bentler, 1999)*
5	**RMSEA** (Root Mean Square Error of Approximation)	.072	< 0.08 *(Hair, et al., 2010)*
6	**NFI** (Normed Fit Index)	.954	>0.90 *(Hair, et al., 2010)*
7	**CFI** (Comparative Fit Index)	.900	> 0.90 *(Hu & Bentler, 1999)*
8	**TLI** (Tucker Lewis Index)	.952	>0.90 *(Hair, et al., 2010)*

Source: Primary Data

The analysis revealed acceptable fit for the five-factor solution as the value CMIN/DF of 4.38 is less than 5, GFI (0.968) is greater than 0.90, and AGFI (0.879) is greater than 0.80. The two badness of fit indices also produces lesser result than acceptable limit of 0.08, since RMSEA = 0.072, RMR=0.079, which indicates that the discrepancy between actual and predicted covariances are less. The values of incremental fit indices NFI (0.954), CFI (0.900) and TLI (0.952) are greater than the acceptable value of 0.90. The result of analysis shows that there is adequate fit for the measurement model, there for we can confirm the result of exploratory factor analysis of the construct Behavioural bias.

4.10 Validation of Measurement Scale – Trading Performance

Based on the literature review, the investment return rate and investment satisfaction levels are suggested as criteria for measuring the performance of investments in this study. Three statements each were asked to respondents to measure the performance and satisfaction of equity derivative traders in Kerala. In addition to that two questions were asked to measure the actual return. Since there are only six scaled variables used for measuring the trading performance the EFA is not performed to check the validity.

But CFA is used to confirm the reliability and validity of the scale used to measure trading performance. The result of reliability test is illustrated in Table 4.19.

Table 4.19

Result of Reliability test- Trading Performance

No. of statements	Cronbach's Alpha
6	0.759

Source: Pilot Survey

Reliability of the scale was calculated using the Cronbach's alpha. The Cronbach's alpha value of the construct is 0.759 (greater than 0.7). A Cronbach's alpha value of greater than or equal to 0.7 is considered acceptable for the factor to be reliable *(Hair, et al., 2010).*

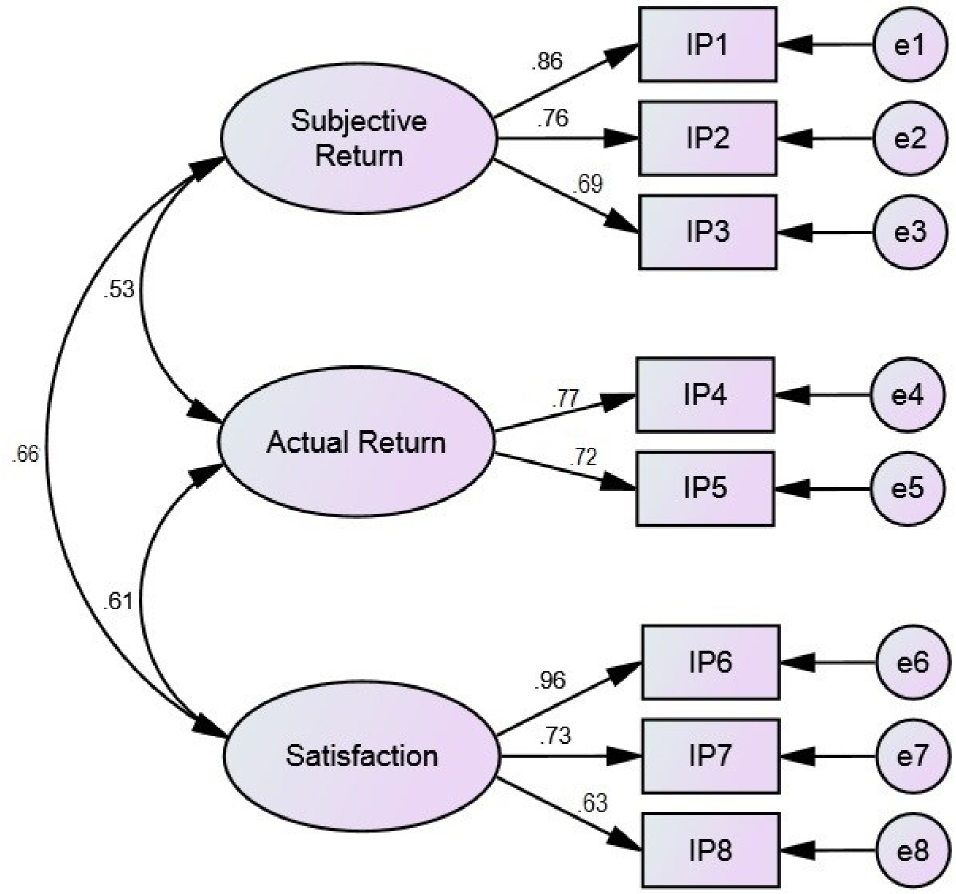
The next step is to conduct a Confirmatory Factor Analysis (CFA) for the Trading Performance level sub constructs identified based on literature review.

4.10.1 Confirmatory Factor Analysis – Trading Performance

Structural Equation Modeling (SEM) using AMOS 23 was used to perform the confirmatory factor analysis. Confirmatory factor analysis revealed that the measurement items loaded in accordance with the pattern revealed in the exploratory factor analysis. The proposed model of Trading Performance of equity derivative traders consists of three factors, namely subjective return, actual return and trading satisfaction Figure 4.4 shows the result of CFA measurement model.

Figure 4.4

CFA Measurement model –First order: Trading Performance



Source: Primary Data

The above measurement model comprised three sub-factors of trading performance of equity derivative traders *(Subjective return, Actual Return and Satisfaction*). The path estimates between constructs and items are illustrated in Table 4.20.

Table 4.20

Path estimates and Regression Weights of CFA measurement model – Trading Performance

Sl. No.	Path	Estimate	S.E.	C.R.	P	Standardized Loadings
1	IP1 ← Subjective Return	1				.859
2	IP2 ← Subjective Return	0.961	0.07	13.783	<.01***	.762
3	IP3 ← Subjective Return	0.262	0.081	3.211	<.01***	.698
4	IP4 ← Actual Return	1				.766
5	IP5 ← Actual Return	0.256	0.08	3.207	<.01***	.718
6	IP6 ← Satisfaction	1				.958
7	IP7 ← Satisfaction	0.695	0.048	14.357	<.01***	.727
8	IP8 ← Satisfaction	0.383	0.051	7.567	<.01***	.628

Source: Primary data ****Significant at 1% level*

Table 4.20 shows the regression weights of each path included in the measurement model of trading performance. The standardised regression weights of all the statements are satisfactory and standardised loadings of all the statements are above 0.5, which indicates that all the variables satisfactorily contribute to the variance of the construct. The *p*-values of all the variables included in the construct are highly significant and indicates the desirability of respective variables. An item with highest loading in a construct contributes more to the variance of the construct. The statement '*The rate of return from derivative trade meets my expectation' (IP1)* is the highest loading item (0.859) which contributes more to the factor *'Subjective return'*. The item *'winning ratio' (IP4)* contributes more to the factor *'Actual return'* (with loading of 0.77), and the statement '*Are you satisfied with return realised from derivative trading' (IP6*) contributes more to the factor 'Trading satisfaction' (0.958).

Model validity estimates for convergent and discriminate validity are analysed and discussed in the following section. Table 4.21 illustrates the result of model validity estimation.

Table 4.21

Validity and Reliability of CFA measurement model – Trading Performance

Construct	Items	Statements	Factor Loadings	CR	AVE	MSV
Subjective return	IP1	The rate of return of my recent trade meets my expectation	.859	0.818	.602	.436
	IP2	My rate of return from derivative trade is higher than the average rate of return from equity market	.762			
	IP3	I am getting a consistent return from F&O trading in the last one year	.698			
Actual return	IP4	Average monthly return realized	.766	0.711	.551	.372
	IP5	Winning ratio of trade	.718			
Trading satisfaction	IP6	Do you satisfied with return from derivative trade	.958	0.822	.614	.436
	IP7	Do you satisfied with hedge efficiency of derivative contract	.727			
	IP8	Do you satisfied with brokers competency and service	.628			

Source: Primary data

Table 4.21 shows the Standardised Factor Loadings (SFL) of each item included in the measurement model of Trading Performance. The standardised loadings of all the statements are above 0.5, which indicates that all the variables satisfactorily contribute to the variance of the construct. The *Composite Reliability* (CR) values and Average Variance Extracted (AVE) values of all the constructs are greater than 0.5. Hence, we can confirm the *convergent validity* of the scale and it also established that each of the variable used for the measurement correlate strongly with its construct 'Trading performance'.

The *discriminant validity* of the scale is tested by comparing the Maximum Shared Variance (MSV) with Average Variance Extracted (AVE) for each construct. For all factors the values of AVE are greater than MSV (AVE>MSV), which empirically proves the discriminant validity of the scale used to measure the construct 'Trading performance'.

Since the model validity estimates for convergent and discriminate validity are satisfactory, the next step is to check the model fitness. The structural equation model using Amos produces several indices of fit like measure of goodness of fit, badness of fit, incremental fit, comparative fit and parsimony fit etc. The result of model fit analysis is illustrated in Table 4.22.

Table 4.22

Model Fit Indices- Trading Performance

Sl. No.	Indices	Value Obtained	Suggested Value
1	**CMIN/DF**	2.947	< 5.00 *(Hair, et al., 2010)*
2	**GFI** (Goodness of Fit Index)	0.962	> 0.90 *(Hair, et al., 2010)*
3	**AGFI** (Adjusted Goodness of Fit Index)	0.913	> 0.80 *(Hair, et al., 2010)*
4	**RMR** (Root Mean Square Residuals)	0.067	< 0.08 *(Hu & Bentler, 1999)*
5	**RMSEA** (Root Mean Square Error of Approximation)	0.08	< 0.08 *(Hair, et al., 2010)*
6	**NFI** (Normed Fit Index)	0.940	>0.90 *(Hair, et al., 2010)*
7	**CFI** (Comparative Fit Index)	0.959	> 0.90 *(Hu & Bentler, 1999)*
8	**TLI** (Tucker Lewis Index)	0.929	>0.90 *(Hair, et al., 2010)*

Source: Primary Data

The analysis revealed acceptable fit for the five-factor solution as the value CMIN/DF of 2.947 is less than 5, GFI (0.962) is greater than 0.90, and AGFI (0.913) is greater than 0.80. The two badness of fit indices also produces lesser result than acceptable limit of 0.08, since RMSEA = 0.08, RMR=0.067, which indicates that the discrepancy between actual and predicted covariances are less. The values of incremental fit indices NFI (0.940), CFI (0.959) and TLI (0.929) are greater than the acceptable value of 0.90. The result of analysis shows that there is adequate fit for the measurement model.

4.11 Normality of the Data

Normality tests are used in statistics to examine whether a data set is well-modeled by a normal distribution and to estimate the likelihood that a random variable underlying the data set will be normally distributed. In this study, Kolmogorov-Smirnov and Shapiro-Wilk tests are used to assess the normality of data with the following test hypothesis.

H_0: The distribution is normal
H_1: The distribution is not normal

The results of normality tests are summarised in Table 4.23 below.

Table 4.23

Result of normality test of variables

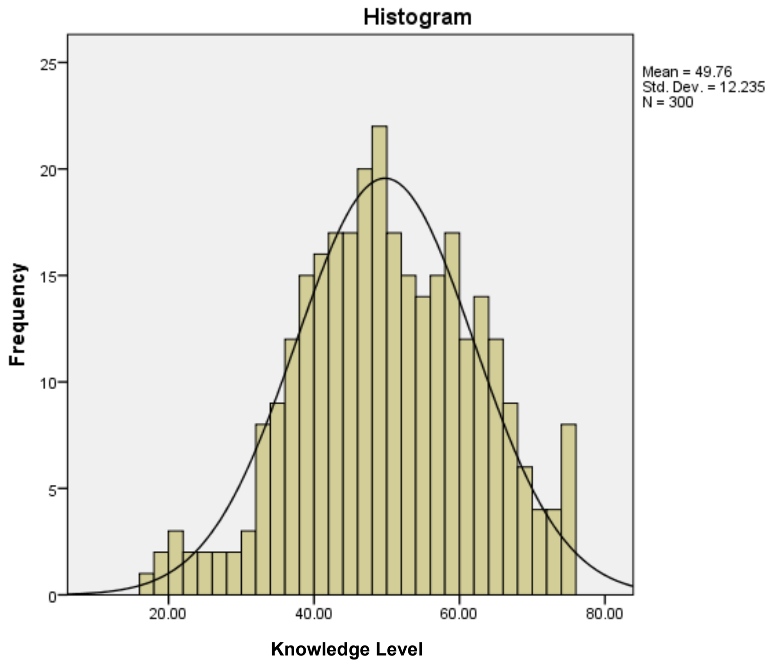
Variable	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	*p*-value	Statistic	df	*p*-value
Knowledge Level	.036	300	.182	.991	300	.060
Trading Strategy	.040	300	.170	.995	300	.449
Behavioural bias	.042	300	.126	.991	300	.054
Trading performance	.050	300	.070	.985	300	.003

Source: Primary data

Table 4.23 show that both the *p*-values of Kolmogorov-Smirnov and Shapiro Wilk are higher than 0.05 hence the null hypothesis is accepted at 5 per cent level of significance and it can be concluded that the distribution is normal. The histogram with normal curve of all above distributions is illustrated in Figures 4.5, 4.6, 4.7 and 4.8.

Figure 4.5

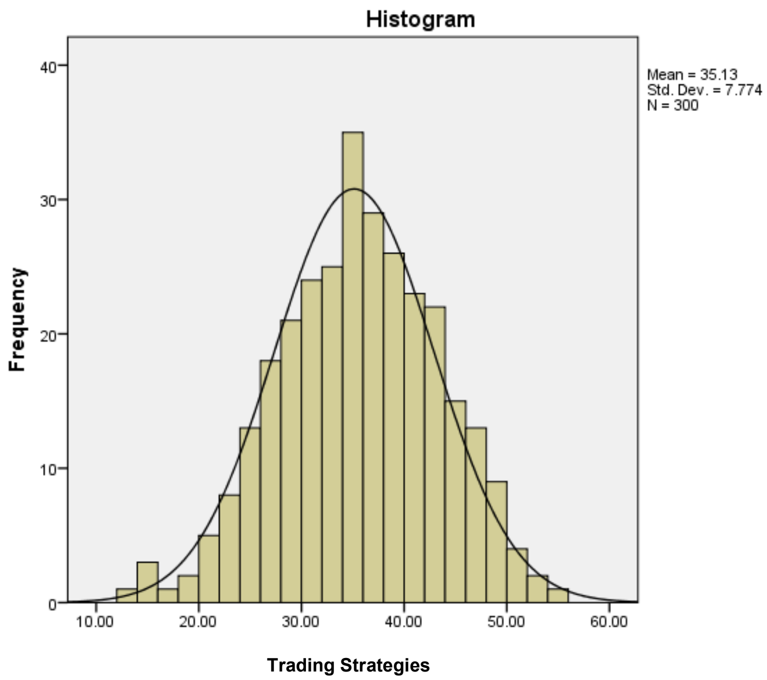
Histogram with normal curve of distributions of Knowledge level



Source: Primary Data

Figure 4.6

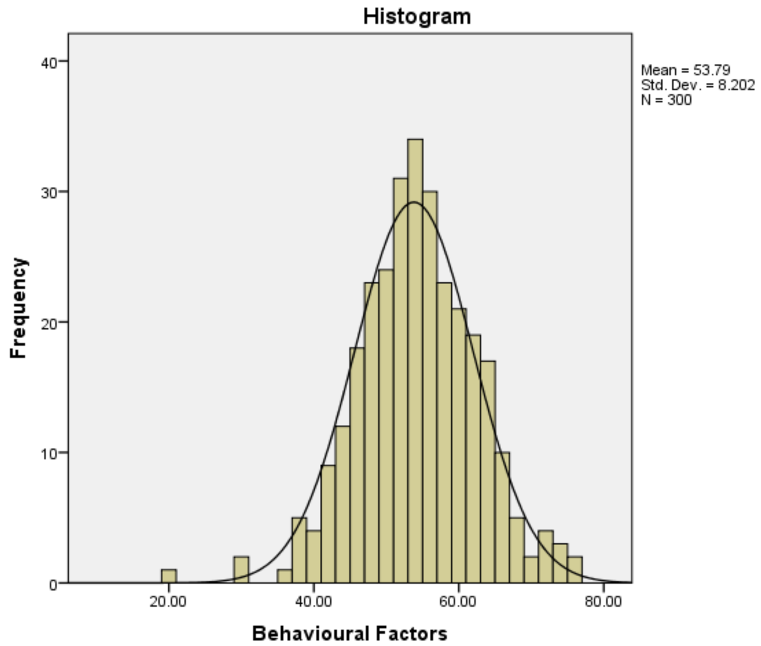
Histogram with normal curve of distributions of Trading strategies



Source: Primary Data

Figure 4.7

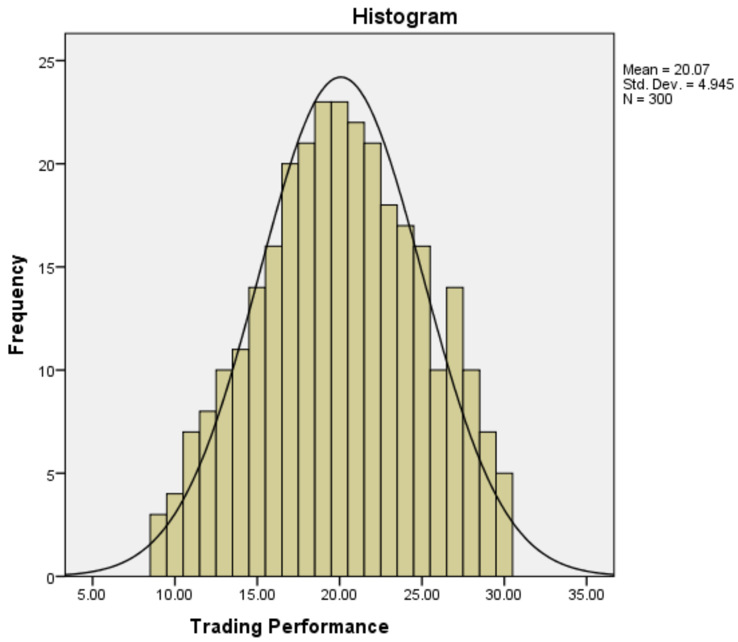
Histogram with normal curve of distributions of Behavioural bias



Source: Primary Data

Figure 4.8

Histogram with normal curve of distributions of Trading performance



Source: Primary Data

Since all the distributions found normal parametric tests (ANOVA, t-test, etc) and Structural equation modelling is considered as the most suitable statistical techniques for data analysis.

4.12 Conclusion

The research design and methodology are discussed in this chapter. The result of the pilot study, reliability and validity analysis of the questionnaire, test of normality of data are also discussed in this chapter. This study is designed as cross-sectional descriptive and analytical research. The findings of this study are mainly based on primary data, but secondary data were also used in this study. The purposive sampling methodology is used in this study. A pilot study is conducted with 75 respondents and based on the data, the validity and reliability of the questionnaire was determined. Confirmatory Factor analysis is also done to confirm the reliability and validity of the research instrument. The next chapter deals with data analysis relating to equity derivative traders' knowledge level and trading strategies.

REFERENCES

Aday, L. A., & Cornelius, L. J. (2006). Designing and conducting health surveys: a comprehensive guide. In *John Wiley & Sons* (Third Edit). Jossey-Bass. https://doi.org/10.5860/choice.27-5148

Bentler, P. M., & Bonett, D. G. (1980). Significance Tests and Goodness-of-Fit in Analysis of Covariance Structures. *Psychological Bulletin*, *88*(3), 588–606. https://doi.org/10.1037/0033-2909.88.3.588

Boateng, G. O., Neilands, T. B., Frongillo, E. A., Melgar-Quinonez, H. R., & Young, S. L. (2018). Best Practices for Developing and Validating Scales for Health , Social , and Behavioral Research : A Primer. *Frontiers in Public Health*, *6*(June), 1–18. https://doi.org/10.3389/fpubh.2018.00149

Carlson, M. D. A., & Morrison, R. S. (2009). Study design, precision, and validity in observational studies. *Journal of Palliative Medicine*, *12*(1), 77–82. https://doi.org/10.1089/jpm.2008.9690

Field, A. (2005). *Discovering statistics using SPSS: and sex and drugs and rock "n" roll (2nd Edition)* (Third Edit). SAGE Publications Ltd.

Fisher, C. (2010). *Researching and Writing a Dissertation- An Essential Guide for Business Students* (Third Edit). Pearson Education Ltd. http://www.mim.ac.mw/books/ Researching and Writing a Dissertation.pdf

Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, *18*(1), 39–50. https://doi.org/10.2307/3151312

George, D., & Paul Mallery. (1999). *SPSS for Windows Step by Step A Simple Guide and Reference*.

Ghauri, P., & Gronhaug, K. (2010). *Research Methods in Business Studies- A Practical Guide* (Third Edit). Pearson Education Ltd.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Joseph F. Hair, William C. Black, Barry J. Babin, R. E. A. (2010). *Multivariate Data Analysis* (7th Editio). Prentice Hall.

Koh, C. E., & Nam, K. T. (2005). Business use of the internet A longitudinal study from a value chain. *Industrial Management and Data System*, *105*(1), 82–95. https://doi.org/10.1108/02635570510575207

Morgado, F. F. R., Meireles, J. F. F., Neves, C. M., Amaral, A. C. S., & Ferreira, M. E. C. (2017). Scale development : ten main limitations and recommendations to improve future research practices. *Psicologia: Reflexão e Crítica*, *30*(3), 1–20. https://doi.org/10.1186/s41155-016-0057-1

Panneerselvam, R. (2016). *Research Methodology* (Second Edi). PHI Learning Private Limited.

Robert F. Devellis. (2017). *Scale Development: Theory and Applications* (Fourth Edi). Sage Publications, Inc.

Straub, D., Boudreau, M.-C., & Gefen, D. (2004). Validation Guidelines for IS Positivist Research. *Communications of the Association for Information Systems*, *13*, 380–427. https://doi.org/10.17705/1CAIS.01324

Taherdoost, H. (2016). Validity and Reliability of the Research Instrument; How to Test the Validation of a Questionnaire/Survey in a Research. *International Journal of Academic Research in Management (IJARM)*, *5*(3), 28–36. https://doi.org/10.2139 /ssrn.3205040

Wagner, C., Garner, M., & Kawulich, B. (2011). The state of the art of teaching research methods in the social sciences: Towards a pedagogical culture. *Studies in Higher Education*, *36*(1), 75–88. https://doi.org/10.1080/03075070903452594

Waweru, N. M., Munyoki, E., & Uliana, E. (2008). The effects of behavioural factors in investment decision-making : a survey of institutional investors operating at the Nairobi Stock Exchange. *International Journal of Business and Emerging Markets*, *1*(1), 24–41. https://doi.org/DOI:10.1504/IJBEM.2008.019243

Zangirolami-Raimundo, J., Echeimberg, J. de O., & Leone, C. (2018). Research methodology topics: Cross-sectional studies. *Journal of Human Growth and Development*, *28*(3), 356–360. https://doi.org/10.7322/jhgd.152198

5.1 Introduction

Analysis of original data gathered from equity derivative traders in Kerala is included in this chapter. This chapter's main goal is to comprehend the knowledge, preferences, and trading methods of equity derivative traders in Kerala. It is divided into three sections. The demographic profile of the respondents is shown in the first section of this chapter. In the second section, it is examined to what extent derivative traders are familiar with market fundamentals and concepts. The final section analyses the trading preferences and strategies used by equity derivative traders.

5.2 Profile of the Respondents

The equity derivative traders in Kerala are the respondents from whom data have been collected using a structured questionnaire. The demographic and professional characteristics of respondents are summarised here. The demographic features of respondents are presented in two sections. The descriptive statistics of qualitative features like area, gender, qualifications, etc. are presented in Table 5.1, and other quantitative features like age, annual income, etc. are presented in Table 5.2.

Table 5.1

Demographic Profile of Respondents

(n=300)

	Variables	Frequency	Per cent
Area of Respondent	Urban	156	52.0
	Rural	144	48.0
Gender	Male	264	88.0
	Female	36	12.0
Education Qualification	SSLC	13	4.3
	Higher Secondary	10	3.3
	Graduate	130	43.3
	Post Graduate	92	30.7
	Professional	55	18.3
Occupation	Govt. Employee	38	12.7
	Private sector employee	97	32.3
	Professional	46	15.3
	Self employed	37	12.3
	Business	52	17.3
	Full-time trader	30	10.0

Source: Primary data

Area of Respondent: Table 5.1 shows that 156 (52%) of the sample derivative traders reside in urban area and 144 (48%) resides in rural area. From the above distribution, it can be inferred that derivative traders are almost equally distributed in urban and rural areas in the State of Kerala.

Gender: It can be observed from the table that 264 (88%) of the sample derivative traders are male and the remaining 36 (12%) are female. Even though the female population in Kerala outnumbers the male population, they are very less in the field of trading derivative securities.

Education Level: Anyone having a De-mat account with a broker can become a derivative trader. There are no minimum educational qualifications are required for a derivative trader. It can be noticed from the table that out of 300 sample derivative traders 13 (4.3%) have passed SSLC, 10 (3.3%) have higher secondary qualification, 130 (43.3%) are graduates, 92 (30.7%) are post-graduates and 55 (18.3%) are having professional qualifications. Hence it can be found that more than 90 per cent of the respondents selected for the study are possessing high educational qualifications (graduates, post-graduates, and professionals) which is evident that people with high educational qualifications are more attracted to derivative trading.

Occupation: The above table also shows the classification of sample derivative traders based on occupation. The following classification includes the retired employees from each respective group. It can be observed from the table that out of 300 respondents, 38 (12.7%) are employed in the government sector, 97 (32.3%) are employed in the private sector, 46 (15.3%) are professionals, 37 (12.3%) are self-employed, 52 (17.3%) are doing business and remaining 30 (10%) are full-time derivative traders. From the above distribution, it can be inferred that private-sector employees are more attracted to derivative trading. Table 5.2 presents the descriptive statistics of scaled demographic and trading variables.

Table 5.2

Descriptive statistics of scaled demographic variables

(n=300)

Variables		Frequency	Per cent	Mean ± SD
Age of respondents	Up to 30	85	28.3	36.93 ± 9.65
	31 - 40	135	45.0	
	41 - 50	55	18.3	
	51 & above	25	8.3	
Average annual income	Up to 2 Lakhs	22	7.3	10.56 L ± 13.55 L
	2,00,001 – 5 Lakhs	98	32.7	
	5,00,001 - 10 Lakhs	79	26.3	
	Above 10 Lakhs	101	33.7	

Variables		Frequency	Per cent	Mean ± SD
Trading Experience in the Derivative Market	2 years and below	161	53.7	3.97 ± 4.17
	3-5 years	81	27.0	
	5-10 years	32	10.7	
	Above 10 years	26	8.7	
Trading Capital	Below 1 Lakh	74	24.7	14.30 L ± 65.97 L
	1- 5 lakhs	136	45.3	
	5-10 lakhs	29	9.7	
	10-20 lakhs	24	8.0	
	Above 20 lakhs	37	12.3	

Source: Primary data

Age of Respondents: In India any person who attains the age of 18 can start stock or derivative trading. Table 5.2 shows that from the set of 300 sample derivative traders 85 (28.3%) are in the age group of 30 years and below, 135 (45%) are in the age group of 31-40, 55 (18.3%) are the age group of 41-50 and remaining 27(8.3%) are above 51 years. The average age of respondents is 36.93 from the above data we can conclude that more than 70 per cent of derivative traders are in the younger age group of 40 years and below.

Average Annual Income: Anyone owing a PAN card and producing a 6-month bank statement can open a derivative trading account in our country. The income levels of sample derivative traders included in the study are presented in the above table. It can be seen that 22 (7.3%) respondents have an average annual income of Rs.2 Lakhs and below, 98 (32.7%) belong to the annual income category of Rs. 2-5 lakhs, 79 (26.3%) belong to Rs.5-10 lakhs, and 101 (33.7%) belongs to more than Rs.10 lakhs annual income category. The mean annual income of the sample is Rs. 1055987.92 with a standard deviation of 1355277.18.

Trading Experience: It may be assumed that the more experienced investors outperform the less experienced ones. To test this phenomenon, the investors are categorized according to their experience in years in the stock market. The table shows the classification of sample investors according to their years of experience in the equity derivative market. It can be observed that more than half (53.7%) of the sample derivative traders have an experience of 2 years and below, 27% (81) have an experience of 3-5 years, 10.7% have an experience 5-10 years and only 8.7% have more than 10 years' experience. The mean value of experience in derivative trading of the sample is 3.97 years with a standard deviation of 4.17.

Trading Capital: Derivative traders are required to have sufficient balance in their accounts to hold/carry forward positions. Leverage is provided to clients subject to market conditions and changes in its proportion are dynamic. Fines can be levied by the exchange for a short margin will be payable by the client. A collateral margin will be available to trade after the applicable haircut on various stocks. Traders will be able to use this entire margin after a haircut for taking intraday or overnight positions in Futures, and for writing Options of equities, indices, and currencies. But traders will not be able to use this margin to buy Options or take further positions on the equity segment. Exchanges stipulate that for overnight F&O positions, 50% of the margin needs to compulsorily come in cash and the remaining 50% can be in terms of collateral margin. If a trader doesn't have enough cash, his account will be in debit balance and there will be a delayed payment (interest) charges charge of 0.035% per day applicable on the debit amount. So, if a trader takes positions that require a margin of Rs 1 lakh, he needs at least Rs 50,000 in cash irrespective of how much collateral margin he has. Liquid funds like Govt. securities, mutual funds, ETFs, Bank FD receipts, etc. are considered as cash equivalents by the exchange, so the above 50% rule wouldn't apply. The Margin received from pledging liquid funds will be as good as having cash in his trading account.

From Table 5.2, the following interpretations can be made. Out of 300 sample derivative traders 74 (24.7%) use a monthly trading capital of below Rs. 1 lakh, 136 (45.3%) use a monthly trading capital of Rs. 1-5 lakhs, 29 (9.7%) of respondents use a monthly trading capital between Rs. 10 and 20 lakhs and remaining 37 (12.3%) use more than Rs. 20 lakhs for trading equity derivatives in a span of 30 days. From the above, it can be inferred that the majority of the equity derivative traders are using trading capital of 1-5 lakhs.

5.3 Classification of Respondents based on Brokers

Derivatives are sophisticated financial instruments and it requires specialised knowledge and sufficient trading expertise to take full advantage of what the derivative market has to offer. It is corroborated by the financial industry experts' observations and the study of the age and trading background of the sample respondents shows that the majority of active traders in the derivative market are novice investors. This highlights the requirement for effective orientation instruction for derivative traders. Many brokers are providing courses on derivative trading, especially on options trading. This is one of the important factors influencing the selection of broker for trading equity derivatives. The amount of brokerage is another important factor determining the broker selection. This study examines the choice of broker for trading derivatives based on sample traders included in this study.

Table 5.3

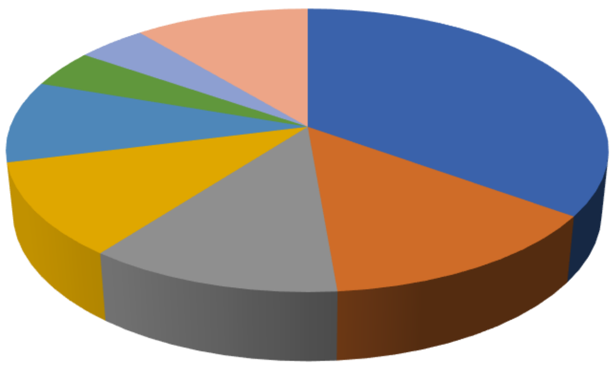
Distribution of respondents based on Broker

Sl. No.	Name of Broker	Frequency	Per cent
1	Zerodha	105	35
2	Geojit	41	13.7
3	Acumen capital	35	11.7
4	Motilal Oswal	32	10.7
5	Upstox	28	9.3
6	Angel One	13	4.3
7	Compositedge	13	4.3
8	Others	33	11
	Total	300	100

Source: Primary data

Figure 5.1

Distribution of equity derivative traders based on their broker



Source: Primary data

Table 5.3 shows that the majority (35%) of the respondents are maintaining a derivative trading account with Zerodha, 13.7% of respondents are trading with Geojit, 11.7% are trading with Acumen Capital, followed by Motilal Oswal with 10.7% of traders, 28 respondents (9.3%) are maintaining a trading account in Upstox, 13 (4.3%) each with Angel One and Compositedge. The remaining 33 respondents are maintaining trading accounts with other brokers like Alice Blue, Kotak Securities, etc. We may infer from the distribution that Zerodha, a discount broker, is the most well-liked among stock derivative traders in Kerala.

5.4 Level of Knowledge about the Derivative Market

Derivatives are complex by their very nature. As Warren Buffet, the world-famous investment guru once quoted, “Derivatives are financial weapons of mass destruction”, they are very dangerous tools in the hands of irrational traders *(Buffet, 2002)*. So, a thorough understanding of the derivative market is essentially a prerequisite for successful trading. Here in this section efforts are made to measure the level of knowledge of Derivative traders about various aspects of the derivative market. The knowledge of the derivative is assessed in two groups such as knowledge *of basics of the derivative market* and *knowledge of trading strategies*. The sample distribution of the level of knowledge of derivative traders was found normal and the normality test result is presented in chapter 4.

5.4.1 Level of Knowledge about the Basics of Derivative Market

The derivatives market is a vast market with huge potential risks, a variety of products and strict regulations. Different products offer different risk-return characteristics. Proper knowledge about the basics of these instruments and their usage will help Investors to trade successfully in the market *(Toopalli & Kalyan, 2020)*. The level of knowledge about the basics of the derivative market is measured using seven variables on a five-point scale and analyzed using one sample t-test with a test value of 3, which is the mean of the 5-point response scale *(Sullivan & Artino, 2013)*. The test hypothesis is given below

H_0: $\mu = 3$ (The mean knowledge level is equal to 3)
H_1: $\mu \neq 3$ (The mean knowledge level is not equal to 3)

The test results of seven variables on the basics of the derivative market are measured and summarized in Table 5.4.

Table 5.4

Level of Knowledge about the Basics of Derivative Market

(n=300)

Sl. No.	Variables		Frequency	Per cent	Mean ± SD	t^*	p-value
1	Basic Concepts of Derivatives	Very Poor	6	2.0	3.85 ± 0.99	14.841	<.01***
		Poor	17	5.7			
		Average	86	28.7			
		High	98	32.7			
		Very High	93	31.0			
2	Derivative products trading in India	Very Poor	4	1.3	3.76 ± 0.96	13.707	<.01***
		Poor	22	7.3			
		Average	93	31.0			
		High	103	34.3			
		Very High	78	26.0			

Sl. No.	Variables		Frequency	Per cent	Mean ± SD	t*	p-value
3	SEBI Regulations and guidelines relating to derivative trading	Very Poor	9	3.0	3.46 ± 1.07	7.444	<.01***
		Poor	50	16.7			
		Average	92	30.7			
		High	92	30.7			
		Very High	57	19.0			
4	Leverage Risks in Futures and Options Trading	Very Poor	16	5.3	3.85 ± 1.14	12.825	<.01***
		Poor	25	8.3			
		Average	51	17.0			
		High	105	35.0			
		Very High	103	34.3			
5	NSEs new Margin requirements for Futures and Options trading	Very Poor	21	7.0	3.72 ± 1.20	10.393	<.01***
		Poor	28	9.3			
		Average	59	19.7			
		High	98	32.7			
		Very High	94	31.3			
6	Brokerage and other charges relating to Futures and Options trade	Very Poor	9	3.0	4.01 ± 1.08	16.27	<.01***
		Poor	26	8.7			
		Average	40	13.3			
		High	102	34.0			
		Very High	123	41.0			
7	knowledge about Tax treatment of derivatives trading gain or loss	Very Poor	32	10.7	3.52 ± 1.30	6.917	<.01***
		Poor	34	11.3			
		Average	66	22.0			
		High	82	27.3			
		Very High	86	28.7			

Source: Primary data ******Difference is significant at 1% level, *One sample t-test, Average=3*

Table 5.4 Indicates that sample derivative traders have a high level of knowledge on all seven aspects of the basics of the derivative market. Level of knowledge on brokerage and other charges has the highest mean score and knowledge on SEBI regulations and guidelines has the lowest mean score. Mean scores of all variables are significantly above the mean score of the response scale i.e., 3 with 't' values showing significance at 5 per cent level. The one-sample t-test shows that there was a statistically significant difference between means ($p < .01$). Therefore, the null hypothesis is rejected and it can be concluded that the mean level of knowledge on the basics of the derivative market is high.

5.4.2 Overall Analysis of the Level of knowledge about Basics of the Derivative Market

The overall level of knowledge of basics of derivative market is analyzed by combing all the seven variables used to measure the level of Knowledge and classifying the total score (7×5=35) into three classes. Where Low = 7 to 17, Medium = 18 to 24 and High = 25 to 35. The data is then measured on a three-point scale (ie. Low=1, Medium=2, High=3) and analyzed using one sample t-test with a test value of 2, which is the mean of the three-point scale used to measure the overall knowledge level. The test hypothesis is given below:

H_0: $\mu = 2$ (The mean knowledge level on the basics of derivative market is equal to 2)

H_1: $\mu \neq 2$ (The mean knowledge level on the basics of derivative market is not equal to 2)

The result of one sample t-test is summarised in Table 5.5 below.

Table 5.5

Overall Level of Knowledge about Basics of Derivative Market

Level of Knowledge	Frequency	Per cent	Mean ± SD	t*	*p*-value
Low	28	9.3			
Medium	82	27.3	2.54 ± 0.661	14.156	<.01***
High	190	63.4			
Total	300	100.0			

Source: Primary data   ****Difference is significant at 1% level, *One sample, Mean = 2*

Table 5.5 shows that out of 300 sample derivative traders 28 (9.3%) have low level of knowledge on the basics of derivative market, 822 (27.3%) traders have a medium level of knowledge and 190 (63.4%) have high level of knowledge on basics of derivative market. The mean score obtained for measuring the level of knowledge on the basics of derivative market is 2.54, which is above the mean score of the response scale i.e., 2. The one-sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 14.156, *p* =.000. Hence, it can be concluded that the derivative traders have high level of knowledge on the basics of derivative market.

5.4.3 Level of Knowledge about F&O Trading Strategies

Proper knowledge about trading strategies will help traders to trade successfully in the market. Various strategies are available for derivative traders based on the type of instrument and payoff structure. Futures among derivative products have linear payoffs, meaning they have unlimited potential for both profit and loss, whereas options have non-linear payoffs, meaning they have limitless profit potential but restricted loss potential. One can create complicated payoffs that lead to a variety of trading strategies by fusing futures and options *(Rangappa, 2012)*. Traders' knowledge of derivative trading strategies is measured in terms of eight variables on a five-point scale and analyzed using one sample t-test with a test value of 3, which is the mean of the 5-point response scale. The test hypothesis is given below:

H_0: $\mu = 3$ (The mean knowledge level is equal to 3)
H_1: $\mu \neq 3$ (The mean knowledge level is not equal to 3)

The test results of measuring the level of knowledge about F&O Trading strategies are summarized in Table 5.6.

Table 5.6

Level of Knowledge about F&O Trading Strategies

(n=300)

Sl. No.	Variables		Frequency	Per cent	Mean ± SD	t*	p-value
1	Basic future and option trading strategies	Very Poor	6	2.0	3.87 ± 1.00	14.996	<.01***
		Poor	21	7.0			
		Average	74	24.7			
		High	104	34.7			
		Very High	95	31.7			
2	Option Greeks and their impact on the option position	Very Poor	53	17.7	3.1 ± 1.33	1.305	.193
		Poor	41	13.7			
		Average	79	26.3			
		High	77	25.7			
		Very High	50	16.7			
3	Technical charts-based strategy	Very Poor	28	9.3	3.45 ± 1.22	6.473	<.01***
		Poor	30	10.0			
		Average	91	30.3			
		High	79	26.3			
		Very High	72	24.0			
4	Delta neutral trading strategy	Very Poor	66	22.0	2.72 ± 1.30	-3.762	<.01***
		Poor	74	24.7			
		Average	76	25.3			
		High	47	15.7			
		Very High	37	12.3			
5	Option strategy builder software and its uses	Very Poor	83	27.7	2.74 ± 1.42	-3.130	<.01***
		Poor	55	18.3			
		Average	64	21.3			
		High	52	17.3			
		Very High	46	15.3			
6	Algo trading strategy and its benefits	Very Poor	98	32.7	2.48 ± 1.36	-6.569	<.01***
		Poor	73	24.3			
		Average	43	14.3			
		High	58	19.3			
		Very High	28	9.3			

Sl. No.	Variables		Frequency	Per cent	Mean ± SD	t*	*p*-value
7	Pair Trading Strategy	Very Poor	88	29.3	2.57 ± 1.33	-5.543	<.01***
		Poor	62	20.7			
		Average	71	23.7			
		High	48	16.0			
		Very High	31	10.3			
8	Options trading strategies like straddle, strange, etc.	Very Poor	53	17.7	3.19 ± 1.38	2.392	.017**
		Poor	40	13.3			
		Average	65	21.7			
		High	81	27.0			
		Very High	61	20.3			

Source: Primary data ****, ** Difference is significant at 1% & 5% level respectively*
**One sample t-test, Average=3*

From the above table, it can be seen that the sample derivative traders have a high level of knowledge on only three F&O trading strategies namely basic futures and options strategies, chart-based trading strategies and strategies like straddle, strangle, etc. At the same time, they have reported a low level of knowledge on delta neutral trading strategy, options strategy builder, algo trading and pair trading strategy. Among the eight variables considered, basic futures and options strategy seems to be the most familiar among traders with a mean score of 3.87 which is significantly higher than the mean of the response scale as the significance level of one sample t-test is less than 0.05.

The mean scores of three variables are significantly above the mean score of the response scale i.e., 3 with t values showing significance at 5 per cent level, namely basic F&O strategy, chart-based trading strategy and strategy like straddle strangle, etc. The mean score of only one variable (i.e., knowledge on Option Greeks and its impact) is equal to the mean of the response scale with the t value showing no significance at 5 per cent level. The mean score of all other variables such as knowledge on delta neutral trading strategy, strategy builder software, algo trading and pair trading are less than the mean score of the response scale of 3. The one-sample t-test shows that on one variable there is no statistically significant difference between means (p > .05). Therefore, the null hypothesis can be accepted in case of knowledge on option Greeks and in all other cases null hypothesis can be rejected.

5.4.4 Overall Analysis of Level of Knowledge about F&O Trading Strategies

The overall level of knowledge of futures and options trading strategy is analyzed by combing all the eight variables used for this study and is measured on a three-point scale (ie. Low=1, Medium=2, High=3). Where Low = 8 to 20, Medium = 21 to 27 and High = 28 to 40. The data is then measured on a three-point scale (i.e. Low=1, Medium=2, High=3) and analyzed using one sample t-test with a test value of 2, which is the mean of the three-point scale used to measure the overall knowledge level. The test hypothesis is given below:

H_0: $\mu = 2$ (The mean knowledge level on F&O trading strategy is equal to 2)

H_1: $\mu \neq 2$ (The mean knowledge level on F&O trading strategy is not equal to 2)

The result of one sample t-test is summarised in Table 5.7 below.

Table 5.7

Overall Level of Knowledge about F&O trading strategies

Level of Knowledge	Frequency	Per cent	Mean ± SD	t*	*p*-value
Low	99	33.0	1.997 ± 0.812	-0.071	.943
Medium	103	34.3			
High	98	32.7			
Total	300	100.0			

Source: Primary data *One sample t-test, Average=2*

Table 5.7 shows that out of 300 sample derivative traders 99 (33%) have a low knowledge level on trading strategies, 103 (34.3%) traders have medium knowledge and 98 (32.7%) have high knowledge level on F&O trading strategies. The one-sample t-test shows that the difference between means is statistically not significant because of the *p*-value of .943 (*p*>.05). Therefore, it can be concluded that the derivative traders in Kerala have a medium level of knowledge about futures and options trading strategies.

5.5 Comparison of Knowledge Level with different Demographic Variables

The level of knowledge of derivative traders about the *derivative market* is examined by combining all the fifteen variables used to measure the knowledge level about basics of derivatives and derivative trading strategies. The Level of knowledge of equity derivative traders is compared concerning six demographic variables such as *Area, gender, education level, age, trading experience and trading capital.* Since the distribution found normal parametric tests (ANOVA, t-test, etc) are used to compare the level of knowledge of traders among different demographic variables. The analysis and results are presented below.

5.5.1 Area-wise Analysis of the Level of Knowledge about the Derivative Market

The sample selected for this study includes equity derivative traders from urban and rural areas, hence it is relevant to examine whether there is any difference in the knowledge level of traders between urban and rural areas. Here it is required to compare the means of two groups of traders such as urban and rural. Independent samples t-test is used to test whether two population means are different. This procedure is an inferential statistical hypothesis test, meaning it uses samples to draw conclusions about populations. The test hypothesis is given below:

> H_0: *$\mu1 = \mu2$ (There is no significant difference in the level of knowledge among traders of urban and rural areas)*
>
> H_1: *$\mu1 \neq \mu2$ (There is a significant difference in the level of knowledge among traders of urban and rural areas)*

The result of the independent sample t-test is summarised in Table 5.8 below.

Table 5.8

Area-wise analysis of level of knowledge about the derivative market

Test variable	Group	N	Mean ± SD	t	*p*-value	Remarks
Knowledge Level about derivative market	Urban	156	50.04 ± 11.87	0.41	.679	Equal variances assumed
	Rural	144	49.46 ± 12.65			

Source: Primary data

Levene's Test for Equality of Variances gives *p*-value of .19, therefore equal variance is accepted and results are interpreted accordingly. From table 5.8 it can be observed that the mean score of knowledge level of urban and rural traders are 50.04 and 49.46 respectively and indicates very little difference between the mean values. The Independent sample t-test is used to check whether the mean score difference is significant or not, among urban and rural equity derivative traders with regard to knowledge level. Since the *p*-value (0.679) of 't' is more than 0.05, it can be inferred that there is no significant difference in the level of knowledge among traders of urban and rural area.

5.5.2 Gender-wise Analysis of Level of Knowledge about Derivative Market

The sample selected for this study includes male and female equity derivative traders, hence it is relevant to examine whether there is any difference in the knowledge level of traders between males and females. The male and female traders may have differences in their knowledge level about derivative market. To test the same, descriptive analysis has been done which shows the mean score of male and female traders about knowledge about the derivative market. To find out the statistical significance of the difference in mean score independent sample t-test is also applied. The test hypothesis is given below and the result is summarised in table 5.9.

H_0: $\mu 1 = \mu 2$ *(There is no significant difference in the level of knowledge between male and female traders)*

H_1: $\mu 1 \neq \mu 2$ *(There is a significant difference in the level of knowledge between male and female traders)*

Table 5.9

Gender-wise analysis of level of knowledge about the derivative market

Test variable	Group	N	Mean ± SD	t	*p*-value	Remarks
Knowledge Level about derivative market	Male	264	49.68 ± 12.36	-0.327	.744	Equal variances assumed
	Female	36	50.39 ± 11.42			

Source: Primary data

Levene's Test for Equality of Variances gives a *p*-value of .743, therefore equal variance is accepted and results are interpreted accordingly. From Table 4.10, it can be observed that the mean score of the knowledge level of male and female traders are 49.68 and 50.39 respectively and indicates very little difference between the mean values. Since the *p*-value (0.744) is more than 0.05, it can be inferred that there is no significant difference in the level of knowledge among male and female equity derivative traders in Kerala.

5.5.3 Age-wise Analysis of Level of Knowledge about Derivative Market

Traders with different age categories may have different levels of knowledge about the derivative market. Based on age, the sample respondents are classified into four groups such as: *Up to 30 (1)*, *31-40 (2)*, *41-50 (3)* and *51& above (4)*. Hence the data has been classified age-wise and descriptive analysis has been done to know the mean score of investors in different age categories. The test hypothesis is given below and the result is summarised in Table 5.10

H_0: *There is no significant difference in the level of knowledge about derivative markets among traders of different age groups.*

H_1: *There is a significant difference in the level of knowledge about derivative markets among traders of different age groups.*

Table 5.10

Descriptive statistics of age-wise analysis of knowledge about derivative market

Test Variable	Age Group (in years)	N	Mean ± SD
Knowledge Level about derivative market	Up to 30	85	50.39 ± 11.77
	31 – 40	135	48.06 ± 12.10
	41 – 50	55	55.45 ± 12.06
	51 & above	25	44.32 ± 10.58
	Total	300	49.76 ± 12.24

Source: Primary data

From the above table, it is found that there is a difference in the mean score of knowledge level for traders in different age categories. The age group *41-50 (group 3)* has the highest mean score of knowledge level and the age group *51& above (group 4)* has the lowest mean score of knowledge level about the derivative market. The ANOVA is applied to test the significance of difference among the mean of different age groups and the result is summarised in Table 5.11 below.

Table 5.11

Result of One-way ANOVA: age-wise analysis of knowledge level

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	2947.406	3	982.469	6.955	<.01***
Within Groups	41814.791	296	141.266		
Total	44762.197	299			

Source: Primary data *** *The difference is significant at the 1% level.*

The one-way ANOVA reveals that there is a statistically significant difference in the mean score of knowledge level between at least two age groups (F (3, 296) = [6.955], p <.01). Since data met the assumption of homogeneity of variances, to know the exact significant difference between different age groups Tukey HSD test has been used and the result is shown in Table 5.12.

Table 5.12

Age group-wise Post Hoc (HSD) analysis for multiple comparisons of knowledge level

Age of respondents (I)	Age of respondents (J)	Mean Difference (I-J)	Std. Error	*p*-value	95% Confidence Interval	
					Lower Bound	Upper Bound
Up to 30 (1)	31 - 40	2.32898	1.64571	.491	-1.9230	6.5810
	41 - 50	-5.06631	2.05680	.068	-10.3804	.2478
	51 & above	6.06824	2.70418	.114	-.9185	13.0550
31 – 40 (2)	Up to 30	-2.32898	1.64571	.491	-6.5810	1.9230
	41 - 50	-7.39529*	1.90129	.001	-12.3076	-2.4830
	51 & above	3.73926	2.58787	.472	-2.9470	10.4255
41 – 50 (3)	Up to 30	5.06631	2.05680	.068	-.2478	10.3804
	31 - 40	7.39529*	1.90129	.001	2.4830	12.3076
	51 & above	11.13455*	2.86690	.001	3.7274	18.5417
51 & Above (4)	Up to 30	-6.06824	2.70418	.114	-13.0550	.9185
	31 - 40	-3.73926	2.58787	.472	-10.4255	2.9470
	41 - 50	-11.13455*	2.86690	.001	-18.5417	-3.7274

Source: Primary data   ** The mean difference is significant at the 5% level*

Table 5.12 shows the result of the HSD test for multiple comparisons and it is found that the mean value of knowledge level is significantly different between age groups *2 and 3* (p = .001, 95% C.I. = [-12.3076, -2.4830]), and *3 and 4* (p = .001, 95% C.I. = [3.7274, 18.5417]). There is no significant difference in mean knowledge scores between *1 and 2*, *1 and 3*, *1 and 4*, and *2 and 4 age groups*. That means out of six group comparisons *between two age groups* the knowledge level about the derivative market is significantly different and between *four* groups the difference is not significant with regard to knowledge level.

5.5.4 Education Qualification-wise Analysis of Level of Knowledge about Derivative Market

The sample selected under this study includes equity derivative traders with different educational qualifications. Hence it is important to examine whether there is any difference in the knowledge level of traders among different educational qualification groups. On the basis of education level, the sample respondents are classified into five groups such as SSLC, Higher Secondary, Graduate, Post Graduate, and Professional. The level of education of traders may affect the knowledge level about derivative market. To test the same, descriptive analysis has been done which shows the mean score of the knowledge level of traders with different educational qualifications. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is applied. The test hypothesis is given below and the result of the descriptive analysis is summarized in Table 5.13.

H_0: *There is no significant difference in the level of knowledge about derivative markets among traders of different educational qualification.*

H_1: *There is a significant difference in the level of knowledge about derivative markets among traders of different educational qualification.*

Table 5.13

Descriptive statistics of Education qualification - wise analysis of knowledge about derivative market

Test Variable	Education Group	N	Mean ± SD
Knowledge Level about derivative market	SSLC	13	36.15 ± 12.46
	Higher Secondary	10	50.70 ± 9.11
	Graduate	130	49.42 ± 11.42
	Post Graduate	92	51.85 ± 11.61
	Professional	55	50.15 ± 13.77
	Total	300	49.76 ± 12.23

Source: Primary data

From the above table, it is found that there is a difference in the mean score of knowledge level between traders with different educational qualifications. The traders with post-graduation have the highest mean score (51.85) of knowledge level and traders with SSLC have the lowest mean score (36.15) of knowledge level about derivative market. The ANOVA is applied to test the significance of differences among the mean knowledge level of different educational qualification groups and the result is summarised in Table 5.14 below.

Table 5.14

Result of One-way ANOVA: Education-wise analysis of knowledge level

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	2840.129	4	710.032		
Within Groups	41922.067	295	142.109	4.996	<.01***
Total	44762.197	299			

Source: Primary data *** *The mean difference is significant at the 1% level*

The one-way ANOVA reveals that there is a statistically significant difference in the mean score of knowledge level between traders of at least two educational qualification groups (F (4, 295) = [4.996], *p* = .001). To know the exact significant difference in knowledge level between different groups of educational qualifications HSD test has been used and the result is shown in Table 5.15.

Table 5.15

Education qualification wise Post Hoc (HSD) analysis for multiple comparisons of knowledge level

Education Level (I)	Education Level (J)	Mean Difference (I-J)	Std. Error	*p*-value	95% Confidence Interval	
					Lower Bound	Upper Bound
SSLC	Higher Secondary	-14.54615*	5.01421	.032	-28.3088	-.7835
	Graduate	-13.26154*	3.46765	.001	-22.7793	-3.7438
	Post Graduate	-15.69398*	3.53215	.000	-25.3888	-5.9992
	Professional	-13.99161*	3.67631	.002	-24.0821	-3.9012
Higher Secondary	SSLC	14.54615*	5.01421	.032	.7835	28.3088
	Graduate	1.28462	3.91203	.997	-9.4528	12.0221
	Post Graduate	-1.14783	3.96932	.998	-12.0425	9.7469
	Professional	.55455	4.09813	1.000	-10.6937	11.8028

Education Level (I)	Education Level (J)	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
					Lower Bound	Upper Bound
Graduate	SSLC	13.26154*	3.46765	.001	3.7438	22.7793
	Higher Secondary	-1.28462	3.91203	.997	-12.0221	9.4528
	Post Graduate	-2.43244	1.62413	.565	-6.8902	2.0254
	Professional	-.73007	1.91753	.996	-5.9932	4.5330
Post Graduate	SSLC	15.69398*	3.53215	.000	5.9992	25.3888
	Higher Secondary	1.14783	3.96932	.998	-9.7469	12.0425
	Graduate	2.43244	1.62413	.565	-2.0254	6.8902
	Professional	1.70237	2.03186	.919	-3.8745	7.2793
Professional	SSLC	13.99161*	3.67631	.002	3.9012	24.0821
	Higher Secondary	-.55455	4.09813	1.000	-11.8028	10.6937
	Graduate	.73007	1.91753	.996	-4.5330	5.9932
	Post Graduate	-1.70237	2.03186	.919	-7.2793	3.8745

Source: Primary data ** The difference is significant at the 5% level*

Table 5.15 shows the result of the Tukey HSD test for multiple comparisons and it is found that the mean value of knowledge level is significantly different between traders possessing educational qualification of *SSLC and Higher secondary* (p = .032, 95% C.I. = [-28.3088, -.7835]), *SSLC and Graduate* (p = .001, 95% C.I. = [-22.7793, -3.7438]), *SSLC and Postgraduate* (p = .000, 95% C.I. = [-25.3888, -5.9992]), and finally *SSLC and Professional* (p = .002, 95% C.I. = [-24.0821, -3.9012]). There is no significant difference in mean knowledge scores between traders of higher secondary and above qualifications. That means there is no significant difference in knowledge level between traders having qualifications of Higher Secondary, Graduation, Post Graduation and Professional degree.

5.5.5 Trading Experience-wise Analysis of Level of Knowledge about Derivative Market

The sample selected for this study includes equity derivative traders with varying years of trading experience. Hence it is relevant to examine whether there is any difference in the knowledge level of traders among different trading experience groups. On the basis of years of trading experience, the sample respondents are classified into four groups such as *2 years & below (1)*, *3-5 years (2)*, *5-10 years (3)* and *above 10 years (4).* The number of years of trading experience of equity derivative traders may affect their knowledge level about derivative market. To test the same, descriptive analysis has been done which shows the mean score of knowledge level of traders with different years of trading experience. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The test hypothesis is given below and the result of the descriptive analysis is summarized in Table 5.16.

H_0: *There is no significant difference in the level of knowledge about derivative markets among traders with different trading experiences.*

H_1: *There is a significant difference in the level of knowledge about derivative markets among traders with different trading experiences.*

Table 5.16

Descriptive statistics of trading experience-wise analysis of knowledge about derivative market

Test Variable	Trading experience	N	Mean ± SD
Knowledge Level about derivative market	2 years and below	161	47.25 ± 12.18
	3-5 years	81	51.07 ± 11.63
	5-10 years	32	55.50 ± 10.95
	Above 10 years	26	54.19 ± 12.32
	Total	300	49.76 ± 12.24

Source: Primary data

From table 5.16, it is found that there is a difference in the mean score of knowledge level between traders with different years of trading experience. Traders with 5-10 years of trading experience have the highest knowledge level with a mean score of 55.50 and traders with below 2 years of experience have the lowest knowledge level about the derivative market with a mean score of 47.25. The ANOVA is applied to test the significance of differences in the mean knowledge level among traders with different years of experience and the result is summarised in table 5.17.

Table 5.17

Result of One-way ANOVA: Trading experience - wise analysis of knowledge level about derivative market

	Sum of Squares	**df**	**Mean Square**	**F**	***p*-value**
Between Groups	2712.908	3	904.303		
Within Groups	42049.289	296	142.058	6.366	<.01***
Total	44762.197	299			

Source: Primary data *** *The difference is significant at the 1% level*

The one-way ANOVA reveals that there is a statistically significant difference in the mean score of knowledge level between traders of at least two groups with different years of trading experience (F (3,296) = [6.366], *p* <.01). To know the exact significant difference in knowledge level between different groups of trading experience HSD test has been performed and the result is shown in Table 5.18.

Table 5.18

Trading experience-wise Post Hoc (HSD) analysis for multiple comparisons of knowledge level

Trading Experience in Derivative (I)	Trading Experience in Derivative (J)	Mean Difference (I-J)	Std. Error	*p*-value	95% Confidence Interval	
					Lower Bound	Upper Bound
2 years and Below (1)	3-5 years	-3.80707	1.62362	.090	-8.0020	.3879
	5-10 years	-8.24534*	2.30688	.002	-14.2056	-2.2851
	Above 10 years	-6.93765*	2.51915	.032	-13.4463	-.4290
3-5 years (2)	2 years and below	3.80707	1.62362	.090	-.3879	8.0020
	5-10 years	-4.43827	2.48860	.283	-10.8680	1.9915
	Above 10 years	-3.13058	2.68656	.649	-10.0718	3.8106
5-10 years (3)	2 years and below	8.24534*	2.30688	.002	2.2851	14.2056
	3-5 years	4.43827	2.48860	.283	-1.9915	10.8680
	Above 10 years	1.30769	3.14692	.976	-6.8230	9.4383
Above 10 years (4)	2 years and below	6.93765*	2.51915	.032	.4290	13.4463
	3-5 years	3.13058	2.68656	.649	-3.8106	10.0718
	5-10 years	-1.30769	3.14692	.976	-9.4383	6.8230

Source: Primary data ** The difference is significant at the 5% level*

Table 5.18 shows the result of Tukey's HSD test for multiple comparisons and it is found that the mean value of knowledge level is significantly different between traders with a trading experience of 2 *years & below* and *5-10 years* (p = .002, 95% C.I. = [-14.2056, -2.2851]) and 2 *years & below* and *above 10 years* (p = 0.032, 95% C.I. = [-13.446, -.4290]). There is no significant difference in mean knowledge scores between traders of 2 *years & below* and *3-5 years, 3-5 years* and *5-10 years, 3-5 years* and *above 10 years* and *5-10 years* and *above 10 years.*

5.5.6 Trading Capital-wise Analysis of Level of Knowledge about the Derivative Market

The sample selected under this study includes equity derivative traders with different amounts of trading capital. The amount of trading capital may affect the level of knowledge of traders about the derivative market. Hence it is important to examine whether there is any difference in the knowledge level between traders of different trading capital. On the basis of trading capital, the sample respondents are classified into five groups such as: *Below 1 lakh (group1)*, *1-5 lakhs (group2)*, *5-10 lakhs(group3), 10-20 lakhs (group4)* and *Above 20 lakhs (group5)*. To examine the relationship between trading capital and level of knowledge about derivative market, descriptive analysis has been done which shows the mean score of knowledge level of traders with different amounts of trading capital. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The test hypothesis is given below and the result of the descriptive analysis is summarized in table 5.19.

H_0: There is no significant difference in the level of knowledge about derivative market among traders with different trading capital

H_1: There is a significant difference in the level of knowledge about derivative market among traders with different trading capital

Table 5.19

Descriptive statistics of trading capital-wise analysis of knowledge about the derivative market

Test Variable	Trading capital	N	Mean ± SD
Knowledge Level about derivative market	Below 1 lakh	74	47.01 ± 11.63
	1-5 lakhs	136	49.33 ± 11.92
	5-10 lakhs	29	50.45 ± 12.32
	10-20 lakhs	24	55.92 ± 11.36
	Above 20 lakhs	37	52.32 ± 13.69
	Total	300	49.76 ± 12.24

Source: Primary data

From table 5.19, it is found that there is a difference in the mean score of knowledge level between traders with different amounts of trading capital. Traders with a trading capital of *10-20 lakhs* have the highest knowledge level with a mean score of 55.92 and traders with a trading capital of *below 1 lakh* have the lowest knowledge level about derivative market with a mean score of 47.01. From the above data, it can be concluded that the knowledge level about derivative market is increasing with a corresponding increase in the trading capital of derivative traders. The ANOVA is performed to test the significance of differences in the mean knowledge level among traders with different amounts of trading capital and the result is summarised in Table 5.20.

Table 5.20

Result of One-way ANOVA: Trading capital-wise analysis of knowledge level about derivative market

	Sum of Squares	**df**	**Mean Square**	**F**	***p*-value**
Between Groups	1749.986	4	437.497		
Within Groups	43012.211	295	145.804	3.001	.019**
Total	44762.197	299			

Source: Primary data *** The difference is significant at the 5% level*

The one-way ANOVA reveals that there is a statistically significant difference in the mean score of knowledge level between traders of at least two groups with different trading capital (F (4,295) = [3.001], p = .019). To know the exact significant difference in knowledge level between different groups of trading capital Tukey HSD test has been performed and the result is shown in Table 5.21.

Table 5.21

Trading capital-wise Post Hoc (HSD) analysis for multiple comparisons of knowledge level

Trading Capital (I)	Trading Capital (J)	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
					Lower Bound	Upper Bound
Below 1 lakh (Group1)	1-5 lakhs	-2.31737	1.74425	.674	-7.1049	2.4701
	5-10 lakhs	-3.43476	2.64538	.692	-10.6956	3.8261
	10-20 lakhs	-8.90315*	2.83646	.016	-16.6885	-1.1179
	Above 20 lakhs	-5.31081	2.43125	.188	-11.9839	1.3623
1-5 lakhs (Group2)	Below 1 lakh	2.31737	1.74425	.674	-2.4701	7.1049
	5-10 lakhs	-1.11739	2.46978	.991	-7.8963	5.6615
	10-20 lakhs	-6.58578	2.67344	.102	-13.9236	.7521
	Above 20 lakhs	-2.99344	2.23892	.668	-9.1386	3.1518
5-10 lakhs (Group3)	Below 1 lakh	3.43476	2.64538	.692	-3.8261	10.6956
	1-5 lakhs	1.11739	2.46978	.991	-5.6615	7.8963
	10-20 lakhs	-5.46839	3.33210	.472	-14.6141	3.6773
	Above 20 lakhs	-1.87605	2.99473	.971	-10.0957	6.3436
10-20 lakhs (Group4)	Below 1 lakh	8.90315*	2.83646	.016	1.1179	16.6885
	1-5 lakhs	6.58578	2.67344	.102	-.7521	13.9236
	5-10 lakhs	5.46839	3.33210	.472	-3.6773	14.6141
	Above 20 lakhs	3.59234	3.16478	.788	-5.0941	12.2788
Above 20 lakhs (Group5)	Below 1 lakh	5.31081	2.43125	.188	-1.3623	11.9839
	1-5 lakhs	2.99344	2.23892	.668	-3.1518	9.1386
	5-10 lakhs	1.87605	2.99473	.971	-6.3436	10.0957
	10-20 lakhs	-3.59234	3.16478	.788	-12.2788	5.0941

Source: Primary data ** The difference is significant at the 5% level*

Table 5.21 shows the result of Tukey HSD test for multiple comparisons and it is found that the mean value of knowledge level is significantly different between traders with trading capital of *below1 lakh* and *10-20lakhs (group1 and group 4)* (p = 0.016, 95% C.I. = [-16.6885, -1.1179. There is no significant difference in mean knowledge scores between traders of all other groups such as *group 1 and 2*, *group 1 and 3*, *group 1 and 5*, *group 2 and 3*, *group 2 and 4*, *group 2 and 5, group 3 and 4*, *group 3 and 5* and finally between *group 4 and 5*.

5.6 Classification of Traders based on Level of Knowledge about the Derivative Market

The equity derivative traders included in this study are classified into three groups based on the score of knowledge level about the derivative market and is done by combing all the fifteen variables used for examining the knowledge level and classified the total score (15 x 5 = 75) into three categories. Where; Category 1 = 15 to 38, Category 2 = 39 to 50 and Category 3 = 51 to 75. Category 1 represents traders with very little knowledge about derivative market. The category 2 represents traders with moderate knowledge about derivative market, and the category 3 represents traders with a high level of knowledge about derivative market. A descriptive analysis has been done which shows the mean score of knowledge level of these three categories of traders. To find out the statistical significance of the difference in the mean score one sample t-test is also applied. The test hypothesis is given below and the result is summarised in table 5.22.

H_0: $\mu = 2$ (The mean knowledge level is equal to 2)

H_1: $\mu \neq 2$ (The mean knowledge level is not equal to 2)

Table 5.22

Classification of traders based on Level of knowledge about derivative market

Level of Knowledge	Category	Frequency	Per cent	Mean	Std. Deviation	t*	p-value
Low	1	52	17.30	2.32	0.7516	7.29	.4340
Medium	2	101	33.70				
High	3	147	49.00				
Total		300	100.0				

Source: Primary data *One sample t-test, Average=2*

Table 5.22 shows that out of 300 sample derivative traders 52 (17.3%) have a low level of knowledge about the derivative market, 101 (33.7%) traders have a medium level of knowledge about derivative market and 147 (49%) have high level of knowledge about derivative market. The mean score obtained for measuring the knowledge level of derivative traders is 2.32, which is above the mean score of the scale used for categorisation i.e., 2. The result of one sample t-test shows that the mean score is not significantly different from the mean of the response scale (population average score), t (299) = 7.29, p = .4340. Since the p>.05, the null hypothesis is accepted and it can be concluded that the level of knowledge of derivative traders about the derivative market is moderate.

5.7 Objectives and Preferences of Equity Derivative Traders

Derivative traders have certain preferences and patterns of trading in the derivative market. Their preferences towards the trading objective, market, contract, type of trade, maturity of the contract, strike price and type of strategy etc. have been analyzed and presented in this section. Traders were asked to express their preferences by giving multiple-choice responses to each variable of trading preferences.

5.7.1 Trading Objectives of Equity Derivative Traders in Kerala

Investors have different objectives for trading in the derivative market such as hedging a stock portfolio, earning a speculative profit, earning arbitrage profit, getting an additional return on an existing portfolio, etc. *(Hull & Basu, 2017)*. Table 5.23 presents the objectives of traders while trading derivatives.

Table 5.23

Trading Objectives of equity derivative traders

Sl. No.	Response	Frequency	Percent
1	For Hedging a stock portfolio	16	5.3
2	For earning speculative profit	133	44.3
3	Both hedging and speculation	75	25.0
4	For earning arbitrage profit	11	3.7
5	For getting additional return on existing portfolio	65	21.7
	Total	300	100.0

Source: Primary data

Table 5.23 presents the objectives of sample equity derivative traders in Kerala. It shows that earning speculative profit (44.3%) is the most preferred trading objective of traders in the derivatives market. Out of 300 respondents 16 (5.3%) aim at trading derivatives for hedging, 133 (44.3%) for speculation, 75 (25%) respondents use derivatives for both hedging and speculation, only 3.7% (11) are trading derivatives for earning arbitrage gain, and remaining 65 (21.7%) are trading derivative for getting an additional return on existing equity portfolio. Derivatives emerged as hedging tools, but most investors are reluctant to use them for hedging equity portfolios because of higher cost as compared to the benefit received from hedging. Therefore, many high-profile investors in the equity market now trading in the derivative market using capital by way of pledging their equity holding and earning a reasonably good percentage of additional return on equity portfolio.

5.7.2 Preferences of Equity Derivative Traders

Trading preferences of derivative traders refer to the specific strategies, instruments, and market conditions that derivative traders prefer and are comfortable with when engaging in trading activities. These traders may engage in various types of derivatives trading, including options, futures, swaps, and other complex financial instruments.

Trading preferences can vary significantly among derivative traders based on their risk appetite, investment goals, market outlook, and individual trading styles. Here are a few common trading preferences observed among derivative traders:

Market: Traders may have preferences for specific markets, such as futures markets, options markets, or spot markets. Certain strategies may work better under specific markets, and traders may adjust their preferences accordingly.

Instruments: Traders may have preferences for particular derivative instruments based on their risk-reward profiles and familiarity with the underlying asset. For example, some traders may prefer trading equity options, while others may focus on equity futures or index derivatives.

Timeframe: Traders may have preferences regarding their trading type, such as short-term scalping, intra-day trading and swing trading. Each type of trade requires different skills, analysis techniques, and risk management approaches.

Timeframe/maturity of contracts: Traders may have preferences regarding contract maturity or trading timeframe, such as weekly, monthly or annual contracts. Each timeframe requires different skills and trading techniques.

Strike prices: Options Traders may have preferences for different options strikes, such as ATM, ITM, OTM, DITM, etc. Certain strategies may require certain strikes, and they may work better under different market conditions.

Trading strategies: Derivative traders may have preferences for specific trading strategies, such as basic strategy, spread strategy, range-bound strategy, breakout trading, or volatility trading. They may develop and refine strategies based on their understanding of market dynamics and their ability to identify profitable trading opportunities.

It's important to note that trading preferences can vary widely among individual traders, and there is no one-size-fits-all approach. Traders develop their preferences based on their experience, knowledge, and personal trading goals, and these preferences may evolve over time as they refine their strategies and adapt to changing market conditions.

The choice to make trading in a derivative market is a complex decision. Once you decide to start derivative trading, the next question is which instrument is suitable for you- Futures or Options? Both futures and option contracts have their own benefits and risks. It may seem that options are a better choice since your losses can be restricted to the premium paid (in the case of the options buyer). However, in the case of short-selling of options, the potential for losses can be unlimited if the movement gets adverse. One more risk in options trading is the time value. One should be sure about the timing before entering an options contract (buy-side), as most option contracts expire worthless due to time decay. So compared with futures contracts, the chances of making a profit are much higher in options *(Rangappa, 2022)*. After deciding the type of product, the next question is about the underlying asset. Index-based product or stock-based product, which is good for trading? Again, the trader is having a choice between different types of trade like intra-day or overnight, weekly contract or monthly contract? Which is the appropriate strike price? Which type of trading strategy is good, etc., is the choice concern of a derivative trader. The following table shows the trading choice of derivative traders selected in this study.

Table 5.24

Preferences of Equity Derivative traders

(n=300)

Variable		Frequency	Percent
Most Preferred Market	Options Market	164	54.7
	Futures Market	29	9.7
	Spot Market	40	13.3
	Both futures and options market	37	12.3
	All three	30	10.0
Most Preferred Contract	Index Futures	36	12.0
	Stock Futures	20	6.7
	Index Options	156	52.0
	Stock Options	23	7.7
	Any of the above	65	21.7

Variable		Frequency	Percent
Most Preferred type of Trade	Intra-day Trade	120	40.0
	Overnight Trade	29	9.7
	Swing Trade	74	24.7
	Roll-over Trade	17	5.7
	Any of the above	60	20.0
Most Preferred Maturity of contract	Weekly contract	152	50.7
	Monthly contract	74	24.6
	Annual contract	2	0.7
	Any of the above	72	24.0
Most Preferred Option strike	DITM	4	1.4
	ITM	48	16.0
	ATM	89	29.8
	OTM	59	19.8
	DOTM	7	2.3
	Any of the above	63	21
	Not applicable	29	9.7
Most Preferred Option Strategy	Basic Strategy	95	31.7
	Income strategy	8	2.7
	Vertical spread strategy	9	3.0
	Volatility strategy	6	2.0
	Sideways strategy	13	4.3
	Leverage strategy	1	0.3
	Synthetic strategy	3	1.0
	Any of the above	165	55.0

Source: Primary data

Most Preferred Market: Table 5.24 shows that out of 300 sample respondents 164 (54.7%) traders gave more preference to the options market, 29 (9.7%) prefers the futures market, 40 (13.3%) gave preference to the spot market whereas 34 (12.3%) prefer both futures and options market for trading and remaining 30 (10%) prefer all the three markets for trade. From the above data, it can be concluded that the options market is the most preferred market for derivative traders, as more than 50 % of the traders prefer the options market for trade.

Most Preferred Contract: Out of 300 sample respondents 36 (12%) traders give preference to Index futures, 20 (6.7%) prefer stock future, 156 (52%) give preference to Index options, 23 (7.7%) prefer stock options and remaining 65 (21.7%) prefer all types of equity derivatives for trade. From the above data, it can be found that index options are the most preferred contract for derivative traders as more than 50 % of the traders prefer index options for trade.

Most Preferred type of Trade: Out of the total respondents 120 (40%) traders gave preference to intra-day trade, 29 (9.7%) prefer overnight trade, 74 (24.7%) gave preference to swing trade, only 17 (5.7%) prefer roll over trade and 60 (20%) prefer all types of trade. From the above data it can be clear intra-day trade is the most popular type of trade among derivative traders as 40 % of the traders prefer intra-day trade.

Most Preferred Maturity: Out of total respondents 152 (50.7%) traders give preference to weekly maturing contracts for trade, 74 (24.7%) prefer monthly contract, only 2 (0.7%) give preference to annual contract and 72 (24%) are using all type of expiry contract for trade. From the above data, it can be clear that weekly expiring contract is the most popular type of contract among derivative traders.

Most Preferred Option Strike: Five types of option strike prices are available for option traders. This study tries to explore the most demanding option strike price and found that out of total 300 traders 4 (1.4%) always prefer DITM strike, 48 (16%) prefer ITM strike, 89 (29.8%) give preference to ATM strike, 59 (19.8) prefer OTM strike and only 7 (2.3%) prefer DOTM strike for trade. 21% of traders use all types of strike prices for trade and the remaining 29 are futures traders and they are not interested in option trading. From the above data, it can be inferred that ATM is the most demanding strike price for option traders.

Most Preferred Option Strategy: Hundreds of option strategies suitable for different market conditions are available for option traders. This study tries to find out the most popular option trading strategy and for that purpose option strategies are divided into seven broad categories based on the Bible of Option strategy *(Cohen, 2005)*. It is found that out of 300 sample option traders included in the study 95 (31.7%) prefer basic option strategy, 8 (2.7%) prefer income strategy, 9 (3%) prefer vertical spread strategy, 6 (2%) prefer volatility strategy, 13 (4.3%) prefer to use sideways strategy, only 1 (0.3%) prefer leveraged strategy, 3 (1%) prefer synthetic strategy and 165 (55%) prefer all of these strategies based on market outlook. From the above data it can be inferred that majority of option traders are using different types of option strategies depending on market trends.

5.8 Trading Strategies of Equity Derivative Traders

Derivative traders generally adopt certain techniques and strategies while trading in the derivative market *(Reddy & Sreeram, 2021)*. These techniques include deciding stop-loss position, using option strategy builder software, using Algorithmic trading, etc. the habits of using these techniques have been analyzed and presented in this section. The trading strategies and techniques are examined on a five-point scale using ten variables. The data were analyzed using one-sample t-test with a test value of 3, which is the mean of the response scale and the results are summarized in Table 5.25. The sample distribution of trading techniques and strategies of derivative traders was found normal and the result of the normality test is presented in Chapter 4, research methodology.

Table 5.25

Trading Techniques and Strategies of equity derivative traders

(n=300)

Statements	Response	Frequency	Per cent	Mean	SD	t^*	*p*-value
I always decide stop-loss for all trading position	SD	35	11.7	3.70	1.39	8.743	<.01***
	D	23	7.7				
	N	67	22.3				
	A	47	15.7				
	SA	128	42.7				
I always trade with the help of option strategy builder	SD	103	34.3	2.77	1.57	-2.566	.011**
	D	36	12.0				
	N	58	19.3				
	A	34	11.3				
	SA	69	23.0				

Statements	Response	Frequency	Per cent	Mean	SD	t*	*p*-value
I always use Algo-trading system	SD	221	73.7	1.54	1.06	-23.908	<.01***
	D	30	10.0				
	N	28	9.3				
	A	8	2.7				
	SA	13	4.3				
I always trade based on the movement of foreign stock indices	SD	55	18.3	3.27	1.44	3.234	<.01***
	D	29	9.7				
	N	85	28.3				
	A	42	14.0				
	SA	89	29.7				
I always prefer index derivatives for trading than stock derivatives	SD	17	5.7	3.98	1.16	14.61	<.01***
	D	16	5.3				
	N	54	18.0				
	A	83	27.7				
	SA	130	43.3				
I always decide risk -reward ratio for all my trade	SD	18	6.0	3.78	1.18	11.46	<.01***
	D	26	8.7				
	N	63	21.0				
	A	89	29.7				
	SA	104	34.7				
I always prefer to sell options than buy options	SD	50	16.7	3.22	1.45	2.67	<.01***
	D	51	17.0				
	N	69	23.0				
	A	42	14.0				
	SA	88	29.3				
I always consider option Greeks while trading	SD	73	24.3	2.86	1.38	-1.71	.088
	D	44	14.7				
	N	80	26.7				
	A	57	19.0				
	SA	46	15.3				
I always consider Put Call Ratio (PCR) while trading	SD	62	20.7	2.89	1.28	-1.45	.149
	D	41	13.7				
	N	98	32.7				
	A	65	21.7				
	SA	34	11.3				

Statements	Response	Frequency	Per cent	Mean	SD	t*	p-value
I always consider Implied Volatility and movements of India VIX while trading	SD	40	13.3	3.50	1.36	6.30	<.01***
	D	29	9.7				
	N	65	21.7				
	A	74	24.7				
	SA	92	30.7				
I always consider cost of each strategy while trading	SD	35	11.7	3.47	1.32	6.11	<.01***
	D	35	11.7				
	N	69	23.0				
	A	77	25.7				
	SA	84	28.0				

Source: Primary data ***, **Difference is significant a 1% & 5% level respectively
*One sample t-test, Average=3

Table 5.25 presents the trading techniques and strategies of equity derivative traders in Kerala. The sub-variable-wise analysis of the use of trading techniques and strategies is explained below:

Use of Stop-loss: the above table indicates that the mean score obtained for measuring the use of stop-loss is 3.7, which is significantly above the mean score of the response scale i.e. 3, and the one-sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 8.743, p = <.01, Hence, it can be concluded that most of the traders are highly using stop-loss for all their trade.

Use of Option Strategy Builder: the above table indicates that the mean score obtained for measuring the use of option strategy builder is 2.77, which is significantly below the mean score of the response scale, and the one-sample t-test shows that the mean score is statistically significantly lower than the population average score, t (299) = -2.566, p = .011. Hence, it can be concluded that majority of the traders are not using option strategy builder software for their trade.

Use of Algo Trading: above table indicates that the mean score obtained for measuring the use of algo trading is 1.54, which is significantly below the mean score of response scale, and the one-sample t-test shows that the mean score is statistically significantly lower than the population average score, t (299) = -23.908, *p* = <.01, Hence, it can be concluded that majority of the traders do not use Algorithmic trading technique.

Use of Foreign Stock Market Indices: above table indicates that the mean scores obtained for measuring the use of foreign stock market index is 3.27, which is significantly above the mean score of response scale, and the one sample t-test shows that mean score is statistically significantly higher than the population average score, t (299) = 3.234, *p* = .001. Hence, it can be concluded that majority of the traders are frequently using the movement of foreign stock market indices for designing their trading strategies.

Use of Index Derivatives: the above table indicates that the mean scores obtained for measuring the use of index derivatives is 3.98, which is significantly above the mean score of response scale, and the one sample t-test shows that mean score is statistically significantly higher than the population average score, t (299) = 14.61, *p* = <.01, Hence, it can be concluded that majority of the traders are highly using index options and futures for trade than stock options and futures.

Use of Risk-reward Ratio: the above table indicates that the mean score obtained for measuring the use of risk-reward ratio is 3.78, which is significantly above the mean score of the response scale, and the one-sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 11.46, *p* = <.01 Hence, it can be concluded that majority of the traders are highly using risk-reward ratio while designing their trading strategies in the derivative market.

Preference to Option Writing: the above table indicates that the mean scores obtained for measuring the preference of option writing is 3.22, which is significantly above the mean score of response scale, and the one sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 2.67, *p* = .008. Hence, it can be concluded that the majority of the traders are highly preferring option selling to buying options while designing their trading strategies.

Use of Option Greeks: above table indicates that the mean score obtained for measuring the use of option Greeks is 2.86, which is almost equal to the mean score of the response scale, and the one-sample t-test shows that mean score is statistically not significantly different than the population average score, t (299) = -1.71 , p = .088. Hence, it can be concluded that majority of traders are moderately using option Greeks for designing their trading strategies.

Use of Put-call Ratio: above table indicates that the mean score obtained for measuring the use of PCR is 2.89, which is almost equal to the mean score of the response scale, and the one-sample t-test shows that mean score is statistically not significantly different than the population average score, t (299) = -1.45, p = .149. Hence, it can be concluded that majority of the traders are moderately using the put-call ratio for designing their trading strategies.

Use of IV & VIX: above table indicates that the mean score obtained for measuring the use of implied volatility and India VIX is 3.50, which is significantly above the mean score of the response scale, and the one sample t-test shows that mean score is statistically significantly higher than the population average score, t (299) = 6.30, p = <.01, Hence, it can be concluded that majority of the traders are highly using IV and VIX for designing their trading strategies.

Considering Cost of Strategy: above table indicates that the mean score obtained for measuring the influence of the Cost of Strategy is 3.47, which is significantly above the mean score of the response scale, and the one-sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 6.11, p = <.01. Hence, it can be concluded that majority of the traders are highly considering the cost of strategy while designing their trading strategies.

The above result indicates that out of 11 statements used for measuring the use of trading techniques and strategies, seven of them report mean scores significantly above the mean score of the response scale (3), two of them are significantly below the mean score and remaining two having a mean score almost equal to the mean of response scale. This result indicates that the majority of the traders are frequently using stop-loss trading strategies and considering the movements of foreign stock indices while designing trading strategies. The result also suggests that majority of the traders mostly prefer trading of index-based derivatives over stock derivatives. It is also found that majority of the traders are preferring option writing than option buying, this may connect to the findings that most of the traders are considering the risk-reward ratio and cost the strategy of their trade, which may indicate that options writing gives better risk-reward than option buying. This study also found that most of the traders are considering expected market volatility (IV and VIX) designing their trading strategies. This study further points out that majority of the traders are not depending on trading software like algo-trading and option strategy builder for trading in derivative market.

5.9 Classification of Traders based on Trading Strategies

The equity derivative traders included in this study are classified in to three groups based on the score of trading techniques and strategies and is done by combing all the eleven variables used for examining the trading techniques and strategies under this study and classified the total score (11 x 5 = 55) in to three categories. Where; Category 1 = 11 to 28, Category 2 = 29 to 37 and Category 3 = 38 to 55. The category 1 represents traders with very little use of above trading techniques and strategies. The category 2 represents traders with moderately using the above listed trading techniques, and the category 3 represents traders with high use of above trading techniques and strategies. The data is then analyzed using one-sample t-test with a test value of '2' which is the mean of three-point scale used for categorizing the traders. The test hypothesis is given below:

H_0: $\mu = 2$ (The usage of trading techniques and strategies is medium)

H_1: $\mu \neq 2$ (The usage of trading techniques and strategies is not medium)

The descriptive statistics of overall use of trading techniques and strategies are presented in the Table 5.26.

Table 5.26

Classification of traders based on trading strategies

Use of trading techniques	Category	Frequency	Percent	Mean	Std. Dev.	t	p-value
Low	1	62	20.67	2.17	0.749	4.09	<.01***
Medium	2	123	41.00				
High	3	115	38.33				
Total		300	100.0				

Source: Primary data *** *Difference is significant a 1% level respectively*

Table 5.26 shows that out of 300 sample derivative traders 62 (20.67%) have low use of trading techniques, 123 (41%) traders have medium use of trading techniques and 115 (38.3%) have high use of trading techniques and strategies specified in this study. The mean score obtained for measuring the category of trading techniques and strategies is 2.17, which is above the mean score of the scale used for categorisation i.e., 2. The result of one-sample t-test shows that the mean score is statistically different from the population average score, t (299) = 4.087, p = <.01. Hence, it can be concluded that the use of trading techniques and strategies is moderately high among equity derivative traders in Kerala.

5.10 Comparison of the Use of Trading Strategies with Different Demographic Variables

The trading techniques and strategies used by equity derivative traders are compared with respect to eight variables such as: *area, gender, age, education, occupation, income, trading experience, trading capital and knowledge level.* Since the distribution found normal parametric tests (ANOVA, t-test, etc) are used to compare the trading techniques and strategies among different demographic variables. The analysis and results are presented below. In the case of *area* and *gende*r-wise comparison independent sample t-test is used in all other cases; ANOVA is applied to check the difference in trading strategies between different groups. The analysis and results are presented below.

5.10.1 Area wise Analysis of Use of Trading Strategies

The sample selected under this study includes equity derivative traders from urban and rural areas, hence it is relevant to examine whether there is any difference in the trading techniques and strategies of traders between urban and rural areas. Here we need to compare the means of two groups of traders such as urban and rural. Independent samples t-test is used test whether two population means are different. This procedure is an inferential statistical hypothesis test, meaning it uses samples to draw conclusions about populations. The test hypothesis is given below:

H_0: $\mu 1 = \mu 2$ (There is no significant difference in the trading techniques and strategies among traders from urban and rural area)

H_1: $\mu 1 \neq \mu 2$ (There is a significant difference in the trading techniques and strategies among traders from urban and rural area)

The result of independent sample t-test is summarised in table 5.27 below.

Table 5.27

Area-wise analysis of trading techniques and strategies of equity derivative traders in Kerala

Test variable	Group	N	Mean ± SD	t	*p*-value	Remarks
Trading techniques and Strategies	Urban	156	35.06 ± 7.70	0.192	.848	Equal variances assumed
	Rural	144	34.89 ± 8.08			

Source: Primary data

Levene's Test for Equality of Variances gives *p*-value of .240, therefore equal variance is accepted and results are interpreted accordingly. From the table 5.27 it can be observed that the mean score of trading techniques and strategies of urban and rural traders are 35.06 and 34.89 respectively and indicates very little difference between the mean values. The Independent sample t-test shows that the difference is not significant among urban and rural equity derivative traders with regard to trading techniques and strategies, t (298) = 0.192, $p = .848$.

5.10.2 Gender-wise Analysis of Use of Trading Strategies

The sample used in this study includes male and female equity derivative traders, hence it is relevant to examine whether there is any difference in the use of trading techniques and strategies among male and female traders. The male and female traders may have differences in the use of trading strategies. To test the same, descriptive analysis has been done which shows the mean score of male and female traders with regards to trading techniques and strategies. To find out the statistical significance of the difference in mean score independent sample t-test is also applied. The test hypothesis is given below and the result is summarized in Table 5.28.

H_0: $\mu 1 = \mu 2$ (There is no significant difference in the use of trading techniques and strategies between male and female traders)

H_1: $\mu 1 \neq \mu 2$ (There is a significant difference in the use of trading techniques and strategies between male and female traders)

Table 5.28

Gender-wise analysis of trading techniques and strategies of equity derivative traders in Kerala

Test variable	Group	N	Mean ± SD	t	*p*-value	Remarks
Trading Techniques and Strategies	Male	264	35.12 ± 8.05	0.84	.401	Equal variances assumed
	Female	36	33.94 ± 6.47			

Source: Primary data

Levene's Test for Equality of Variances gives *p*-value of .144, therefore equal variance is accepted and results are interpreted accordingly. From table 5.28 it can be observed that the mean score of trading techniques and strategies of male and female traders are 35.12 and 33.94 respectively and indicates small difference between the mean values. The Independent sample t-test shows that there is no significant difference in the use of trading techniques and strategies among male and female equity derivative traders in Kerala, t (298) = 0.84, $p = .401$.

5.10.3 Age-wise Analysis of Use of Trading Techniques and Strategies

Traders with different age categories may have different trading techniques and strategies; hence it is good to check the relationship between age and the use of trading strategies. On the basis of age, the sample respondents are classified in to four groups such as: *Up to 30 (1)*, *31-40 (2)*, *41-50 (3)* and *51& above (4)*. The data has been classified age wise and descriptive analysis has done to know the mean score of traders with different age category. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is applied. The test hypothesis is given below and the result of descriptive analysis is summarized in Table 5.29.

H_0: There is no significant difference in the use of trading techniques and strategies among traders of different age groups

H_1: There is a significant difference in the use of trading techniques and strategies among traders of different age groups

Table 5.29

Descriptive statistics of age-wise analysis of use of trading techniques and strategies

Test Variable	Age Group (in years)	N	Mean ± SD
Trading techniques and strategies	Up to 30	85	36.47 ± 7.64
	31 – 40	135	34.57 ± 7.97
	41 – 50	55	36.45 ± 7.06
	51 & above	25	28.88 ± 7.03
	Total	**300**	**34.98 ± 7.87**

Source: Primary data

From Table 5.29, it is evident that there is a difference in the mean score of trading techniques and practices among traders of different age groups. The ANOVA is applied to test the significance of difference among the mean of different age groups and the result is summarised in table 5.30.

Table 5.30

Result of One-way ANOVA: age-wise analysis of the use of trading techniques and strategies

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	1261.34	3	420.45		
Within Groups	17296.53	296	58.43	7.19	<.01***
Total	18557.88	299			

Source: Primary data ***The difference is significant at the 1% level.

The one-way ANOVA reveals that there is a statistically significant difference in the mean score of trading techniques and practices between at least two age groups (F (3, 296) = [7.19], p = <.01). To know the exact significant difference in the use of trading strategies between different age groups Tukey's HSD test has been used and the result is shown in Table 5.31.

Table 5.31

Age group wise Post Hoc (HSD) analysis for multiple comparisons of the use of trading techniques and strategies

Age of respondents (I)	Age of respondents (J)	Mean Difference (I-J)	Std. Error	*p*-value	95% Confidence Interval	
					Lower Bound	Upper Bound
Up to 30 (1)	31 - 40	1.90022	1.05845	.278	-.8345	4.6349
	41 - 50	.01604	1.32284	1.000	-3.4018	3.4338
	51 & above	7.59059*	1.73920	.000	3.0970	12.0841
31 – 40 (2)	Up to 30	-1.90022	1.05845	.278	-4.6349	.8345
	41 - 50	-1.88418	1.22282	.414	-5.0436	1.2752
	51 & above	5.69037*	1.66440	.004	1.3901	9.9906
41 – 50 (3)	Up to 30	-.01604	1.32284	1.000	-3.4338	3.4018
	31 - 40	1.88418	1.22282	.414	-1.2752	5.0436
	51 & above	7.57455*	1.84386	.000	2.8106	12.3385
51 & Above (4)	Up to 30	-7.59059*	1.73920	.000	-12.0841	-3.0970
	31 - 40	-5.69037*	1.66440	.004	-9.9906	-1.3901
	41 - 50	-7.57455*	1.84386	.000	-12.3385	-2.8106

Source: Primary data ** The difference is significant at the 5% level*

Table 5.31 shows the result of Tukey's HSD test for multiple comparisons and it is found that the mean value of trading techniques and practices is significantly different between age group *1 and 4* (p = .000, 95% C.I. = [3.0970, 12.0841]), *2 and 4* (p = .004, 95% C.I. = [1.3901, 9.9906]),and *3 and 4* (p = .000, 95% C.I. = [2.8106, 12.3385]). There is no significant difference in mean scores of trading strategies between *1 and 2*, *1 and 3* and *2 and 3 age groups*. That means out of six group comparisons with regard to trading techniques and practices, the age group *51 & above* is significantly different from all other age groups. From the above analysis, it is evident that the traders in the age group of 51 and above are using trading techniques in the category 1, i.e. very low use of trading strategies specified in this study.

5.10.4 Education Qualification wise Analysis of the Use of Trading Techniques and Strategies

The sample derivative trader in this study includes equity derivative traders with different educational qualifications. Hence it is important to examine whether there is any difference in the use of trading strategies among different educational qualification group. On the basis of education level, the sample respondents are classified in to five groups such as: SSLC, Higher Secondary, Graduate, Post Graduate, and Professional. The level of education of traders may affect the use of trading techniques and strategies. To test the same, descriptive analysis has been done which shows the mean score of use of trading techniques with different educational qualification. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is applied. The test hypothesis is given below and the result of descriptive analysis is summarized in Table 5.32.

H_0: There is no significant difference in the use of trading techniques and strategies among traders of different educational qualifications.

H_1: There is a significant difference in the use of trading techniques and strategies among traders of different educational qualifications.

Table 5.32

Descriptive statistics of Education qualification -wise analysis of use of trading techniques and strategies

Test Variable	Education Group	N	Mean ± SD
Trading techniques and strategies	SSLC	13	28.08 ± 5.59
	Higher Secondary	10	34.96 ± 6.81
	Graduate	130	35.58 ± 8.15
	Post Graduate	92	36.00 ± 6.89
	Professional	55	32.84 ± 8.73
	Total	300	34.98 ± 7.88

Source: Primary data

From the above table, it is found that there is difference in the mean score of use of trading techniques between traders with different educational qualifications. The traders with post-graduation have the highest mean score (36) and traders with SSLC have the lowest mean score (28.08) of use of trading techniques and strategies. The ANOVA is applied to test the significance of differences in the mean value of the use of trading techniques and strategies among traders of different educational qualifications and the result is summarised in Table 5.33 below.

Table 5.33

Result of One-way ANOVA: Education - wise analysis of use of trading techniques and strategies

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	1009.76	4	252.44	4.18	.003***
Within Groups	17797.08	295	60.33		
Total	18806.84	299			

Source: Primary data ****The mean difference is significant at the 1% level*

The one-way ANOVA reveals that there is a statistically significant difference in the mean score of use of trading techniques and strategies between traders of at least two educational qualification groups (F (4, 295) = [4.18], p = .003). To know the exact significant difference in use of trading strategies between different groups of educational qualifications Tukey's HSD test has been applied and the result is shown in Table 5.34.

Table 5.34

Education qualification wise Post Hoc (HSD) analysis for multiple comparisons of use of trading techniques and strategies

Education Level (I)	Education Level (J)	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
					Lower Bound	Upper Bound
SSLC	Higher Secondary	-6.82308	3.26705	.228	-15.7902	2.1441
	Graduate	-7.50000*	2.25937	.009	-13.7014	-1.2986
	Post Graduate	-7.92308*	2.30140	.006	-14.2398	-1.6064
	Professional	-4.75944	2.39533	.275	-11.3340	1.8151
Higher Secondary	SSLC	6.82308	3.26705	.228	-2.1441	15.7902
	Graduate	-.67692	2.54892	.999	-7.6730	6.3192
	Post Graduate	-1.10000	2.58624	.993	-8.1985	5.9985
	Professional	2.06364	2.67017	.938	-5.2652	9.3925
Graduate	SSLC	7.50000*	2.25937	.009	1.2986	13.7014
	Higher Secondary	.67692	2.54892	.999	-6.3192	7.6730
	Post Graduate	-.42308	1.05822	.995	-3.3276	2.4814
	Professional	2.74056	1.24938	.185	-.6887	6.1698
Post Graduate	SSLC	7.92308*	2.30140	.006	1.6064	14.2398
	Higher Secondary	1.10000	2.58624	.993	-5.9985	8.1985
	Graduate	.42308	1.05822	.995	-2.4814	3.3276
	Professional	3.16364	1.32387	.121	-.4700	6.7973
Professional	SSLC	4.75944	2.39533	.275	-1.8151	11.3340
	Higher Secondary	-2.06364	2.67017	.938	-9.3925	5.2652
	Graduate	-2.74056	1.24938	.185	-6.1698	.6887
	Post Graduate	-3.16364	1.32387	.121	-6.7973	.4700

Source: Primary data ** The mean difference is significant at the 5% level*

Table 5.34 shows the result of Tukey HSD test for multiple comparisons and it is found that the mean value of the use of trading techniques and strategies is significantly different between traders possessing educational qualification of *SSLC and Graduate* (p = .009, 95% C.I. = [-13.7014, -1.2986]), and *SSLC and Post Graduate* (p = .006, 95% C.I. = [-14.2398, -1.6064]). There is no significant difference in trading strategies between traders of higher secondary and above qualifications. That means there is no significant difference in trading strategies between traders having qualifications of higher secondary, Graduation, Post Graduation and Professional degree.

5.10.5 Occupation-wise Analysis of the Use of Trading Techniques and Strategies

The sample derivative trader in this study includes equity derivative traders of different occupations. Hence it is interesting to examine whether there is any difference in the use of trading strategies among different occupational groups of traders. On the basis of occupation, the sample respondents are classified into six groups such as Govt. Employee, private employee, professionals, self-employed, business and full-time traders. The type of occupation of traders may affect the use of trading techniques and strategies. To test the same, descriptive analysis has been done which shows the mean score of the use of trading techniques with different occupational groups. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is applied. The test hypothesis is given below and result of the descriptive analysis is summarized in Table 5.35.

H_0: *There is no significant difference in the use of trading techniques and strategies among traders of different occupational groups.*

H_1: *There is a significant difference in the use of trading techniques and strategies among traders of different occupational groups.*

Table 5.35

Descriptive statistics of occupation -wise analysis of the use of trading techniques and strategies

Test Variable	Occupational Group	N	Mean ± SD
Trading Strategies	Govt. employee	38	33.03 ± 7.09
	Pvt. employee	97	35.65 ± 7.67
	Professionals	46	32.74 ± 8.14
	Self employed	37	35.43 ± 7.77
	Business	52	35.51 ± 8.44
	Full-time trader	30	40.00 ± 6.77
	Total	300	34.98 ± 7.93

Source: Primary data

From the above table, it is found that there is a difference in the mean score of the use of trading techniques between traders with different occupational groups. The mean score of full-time traders is the highest (40.00) and govt. employees is lowest (33.03), which shows that the full-time traders are highly using these trading techniques and strategies. The ANOVA is applied to test the significance of differences in mean value of the use of trading techniques and strategies among traders of different occupations and the result is summarised in Table 5.36 below.

Table 5.36

Result of One-way ANOVA: Occupation-wise analysis of the use of trading strategies

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	1176.04	5	235.21	3.92	.002***
Within Groups	17643.68	294	60.01		
Total	18819.72	299			

Source: Primary data *** *The difference is significant at 1% level*

The one-way ANOVA reveals that there is a statistically significant difference in the mean score of the use of trading strategies between traders of at least two occupation groups ($F(5, 294) = [3.92]$, $p = .002$). To know the exact significant difference in use of trading techniques and strategies between different occupational groups of traders Tukey's HSD test has been applied and the result is shown in Table 5.37.

Table 5.37

Occupation-wise Post Hoc (HSD) analysis for multiple comparisons of use of trading techniques and strategies

Occupation (I)	Occupation (J)	Mean Difference (I-J)	Std. Error	*p*-value	95% Confidence Interval	
					Lower Bound	Upper Bound
Govt. Employee	Pvt. employee	-2.63348	1.48255	.483	-6.8864	1.6194
	Professional	.28719	1.69820	1.000	-4.5843	5.1587
	Self employed	-2.40612	1.78920	.760	-7.5386	2.7264
	Business	-2.49291	1.65329	.660	-7.2356	2.2497
	Full-time trader	-6.97368*	1.89201	.004	-12.4011	-1.5462
Private sector employee	Govt. Employee	2.63348	1.48255	.483	-1.6194	6.8864
	Professional	2.92066	1.38683	.287	-1.0576	6.8990
	Self employed	.22736	1.49688	1.000	-4.0666	4.5213
	Business	.14056	1.33146	1.000	-3.6789	3.9600
	Full-time trader	-4.34021	1.61836	.082	-8.9827	.3023
Professional	Govt. Employee	-.28719	1.69820	1.000	-5.1587	4.5843
	Pvt. employee	-2.92066	1.38683	.287	-6.8990	1.0576
	Self employed	-2.69330	1.71072	.616	-7.6007	2.2141
	Business	-2.78010	1.56803	.485	-7.2782	1.7180
	Full-time trader	-7.26087*	1.81798	.001	-12.4759	-2.0458
Self employed	Govt. Employee	2.40612	1.78920	.760	-2.7264	7.5386
	Pvt. employee	-.22736	1.49688	1.000	-4.5213	4.0666
	Professional	2.69330	1.71072	.616	-2.2141	7.6007
	Business	-.08680	1.66615	1.000	-4.8663	4.6927
	Full-time trader	-4.56757	1.90325	.160	-10.0273	.8921
Business	Govt. Employee	2.49291	1.65329	.660	-2.2497	7.2356
	Pvt. employee	-.14056	1.33146	1.000	-3.9600	3.6789
	Professional	2.78010	1.56803	.485	-1.7180	7.2782
	Self employed	.08680	1.66615	1.000	-4.6927	4.8663
	Full-time trader	-4.48077	1.77609	.121	-9.5757	.6142
Full-time trader	Govt. Employee	6.97368*	1.89201	.004	1.5462	12.4011
	Pvt. employee	4.34021	1.61836	.082	-.3023	8.9827
	Professional	7.26087*	1.81798	.001	2.0458	12.4759
	Self employed	4.56757	1.90325	.160	-.8921	10.0273
	Business	4.48077	1.77609	.121	-.6142	9.5757

Source: Primary data ** The mean difference is significant at the 5% level*

Table 5.37 shows the result of Tukey HSD test for multiple comparisons and it is found that the mean value of the use of trading techniques and strategies is significantly different between traders in the occupational groups of *Govt. employee and Full-time trader* (p = .004, 95% C.I. = [-12.4011, -1.5462]), and *Professionals and Full-time trader* (p = .001, 95% C.I. = [-12.4759, -2.0458]). There is no statistically significant difference in trading strategies between traders of other occupation groups. That means there is no significant difference in trading strategies among traders of Govt. employees, Pvt. Employees, Professionals, self-employed and business.

5.10.6 Trading Experience-wise Analysis of the Use of Trading Techniques and Strategies

The sample selected in this study includes equity derivative traders with varying years of trading experience. Hence it is relevant to examine whether there is any differences in the use of trading techniques among different trading experience group. On the basis of years of trading experience the sample respondents are classified into four groups such as *2 years & below (1)*, *3-5 years (2)*, *5-10 years (3)* and *above 10 years (4).* The number of years of trading experience of equity derivative traders may affect their trading strategies; to test the same, descriptive analysis has been done which shows the mean score of use of trading strategies with different years of trading experience. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The test hypothesis is given below and the result of descriptive analysis is summarized in Table 5.38.

H_0: There is no significant difference in the use of trading strategies among traders with different trading experience.

H_1: There is a significant difference in the use of trading strategies among traders with different trading experience.

Table 5.38

Descriptive statistics of trading experience -wise analysis of the use of trading techniques and strategies

Test Variable	Trading experience	N	Mean ± SD
Trading Strategies	2 years and below	161	35.61 ± 8.08
	3-5 years	81	33.68 ± 6.44
	5-10 years	32	36.94 ± 8.65
	Above 10 years	26	35.92 ± 9.80
	Total	300	35.26 ± 7.93

Source: Primary data

From the table 5.38, it is found that there is a very small difference in the mean score of trading techniques and strategies between traders with different years of trading experience. The traders with 5-10 years of trading experience have the highest mean score (36.94) and traders with below 2 years' experience have the lowest mean score (35.61). The ANOVA is applied to test the significance of the difference in the mean score of trading techniques and strategies among traders with different years of experience and the result is summarised in Table 5.39.

Table 5.39

Result of One-way ANOVA: Trading experience - wise analysis of trading strategies

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	324.22	3	108.07	1.73	.161
Within Groups	18495.50	296	62.49		
Total	18819.72	299			

Source: Primary data

The one-way ANOVA reveals that there is statistically no significant difference in the mean score of trading techniques and strategies between traders with different years of trading experience (F (3,296) = [1.73], p = .161).

5.10.7 Trading Capital-wise Analysis of the Use of Trading Techniques

The sample selected in this study includes equity derivative traders with different amounts of trading capital. The amount of trading capital may affect the use of different trading techniques and practices. Hence it is important to examine whether there is any difference in the use of trading techniques between traders of different trading capital. On the basis of trading capital, the sample respondents are classified in to five groups such as: *Below 1 lakh (group1)*, *1-5 lakhs (group2)*, *5-10 lakhs (group3), 10-20 lakhs (group4)* and *Above 20 lakhs (group5)*. To examine the relationship between trading capital and use of trading techniques and strategies, descriptive analysis has been done which shows the mean score of traders with different amount of trading capital. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The test hypothesis is given below and the result of descriptive analysis is summarized in Table 5.40.

H_0: *There is no significant difference in the use of trading techniques and strategies among traders with different trading capital.*

H_1: *There is significant difference in the use of trading techniques and strategies among traders with different trading capital.*

Table 5.40

Descriptive statistics of trading capital-wise analysis of use of trading techniques and strategies

Test Variable	Trading Capital	N	Mean ± SD
Trading Strategies	Below 1 lakh	74	33.57 ± 7.93
	1-5 lakhs	136	35.60 ± 7.47
	5-10 lakhs	29	34.55 ± 9.00
	10-20 lakhs	24	39.79 ± 7.40
	Above 20 lakhs	37	40.95 ± 5.59
	Total	300	35.99 ± 7.87

Source: Primary data

From table 5.40, it is evident that there is difference in the mean score of trading techniques and strategies between traders with different amount of trading capital. The traders with trading capital of *Above 20 lakhs* have highest mean score (40.95) and traders with trading capital of *below 1 lakh* have lowest mean score (33.57). The ANOVA is performed to test the significance of difference in the mean among traders with different amount of trading capital and the result is summarised in Table 5.41.

Table 5.41

Result of One-way ANOVA: Trading capital-wise analysis of trading strategies

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	1770.243	4	442.561		
Within Groups	16793.744	295	56.928	7.77	<.01***
Total	18563.987	299			

Source: Primary data ****The difference is significant at the 1% level.*

The one-way ANOVA reveals that there is a statistically significant difference in the mean score of trading techniques and strategies between at least two groups of traders with different trading capital ($F(4, 295) = [7.77]$, $p = <.01$). To know the exact significant difference in the use of trading techniques and strategies between traders with different trading capital Tukey's HSD test has been applied and the result is shown in Table 5.42.

Table 5.42

Trading capital group wise Post Hoc (HSD) analysis for multiple comparisons of trading strategies

Trading Capital (I)	Trading Capital (J)	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Below 1 lakh (Group1)	1-5 lakhs	-2.03537	1.08990	.337	-5.0269	.9561
	5-10 lakhs	-.98416	1.65298	.976	-5.5211	3.5528
	10-20 lakhs	-6.22410*	1.77237	.005	-11.0888	-1.3594
	Above 20 lakhs	-7.37838*	1.51917	.000	-11.5481	-3.2087

Trading Capital (I)	Trading Capital (J)	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
					Lower Bound	Upper Bound
1-5 lakhs (Group2)	Below 1 lakh	2.03537	1.08990	.337	-.9561	5.0269
	5-10 lakhs	1.05122	1.54325	.960	-3.1846	5.2870
	10-20 lakhs	-4.18873	1.67050	.092	-8.7738	.3964
	Above 20 lakhs	-5.34300*	1.39899	.002	-9.1829	-1.5032
5-10 lakhs (Group3)	Below 1 lakh	.98416	1.65298	.976	-3.5528	5.5211
	1-5 lakhs	-1.05122	1.54325	.960	-5.2870	3.1846
	10-20 lakhs	-5.23994	2.08207	.090	-10.9547	.4748
	Above 20 lakhs	-6.39422*	1.87126	.006	-11.5303	-1.2581
10-20 lakhs (Group4)	Below 1 lakh	6.22410*	1.77237	.005	1.3594	11.0888
	1-5 lakhs	4.18873	1.67050	.092	-.3964	8.7738
	5-10 lakhs	5.23994	2.08207	.090	-.4748	10.9547
	Above 20 lakhs	-1.15428	1.97752	.977	-6.5820	4.2735
Above 20 lakhs (Group5)	Below 1 lakh	7.37838*	1.51917	.000	3.2087	11.5481
	1-5 lakhs	5.34300*	1.39899	.002	1.5032	9.1829
	5-10 lakhs	6.39422*	1.87126	.006	1.2581	11.5303
	10-20 lakhs	1.15428	1.97752	.977	-4.2735	6.5820

Source: Primary data ** The mean difference is significant at the 5% level*

Table 5.42, shows the result of HSD test for multiple comparisons and it is found that the mean value of trading techniques and strategies is significantly different between traders with trading capital of *below1 lakh* and *10-20lakhs (group1 and group 4)* (p = 0.005, 95% C.I. = [-11.0888, -1.3594]), *below1lakh* and *above 20lakhs (group1 and group 5)* (p = .000, 95% C.I. = [-11.5481, -3.2087]), *1-5lakhs* and *above 20 lakhs (group2 and group5)* (p = .002, 95% C.I. = [-9.1829, -1.2581]), and between *5-10 lakhs* and *above 20 lakhs (group3 and group5)* (p = .006, 95% C.I. = [-11.5303, -1.2581]) There is no significant difference in mean scores between traders of all other groups such as *group 1 and 2*, *group 1 and 3*, *group 2 and 3, group 2 and 4*, *group 3 and 4* and finally between *group 4 and 5*. From the above results it is evident that traders with higher trading capital are highly using trading techniques and strategies listed in this study.

5.11 Comparison of Knowledge Level and Use of Trading Strategies

The level of knowledge about the derivative market is an important factor in determining the use of trading techniques and strategies of a derivative trader. The knowledge level of derivative traders is measured using fifteen variables and traders are classified into three categories based on their level of knowledge about the derivative market. The category 1 represents traders with a low level of knowledge about derivative market. The category 2 represents traders with a moderate level of knowledge about derivative market, and the category 3 represents traders with a high level of knowledge about derivative market.

To examine the relationship between the level of knowledge and use of trading techniques and strategies, descriptive analysis has been done which shows the mean score of trading strategies with different levels of knowledge about derivative market. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The test hypothesis is given below and the result of the descriptive analysis is summarized in Table 5.43.

> H_0: *There is no significant difference in the use of trading techniques and strategies among traders with different level of knowledge about derivative market.*
>
> H_1: *There is significant difference in the use of trading techniques and strategies among traders with different level of knowledge about derivative market.*

Table 5.43

Descriptive statistics of Level of knowledge-wise analysis of use of trading strategies

Test Variable	Knowledge Level	N	Mean ± SD
Trading Strategies	Category 1: Low	52	29.88 ± 9.77
	Category 2: Medium	101	34.31 ± 6.66
	Category 3: High	147	39.30 ± 6.07
	Total	300	35.99 ± 7.88

Source: Primary data

From table 5.43, it is evident that there is a difference in the mean score of trading techniques and strategies among traders with different levels of knowledge about derivative market. Category 1 traders (with low knowledge level) have the lowest mean score (29.88) and Category 3 traders (with high knowledge level) have highest mean score (39.30). The ANOVA is performed to test the significance of the difference in the mean score among different categories of traders with regard to knowledge level and the result is summarised in Table 5.44.

Table 5.44

Result of One-way ANOVA: Level of Knowledge- wise analysis of strategies

	Sum of Squares	df	Mean Square	F	p-value
Between Groups	3837.59	2	1918.79		
Within Groups	14726.39	297	49.58	38.69	<.01***
Total	18563.99	299			

Source: Primary data ****The difference is significant at the 1% level.*

The one-way ANOVA reveals that there is statistically significant difference in mean score of trading techniques and strategies among traders with different level of knowledge about derivative market ($F (2, 297) = [38.69]$, $p < .01$). To know the exact significant difference in use of trading techniques and strategies between different category of traders with regard to knowledge level Tukey's HSD test has been applied and the result is shown in Table 5.45.

Table 5.45

Level of knowledge-wise Post Hoc (HSD) analysis for multiple comparisons of trading strategies

Knowledge Level (I)	Knowledge Level (J)	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
					Lower Bound	Upper Bound
Low (Category1)	Medium	-4.43222*	1.20186	.001	-7.2632	-1.6012
	High	-9.42151*	1.13615	.000	-12.0977	-6.7453
Medium (Category 2)	Low	4.43222*	1.20186	.001	1.6012	7.2632
	High	-4.98929*	.91007	.000	-7.1330	-2.8456
High (Category 3)	Low	9.42151*	1.13615	.000	6.7453	12.0977
	Medium	4.98929*	.91007	.000	2.8456	7.1330

Source: Primary data ** The difference is significant at the 5% level*

Table 5.45, shows the result of HSD test for multiple comparisons and it is found that the mean value of trading techniques and strategies is significantly different between all three groups of traders, i.e. between traders with low knowledge and medium knowledge *(Category1* and *Category 2)* (p = 0.001, 95% C.I. = [-7.2632, -1.6012]), between traders with low knowledge and high knowledge *(Category1* and *Category 3)* (p = .000, 95% C.I. = [-12.0977, -6.7453]), and between traders with medium level of knowledge and high level of knowledge *(Category2* and *Category 3)* (p = .000, 95% C.I. = [-7.1330, -2.8456]). From the above results it is evident that traders with higher level of knowledge about derivative market are highly using trading techniques and strategies listed in this study.

5.12 Use of Option Strategy Builder Software

Normally option traders are doing analysis of positions after entering in to a contract using strategy builder software available in the market. Some brokers are providing option strategy builder software to their clients. These software helps the traders in analyzing pay offs, doing mock trading, etc. Here this study tries to identify the popular option strategy builder software used by equity derivative traders in Kerala and the distribution is presented in the Table 5.46.

Table 5.46

Distribution of traders using option strategy builder software

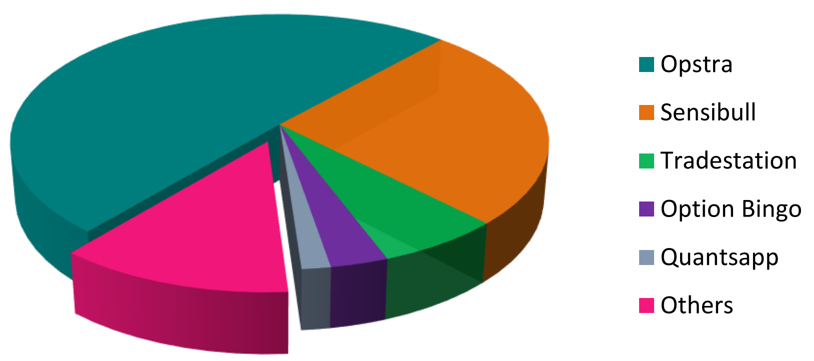
Sl. No.	Name of software	Frequency	Percent
1	Sensibull	51	17.0
2	Opstra	99	33.0
3	Tradestation	13	4.3
4	Quantsapp	3	1.0
5	Option Bingo	6	2.0
6	Others	24	8.0
7	Not Using any software	104	34.7
	Total	300	100.0

Source: Primary data

Table 5.46, indicates that out of 300 respondents 99 (33%) are using Opstra, 51 (17%) traders using Sensibull. 34.7% respondents are not using any strategy builder software. From the above data it can be concluded that Opstra is the most popular option strategy builder software among derivative traders in Kerala, which is depicted in Figure 5.2.

Figure 5.2

Popular Option strategy builder software



Source: Primary data

5.13 Action taken by a Trader when the Market Moves Adversely

Generally, it is expected that a trader makes a detailed analysis of positions before entering into a contract like backtesting of a particular strategy on different market conditions based on historical data. Even after entering into a trading position, the traders are continuously monitoring its payoff and do proper adjustments in the strategy based on subsequent market movements *(Han, et al., 2009)*. It is quite natural that the market may move in contrary to one's calculations. Investors react differently to this situation. Some investors hold on to their existing position, some add more positions to take advantage of this adverse movement in the market and others trigger stop loss to protect themselves from further losses. Here this study examines the actions of traders based on subsequent market changes and the result is summarized and presented in the Table 5.47.

Table 5.47

Action taken by a trader when the market moves adversely

Sl. No.	Type of action	Frequency	Percent
1	Square-off and exit	104	34.7
2	Wait for stop-loss	99	33.0
3	Modify the strategy	73	24.3
4	No answer	24	8.0
	Total	300	100.0

Source: Primary data

Table 5.47, indicates that out of 300 respondents 104 (34.7%) traders square off their position when the market moves adversely, 99 (33%) traders wait for stop-loss and 73 (24.3%) traders modify their strategy in the event of adverse movement in the market.

5.14 Conclusion

This chapter examined the knowledge level, trading preferences, and trading strategies of equity derivative traders in Kerala. The distribution of data relating to knowledge and strategies was found to be normal and therefore parametric tests were applied to examine the relationship between variables. The level of knowledge of derivative traders about various aspects of the derivative market has been examined using 15 variables and it is found that derivative traders have a high level of knowledge of almost all aspects of the derivative market. The knowledge level of derivative traders has been compared with demographic variables and it is found that age, education level, trading experience, and trading capital significantly influence the knowledge level of derivative traders. Trading objectives and preferences were also examined in this chapter and it is revealed that the majority of equity derivative traders are speculators and they mostly prefer to trade index options for speculative gain. It is also found that the majority of traders prefer intraday trade using weekly index options. The use of different trading techniques and strategies by equity derivative traders was also examined in this section. This was done using eleven statements relating to trading techniques and strategies. The result shows that the majority of the traders are frequently use stop-loss trading strategies and considering the movements of foreign stock indices while designing trading strategies. It is also found that the majority of the traders are preferring option writing to options buying, this may connect to the findings that most of the traders are considering the risk-reward ratio and cost of the strategy of their trade, which may indicate that options writing gives better risk-reward than options buying. A comparison of trading strategies of different demographic groups was also made and it is found that age, education, occupation, and trading capital significantly influence the use of trading strategies of equity derivative traders. The final section of this chapter examined the use of option strategy builder software and action taken by the trader in the event of adverse movement in the market, and it is revealed that 'Opstra' is the most preferred strategy builder, and most of the traders' square-off their position when market move against their expectation. This chapter ends with this summary and the next chapter examines the behavioural factors affecting the trading decision of equity derivative traders.

REFERENCES

Buffet, W. E. (2002). “Chairman’s letter”, in Berkshire Hathaway Inc. In *Berkshire Hathaway Annual Report.*

Cohen, G. (2005). *The Bible of Options Strategies*. In Prentice Hall (First Edit). Pearson Education, Inc. New Jersy.

Han, B., Lee, Y., & Liu, Y. (2009). Investor Trading Behavior and Performances : Evidence from Taiwan Stock Index Options. *McCombs Research Paper Series*, January. http://ssrn.com/ abstract=1343270

Hull, J. c, & Basu, S. (2017). *Options, Futures, and Other Derivatives* (9th Editio). Pearson India Education Services Pvt. Ltd.

Karthik Rangappa. (2016). *Basics of Derivatives Market.* Zerodha Varsity. https:// zerodha.com/ varsity/module/futures-trading/

Rangappa, K. (2022). *Options Theory for Professional Trading.* Zerodha Varsity. https:// zerodha.com/ varsity/

Reddy, B. A., & Sreeram, P. A. (2021). An empirical study on derivative trading in India. *Journal of Interdisciplinary Cycle Research*, XIII(2), 247–257.

Sullivan, G. M., & Artino, A. R. (2013). Analyzing and Interpreting Data From Likert-Type Scales. *Journal of Graduate Medical Education*, 5(4), 541–542. https://doi.org/10.4300/jgme-5-4-18

Toopalli, S., & Kalyan, D. N. B. (2020). A Study on the Derivatives Market in India. *SSRN Electronic Journal,* 9(1). https://doi.org/10.2139/ssrn.3510065

6.1 Introduction

Traditional finance has developed in a normative fashion, which refers to the development of numerous conceptions and tools regarding how investors should behave. Investor psychology and behaviour are not given much consideration in it. As a result, the descriptive discipline of behavioural finance evolved as a research area for investor psychology. Behavioural finance is the application of psychology to financial behaviour. *Richard H. Thaler, (1993)* called behavioural finance open-minded finance because in the economy some agents behave less than fully rationally. Investors, according to behavioural finance, are people who don't always make the best decisions. As a result, behavioural finance demonstrates the pervasive irrationality of investors and draws attention to the weaknesses in the intense competition in the markets. The primary focus of this chapter is to examine various psychological biases that influence the decisions of equity derivative traders in Kerala.

6.2 Measurement of Behavioural Biases of Equity Derivative Traders in Kerala

Behavioural factors impact the process of investors' decision-making. According to *Ritter (2003)*, behavioural finance is based on psychology which suggests that human decision processes are subject to several cognitive illusions. These illusions are divided into two groups: illusions caused by the heuristic decision processes and illusions rooted in the adoption of mental frames grouped in the prospect theory *(Waweru et al., 2014)*. Based on the literature survey behavioural factors influencing the investors' decision-making are divided into five groups: *heuristic, prospect, herding, emotions,* and *market impact* which are presented in Table 6.1.

Table 6.1

Behavioural Factors Influencing the trading decision of equity derivative traders

Group	***Behavioural Variables***
Heuristic Theory	*Representativeness bias* *Anchoring bias* *Overconfidence* *Gambler's fallacy*
Prospect Theory	*Loss aversion* *Regret aversion* *Mental accounting*
Herding effect	*General market trend* *Analysts' recommendations* *News about companies*
Emotional bias	*Greed* *Hope* *Fear*
Market Impact	*Market fundamentals* *Past trends of stocks*

Source: Literature survey

Qualitative statements with a five-point agreement scale were used to measure the influence of different behavioural biases that exist among equity derivative traders, where the key to scaling was; 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly agree. The respondents were asked to indicate the extent to which the variables influenced their trading decision-making process. Statements were carefully restructured to suit exactly the situation of derivative trading in Stock exchanges. Mean scores with t-values are computed for each statement under all fifteen behavioural factors. Combined mean scores for each bias are also computed as a measure of the respective groups of behavioural factors. The Mean score of the response scale here is 3.

6.3 Influence of Heuristic Variable on the Decision of Derivative Traders in Kerala

Heuristics are defined as the rules of thumb, which make decision-making easier, especially in complex and uncertain environments. However, they can sometimes lead to biases, especially when things change and can lead to suboptimal investment decisions *(Ritter, 2003). Kahneman and Tversky* seem to be one of the first writers to study the factors belonging to heuristics when introducing three factors namely *representativeness, availability bias, and anchoring (Tversky & Kahneman*, 1974). *Waweru et al., (2014)* also list two factors named *Gambler's fallacy and Overconfidence* in heuristic theory. Based on the above works of literature this study selected four factors under the heuristic theory they are*: Representativeness, Anchoring, Overconfidence and Gamblers fallacy*.

6.3.1 Representativeness Bias

Representativeness occurs when the similarity of objects or events confuses people's thinking regarding the probability of an outcome. People frequently make the mistake of believing that two similar things or events are more closely correlated than they actually are. Representativeness refers to the degree of similarity that an event has with its parent population *(DeBondt & Richard H. Thaler, 1995)* or the degree to which an event resembles its population *(Tversky & Kahneman, 1974).* Representativeness may result in some biases such as people putting too much weight on recent experience and ignoring the average long-term rate *(Ritter, 2003)*. For example, share prices often rise when a company reports increased earnings several quarters in a row because investors tend to infer a high long-term earnings growth rate *(Waweru et al., 2008)*. In this study in order to examine the *representativeness bias* among equity derivative traders the statement *"Once I win a strategy, then I try more similar strategy next time"* is asked to sample respondents with a five-point Likert scale.

6.3.2 Anchoring Bias

Anchoring is a phenomenon used in the situation when people use some initial values to make estimations, which are biased toward the initial ones as different starting points yield different estimates *(Tversky & Kahneman, 1974)*. In the financial market, anchoring arises when a value scale is fixed by recent observations. Investors always refer to the initial purchase price when selling or analysing. Thus, today's prices are often determined by those of the past. Anchoring makes investors define a range for a share price or company's income based on historical trends, resulting in under-reaction to unexpected changes. Anchoring has some connection with representativeness as it also reflects that people often focus on recent experiences and tend to be more optimistic when the market rises and more pessimistic when the market falls *(Waweru et al., 2008)*. Anchoring arises when investors place too much weight on recent performance. Investors assume that current prices are right and usually use their purchase price as a reference point *(Kahneman & Riepe, 1998).* In this study to examine the *anchoring* bias among equity derivative traders the statement *"I have a tendency to trade in F&O based on the indications given by technical charts"* is asked to sample respondents with a five-point Likert scale.

6.3.3 Overconfidence Bias

When people overestimate the reliability of their knowledge and skills, it is the manifestation of overconfidence *(De Bondt & Richard H. Thaler, 1995)*). Many studies show that excessive trading is one effect of overconfidence on investors. There is evidence showing that financial analysts revise their assessment of a company slowly, even in case there is a strong indication proving that the assessment is no longer correct. Investors and analysts are often overconfident in areas in which they have knowledge *(Evans, 2006).* Overconfidence is believed to improve persistence and determination, mental facility, and risk tolerance. In other words, overconfidence can help to promote professional performance. It is also noted that overconfidence can enhance others' perception of one's abilities, which may help to achieve faster promotion and greater investment duration *(Oberlechner & Osler, 2008).* In this study to examine the *overconfidence* bias among equity derivative traders the statement *"I* *always believe that my skills and knowledge of the stock market can help me to make a profit from the F&O market"* is asked to sample respondents with a five-point Likert scale.

6.3.4 Gamblers' Fallacy

Gamblers' fallacy is associated with the situation where investors tend to predict a reversal of a particular trend. In most situations, it leads investors to anticipate the end of good or bad market performance. Thus investors who are biased toward a status tend to choose an alternative regardless of whether or not the choice is optimal *(Kempf & Ruenzi, 2006)*. The belief that a small sample can resemble the parent population from which it is drawn is known as the "law of small numbers"*(Statman, 1999)* which may lead to a Gamblers' fallacy *(Barberis & Thaler, 2003)*. More specifically, in the stock market, Gamblers' fallacy arises when people predict inaccurately the reverse points which are considered the end of good (or poor) market returns *(Waweru et al., 2008)*. In this study in order to examine the gamblers' fallacy bias among equity derivative traders the statement *"When a trade results in a loss, I always believe that my next trade will be a gain and I increase the position size"* is asked to sample respondents with a five-point Likert scale.

The influence of heuristic variable on derivative traders are measured using the above four variables on a five-point scale and analyzed using one sample t-test with a test value of '3', which is the mean of the 5-point response scale. The test hypothesis is given below:

H_0: *$\mu = 3$ (The influence of heuristic variables is average)*
H_1: *$\mu \neq 3$ (The influence of heuristic variables is not average)*

The test results of the influence of four behavioural biases under the heuristic variables are measured and summarized in Table 6.2.

Table 6.2

Influence of the heuristic variables on the trading decisions of equity derivative traders in Kerala

(n=300)

Statement / Variable	Responses#	Frequency	%	Mean ± SD	t*	p-value
Once I win a strategy then I try more similar strategy next time ***(Representativeness)***	SD	19	6.3	3.71±1.13	10.826	<.01***
	D	18	6.0			
	N	80	26.7			
	A	98	32.7			
	SA	85	28.3			
I have a tendency to trade in F&O based on the indications given by technical charts ***(Anchoring)***	SD	15	5.0	3.77±1.07	12.550	<.01***
	D	15	5.0			
	N	77	25.7			
	A	109	36.3			
	SA	84	28.0			
I always believe that my skills and knowledge of the stock market can help me to make a profit from the F&O market ***(Overconfidence)***	SD	10	3.3	3.88±1.06	14.385	<.01***
	D	17	5.7			
	N	77	25.7			
	A	91	30.3			
	SA	105	35.0			
When a trade results in a loss, I always believe that my next trade will be a gain and I increase the position size ***(Gambler's Fallacy)***	SD	76	25.3	2.72±1.34	-3.649	<.01***
	D	61	20.3			
	N	71	23.7			
	A	56	18.7			
	SA	36	12.0			

Source: Primary data #*(SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree)*
One sample t-test, Average=3* ** The Difference is significant at 1% level*

Table 6.2 presents the influence of heuristic variable on sample derivative traders, the sub variable wise analysis of the influence of heuristics variables are explained below:

Representativeness bias: the above table indicates that the mean score obtained for measuring representativeness bias is 3.71, which is significantly above the mean score of the response scale i.e., 3, and the one-sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 10.83, *p* = <.01. Hence, it can be concluded that representativeness bias strongly exists among equity derivative traders in Kerala.

Anchoring Bias: the mean score obtained for measuring anchoring bias is 3.71, which is significantly above the mean score of the response scale i.e., 3, the one-sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 12.55, *p* = <.01. Hence, it can be concluded that anchoring bias strongly exists among equity derivative traders in Kerala.

Overconfidence Bias: the mean score obtained for measuring overconfidence bias is 3.88, which is significantly above the mean score of the response scale i.e., 3, the one sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 14.39, *p* = <.01. Hence, it can be concluded that overconfidence bias strongly exists among equity derivative traders in Kerala.

Gamblers' Fallacy: the mean score obtained for measuring gamblers' fallacy is 2.72, which is significantly below the mean score of the response scale i.e., 3, the one sample t-test shows that the mean score is statistically significantly lower than the population average score, t (299) = -3.65, *p* = <.01. Hence, it can be concluded that the influence of gamblers' fallacy bias is less among equity derivative traders in Kerala.

6.3.5 The Combined Influence of the Heuristic Variable

The overall influence of the heuristic variables on derivative traders is measured by combining the above four variables and classified the total score (4 x 5=20) into three classes. Where Low = 4 to 10, Medium = 11 to 13, and High = 14 to 20. The data is analyzed using one sample t-test with a test value of '2', which is the mean of the three-point response scale. The test hypothesis is given below:

> H_0: *$\mu = 2$ (The combined influence of heuristic variables is average)*
> H_1: *$\mu \neq 2$ (The combined influence of heuristic variables is not average)*

The test result is presented in Table 6.3.

Table 6.3

Combined Influence of the Heuristic variables on the trading decision of equity derivative traders

Variable		Frequency	Per cent	Mean ± SD	t*	p-value
Influence of Heuristic Variables	Low	23	7.7	2.50 ± 0.64	13.61	<.01***
	Medium	104	34.7			
	High	173	57.6			
	Total	300	100.0			

Source: Primary data ****Difference is significant at 1% level, *One sample t-test, Average=2*

Table 6.3 indicates that the mean score obtained for measuring the influence of heuristic variables is 2.50, which is significantly above the mean score of the response scale i.e., 2, the one sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 13.61, p = <.01. Hence, it can be concluded that influence of heuristics variables strongly exists among equity derivative traders in Kerala.

6.4 Comparison of the Influence of Heuristic Variables on Different Demographic Groups of Equity Derivative Traders.

The influence of heuristic variables on the trading decision of equity derivative traders are compared concerning five demographic variables such as *gender, age, educational qualifications, trading experience and trading capital.* The results are discussed below.

6.4.1 Impact of Heuristic Variables on the Gender of Equity Derivative Traders.

The influence of heuristic variables on male and female equity derivative traders is compared using an independent sample t-test and the result is presented in Table 6.4. The test hypothesis is given below:

H_0: $\mu_1 = \mu_2$ (There is no significant difference in the influence of heuristic variable between male and female equity derivative traders)

H_1: $\mu_1 \neq \mu_2$ (There is a significant difference in the influence of heuristic variable between male and female equity derivative traders)

Table 6.4

Gender-wise analysis of impact of heuristic variables on trading decisions of equity derivative traders

Test variable	Group	N	Mean ± SD	*t*	*p-value*
Influence of Heuristic Variables	Male	264	14.00 ± 2.76	-1.369	.172
	Female	36	14.67 ± 2.75		

Source: Primary data

From Table 6.4, it can be observed that the mean score of influence of the heuristic variable of male and female traders are 14.00 and 14.67 respectively and indicates very little difference between the mean values. Since the *p*-value (.172) is more than 0.05, it can be inferred that there is no significant difference in the influence of heuristics variables between male and female equity derivative traders in Kerala.

6.4.2 Age-wise Analysis of the Influence of Heuristic Variables on the Trading Decision of Equity Derivative Traders.

Traders with different age categories may have differences in the influence of heuristic variables on their trading decisions. On the basis of age, the sample respondents are classified into four groups such as: *Up to 30 (1)*, *31-40 (2)*, *41-50 (3)* and *51& above (4)*. Hence the data has been classified age-wise and descriptive analysis has been done to know the mean score of traders in different age categories as shown in Table 6.5.

Table 6.5

Age-wise analysis of the influence of Heuristic variables on the trading decision of equity derivative traders

Test Variable	Age Group (in years)	N	Mean ± SD
Influence of Heuristic Variables	Up to 30	85	14.08 ± 2.69
	31 – 40	135	14.14 ± 3.14
	41 – 50	55	14.18 ± 2.06
	51 & above	25	13.48 ± 2.16
	Total	300	14.08 ± 2.76

Source: Primary data

According to the aforementioned table, there are only minor differences in the mean score of the influence of heuristic variables between traders of different age. The age group 4*1-50 (group 3)* have the highest mean score of influence of heuristic variables and the age group *51& above (group 4)* have a lowest mean score of influence of heuristic variables. The ANOVA is applied to test the significance of difference among the mean of different age groups and the result is summarised in Table 6.6 below. The test hypothesis is given below:

H_0: There is no significant difference in the influence of heuristic variables among equity derivative traders of different age groups

H_1: There is a significant difference in the influence of heuristic variable among equity derivative traders of different age groups

Table 6.6

Result of One-way ANOVA: age-wise analysis of influence of heuristic variables

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	10.065	3	3.355		
Within Groups	2267.171	296	7.659	0.438	.726
Total	2277.237	299			

Source: Primary data

The one-way ANOVA reveals that there is no significant difference in the mean score of influence of heuristic variables among different age groups (F (3, 296) = [0.438], *p* = .726). Hence, it can be inferred that there is no significant difference in the influence of heuristics variables among different age groups of equity derivative traders in Kerala.

6.4.3 Education Qualification-wise Analysis of the Influence of Heuristic Variables on the Trading Decisions of Equity Derivative Traders.

The sample used in this study includes equity derivative traders with different educational qualifications. Hence it is important to examine whether there is any difference in the influence of heuristic variables among different educational qualification groups. On the basis of education level, the sample respondents are classified into five groups such as SSLC, Higher Secondary, Graduate, Post Graduate, and Professional. The level of education of traders may affect the level of influence of heuristic variables on the trading decision. To test the same, descriptive analysis has been done which shows the mean score of influence of heuristic variables among traders with different educational qualifications. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is applied. The result of the descriptive analysis is summarized in Table 6.7.

Table 6.7

Descriptive statistics of Education qualification -wise analysis of Influence of heuristic variables

Test Variable	Education Group	N	Mean ± SD
Influence of heuristic variables	SSLC	13	13.15 ± 2.54
	Higher Secondary	10	13.40 ± 1.96
	Graduate	130	14.08 ± 2.88
	Post Graduate	92	14.15 ± 2.70
	Professional	55	14.29 ± 2.77
	Total	300	14.08 ± 2.76

Source: Primary data

From the above table, it is found that there is no significant differences in the mean score of influence of heuristic variables among traders with different educational qualifications. The traders with professional degrees have the highest mean score (14.29) of influence of heuristic variables and traders with SSLC have the lowest mean score (13.95) of influence of heuristic variables. The ANOVA is applied to test the significance of differences in the influence of heuristic variables among traders of different educational qualification groups and the result is summarised in Table 5.8. the test hypothesis is given below:

H_0: *There is no significant difference in the influence of heuristic variable among equity derivative traders with different educational qualifications*

H_1: *There is a significant difference in the influence of heuristic variable among equity derivative traders with different educational qualifications*

Table 6.8

Result of One-way ANOVA: Education-wise analysis of Influence of heuristic variables on the trading decision of equity derivative traders

	Sum of Squares	Df	Mean Square	F	*p*-value
Between Groups	18.699	4	4.675		
Within Groups	2258.538	295	7.656	0.611	.655
Total	2277.237	299			

Source: Primary data

The one-way ANOVA reveals that there is statistically no significant difference in the mean score of influence of heuristic variables among traders of different educational qualification groups (F (4, 295) = [0.611], p = .655). Hence, it can be inferred that educational qualification has no influence on the level of heuristics bias.

6.4.4 Trading Experience-wise Analysis of the Influence of Heuristic Variables on the Trading Decision of Equity Derivative Traders.

The sample consists of equity derivative traders with varying years of trading experience. Hence it is relevant to examine whether there is any difference in the influence of heuristic variables among different trading experience groups. On the basis of years of trading experience, the sample respondents are classified into four groups such as *2 years & below (1)*, *3-5 years (2)*, *5-10 years (3)* and *above 10 years (4)*. The number of years of trading experience of equity derivative traders may affect the influence level of heuristic variable. To test the same, the descriptive analysis has been done which shows the mean score of influence of heuristic variables on traders with different years of trading experience. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The result of descriptive analysis is summarized in Table 6.9.

Table 6.9

Descriptive statistics of trading experience -wise analysis of Influence of Heuristic variables

Test Variable	Trading experience	N	Mean ± SD
Influence of heuristic variables	2 years and below	161	14.16 ± 2.67
	3-5 years	81	14.22 ± 3.07
	5-10 years	32	13.75 ± 2.59
	Above 10 years	26	13.54 ± 2.58
	Total	300	14.08 ± 2.76

Source: Primary data

From table 6.9 it is found that there is a very small difference in the mean score of influence of heuristic variables among traders with different years of trading experience. The ANOVA is applied to test the significance of differences in the mean influence of heuristic variables among traders with different years of experience and the result is summarised in Table 6.10. the test hypothesis is given below.

H_0: *There is no significant difference in the influence of heuristic variable among equity derivative traders with different trading experience*

H_1: *There is significant difference in the influence of heuristic variable among equity derivative traders with different trading experience*

Table 6.10

Result of One-way ANOVA: Trading experience - wise analysis of Influence of heuristic variables on the trading decision of equity derivative traders

	Sum of Squares	Df	Mean Square	F	*p*-value
Between Groups	13.657	3	4.552	0.595	.619
Within Groups	2263.580	296	7.647		
Total	2277.237	299			

Source: Primary data

The one-way ANOVA result (F (3,296) = [.595], *p* = .619) reveals that there is no significant difference in the influence of heuristic variables among traders with different trading experience. Hence, it can be concluded that trading experience of equity derivative traders have no influence on the level of heuristics bias.

6.4.5 Trading Capital-wise Analysis of the Influence of Heuristic Variables on the Trading Decision of Equity Derivative Traders.

The amount of trading capital may affect the level of influence of heuristic variables on the trading decisions of equity derivative traders. Hence it is important to examine whether there is any difference in the influence of heuristic variables among traders of different trading capital. On the basis of trading capital, the respondents are classified into five groups such as *Below 1 lakh (group1)*, *1-5 lakhs (group2)*, *5-10 lakhs(group3), 10-20 lakhs (group4)* and *Above 20 lakhs (group5)*. To examine the relationship between trading capital and the influence of heuristic variables, descriptive analysis has been done which shows the mean score of the influence of heuristic variables on traders with different amounts of trading capital. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The result of the descriptive analysis is summarized in Table 6.11.

Table 6.11

Descriptive statistics of trading capital -wise analysis of influence of Heuristic variables

Test Variable	Trading capital	N	Mean ± SD
Influence of heuristic variables	Below 1 lakh	74	14.04 ± 2.87
	1-5 lakhs	136	14.24 ± 2.93
	5-10 lakhs	29	13.79 ± 2.27
	10-20 lakhs	24	13.58 ± 2.76
	Above 20 lakhs	37	14.11 ± 2.26
	Total	300	14.08 ± 2.76

Source: Primary data

From table 6.11, it is found that there is a very small difference in the mean score of influence of heuristics variables among traders with different amounts of trading capital. The ANOVA is applied to test the significance of differences in the mean influence of heuristic variables among traders with different amounts of trading capital and the result is summarised in Table 6.12. The test hypothesis is given below.

H_0: There is no significant difference in the influence of heuristic variable among equity derivative traders with different trading capital

H_1: There is significant difference in the influence of heuristic variable among equity derivative traders with different trading capital

Table 6.12

Result of One-way ANOVA: Trading capital-wise analysis of the influence of heuristic variables on the trading decision of equity derivative traders

	Sum of Squares	Df	Mean Square	F	p-value
Between Groups	11.728	4	2.932		
Within Groups	2265.508	295	7.680	0.382	.822
Total	2277.237	299			

Source: Primary data

The one-way ANOVA result (F (4,295) = [0.382], p = .822) reveals that there is no significant difference in the mean score of influence of heuristic variables among traders of different trading capital. Hence, it can be inferred that the trading capital has no effect on the influence of heuristic variables.

6.5 Influence of Prospect Variables on the Decision of Derivative Traders in Kerala

Prospect theory and Expected Utility Theory (EUT) are viewed as two distinct decision-making methodologies. While EUT focuses on investors' rational expectations, prospect theory emphasizes subjective decision-making affected by the investors' value system *(Filbeck et al., 2005)*. People tend to under-weigh probable outcomes compared with certain ones and people respond differently to similar situations depending on the context of losses or gains in which they are presented *(Kahneman & Tversky, 1979)*. Prospect theory describes some states of mind-affecting an individual's decision-making processes including Regret aversion, Loss aversion, and Mental accounting *(Waweru et al., 2008)*.

6.5.1 Regret Aversion

Regret refers to people's emotional reaction to making a mistake *(Plous, 1993)*. Investors consistently engage in behaviour that they regret later *(Hvide, 2002)*. They avoid selling shares that have decreased in value and readily sell shares that have increased in value *(R. Shiller, 1999)*. *Fogel & Berry, (2006)* found that investors reported regrets about holding a losing stock too long than about selling a winning stock too soon. *Statman, (1999)* argued that people tend to feel sorrow and grief after having made an error in judgment. Investors deciding whether to sell a security are typically emotionally affected by whether the security was bought for more or less than the current price. In this study in order to examine the *regret aversion* among equity derivative traders the statement *"I always prefer trading in low-risk strategy even if returns are lower"* is asked to sample respondents with a five-point Likert scale.

6.5.2 Loss Aversion

Loss aversion recognizes that the mental penalty associated with a loss is greater than the mental reward from a similar-size gain *(R. J. Shiller, 2000)* There is evidence showing that people are more distressed at the prospect of losses than they are pleased by equivalent gains *(Barberis & Thaler, 2003)*. Moreover, a loss coming after a prior gain is proved less painful than usual while a loss arriving after a loss seems to be more painful than usual *(Barberis & Huang, 2001)*. In addition, *Lehenkari & Perttunen, (2004)* find that both positive and negative returns in the past can boost the negative relationship between the selling trend and capital losses of investors, suggesting that investors are loss averse. Risk aversion can be understood as a common behaviour of investors, nevertheless, it may result in bad decisions affecting investors' wealth *(Odean, 1998)*. In order to examine the *loss aversion* among equity derivative traders the statement *"I am always focusing on avoiding loss more than on making gain"* is asked to sample respondents with a five-point Likert scale.

6.5.3 Mental Accounting

Mental accounting is a term referring to "the process by which people think about and evaluate their financial transactions" *(Barberis & Huang, 2001).* Mental accounting allows investors to organize their portfolios into separate accounts *(Barberis & Thaler, 2003). Ritter, (2003)* explained mental accounting with an example: '*People sometimes separate decisions that should, in principle, be combined. For instance, many people have a household budget for food and a household budget for entertainment. At home, where the food budget is present, they will not eat lobster or shrimp because they are much more expensive than a fish casserole. In a restaurant, however, they will order lobster and shrimp even though the cost is much higher than a simple fish dinner. If they instead ate lobster and shrimp at home, and the simple fish in a restaurant, they could save money. However, because they are thinking separately about restaurant meals and food at home, they choose to limit their food at home*. To examine the *mental accounting bias* among equity derivative traders the statement *"I generally give different weight to different income. (E.g. I spend my regular income very carefully than my investment or additional income.)"* is asked to sample respondents with a five-point Likert scale.

Prospect theory was evidenced by the presence or absence of the following three behavioural characteristics; *loss aversion, regret aversion, and mental accounting*. Using a five-point Likert scale the respondents were asked to indicate the extent to which these factors influenced their trading decision-making process and analyzed using one sample t-test with a test value of '3', which is the mean of the 5-point response scale. The test hypothesis is given below:

H_0: *$\mu = 3$ (The influence of prospect variables is average)*

H_1: *$\mu \neq 3$ (The influence of prospect variables is not average)*

The test results of influence of three behavioural biases under the prospect variables are measured and summarized in Table 6.13.

Table 6.13

Influence of Prospect Variable on the trading decision of equity derivative traders in Kerala

(n=300)

Statement / Variable	Responses#	Frequency	%	Mean ± SD	t*	p-value
I always prefer trading in low-risk strategy even if returns are lower ***(Loss Aversion)***	SD	18	6.0	3.71 ± 1.19	10.281	<.01***
	D	25	8.3			
	N	87	29.0			
	A	66	22.0			
	SA	104	34.7			
I am always focusing on avoiding loss more than on making gain ***(Regret Aversion)***	SD	12	4.0	3.92 ± 1.14	14.089	<.01***
	D	22	7.3			
	N	67	22.3			
	A	75	25.0			
	SA	124	41.3			
I generally give different weights to different incomes. (I spend my regular income very carefully than my additional income.) ***(Mental Accounting)***	SD	21	7.0	3.58 ± 1.15	8.717	<.01***
	D	24	8.0			
	N	90	30.0			
	A	90	30.0			
	SA	75	25.0			

Source: Primary data #*(SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree)*
* *One-sample t-test, Average=3* ****Difference is significant at 1% level*

Table 6.13 presents the influence of prospect variables on trading decisions of equity derivative traders, the sub variable wise analysis of the influence of prospect variables are explained below:

Loss Aversion: the above table indicates that the mean score obtained for measuring loss aversion is 3.71, which is significantly above the mean score of the response scale i.e., 3, and the one-sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 10.281, *p* = <.01. Hence, it can be concluded that *loss aversion* bias strongly exists among equity derivative traders in Kerala.

Regret Aversion: table 5.13 indicates that the mean score obtained for measuring regret aversion is 3.92, which is significantly above the mean score of the response scale i.e., 3, and the one-sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 14.089, *p* = <.01. Hence, it can be concluded that *regret aversion* bias strongly exists among equity derivative traders in Kerala.

Mental Accounting: table 6.13 indicates that the mean score obtained for measuring mental accounting bias is 3.58, which is significantly above the mean score of the response scale i.e., 3, and the one-sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 8.717, *p* = <.01. Hence, it can be concluded that *mental accounting* bias strongly exists among equity derivative traders in Kerala.

6.5.4 *The Combined Influence of Prospect Variables* on the trading decision of equity derivative traders is measured by combining the above three variables and classified the total score (3 x 5=15) into three classes. Where Low = 3 to 7, Medium = 8 to 10, and High = 11 to 15. The data is analyzed using one sample t-test with a test value of '2', which is the mean of the three-point response scale. The test hypothesis is given below:

H_0: $\mu = 2$ (The combined influence of prospect variables is average)

H_1: $\mu \neq 2$ (The combined influence of prospect variables is not average)

The test result is presented in Table 6.14.

Table 6.14

Combined influences of Prospect Variables on the trading decision of equity derivative traders

Variable		Frequency	Percent	Mean ± SD	t*	p-value
Influence of Prospect Variable	Low	29	9.7	2.56 ± 0.664	14.509	<.01***
	Medium	75	25			
	High	196	65.3			
	Total	300	100.0			

Source: Primary data ***Difference is significant at 1% level *One-sample t-test, Average=2*

Table 6.14 indicates that the mean score obtained for measuring the influence of prospect variables is 2.56, which is significantly above the mean score of the response scale i.e., 2, the one-sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 14.509, p = <.01. Hence, it can be concluded that influence of prospect variable strongly exists among equity derivative traders in Kerala.

6.6 Comparison of the Influence of Prospect Variables on Different Demographic Groups of Equity Derivative Traders.

The influence of prospect variables on the trading decisions of equity derivative traders is compared with respect to five demographic variables such as *gender, age, educational qualifications, trading experience and trading capital.* The results are discussed below.

6.6.1 Gender-wise Analysis of Influence of Prospect Variables on the Trading Decisions of Equity Derivative Traders

The influence of prospect variables on male and female equity derivative traders are compared using an independent sample t-test and the result is presented in Table 6.15. The test hypothesis is given below:

H_0: $\mu_1 = \mu_2$ *(There is no significant difference in the influence of prospect variable between male and female equity derivative traders)*

H_1: $\mu_1 \neq \mu_2$ *(There is significant difference in the influence of prospect variable between male and female equity derivative traders)*

Table 6.15

Gender-wise analysis of influence of prospect variables on the trading decision of equity derivative traders

Test variable	Group	N	Mean ± SD	*t*	*p-value*
Influence of Prospect Variables	Male	264	11.13± 2.79	-1.452	.148
	Female	36	11.83 ± 2.22		

Source: Primary data

From Table 6.15, it can be observed that the mean score of influence of prospect variable of male and female traders are 11.13 and 11.83 respectively and indicates very little difference between the mean values. Since the *p*-value (.148) is more than 0.05, it can be inferred that there is no significant difference in the influence of prospect variables between male and female equity derivative traders in Kerala.

6.6.2 Age-wise Analysis of the Influence of Prospect Variables on the Trading Decision of Equity Derivative Traders.

Traders with different age categories may have differences in the influence of prospect variables on their trading decisions. On the basis of age, the sample respondents are classified into four groups such as: *Up to 30 (1)*, *31-40 (2)*, *41-50 (3)* and *51& above (4)*. Hence the data has been classified age-wise and descriptive analysis has been done to know the mean score of traders in different age categories as shown in Table 6.16.

Table 6.16

Age wise analysis of influence of prospect variables on the trading decision of equity derivative traders

Test Variable	Age Group (in years)	N	Mean ± SD
Influence of Prospect Variables	Up to 30	85	11.33 ± 2.64
	31 – 40	135	11.49 ± 2.75
	41 – 50	55	11.29 ± 2.54
	51 & above	25	9.16 ± 2.60
	Total	300	11.21 ± 2.74

Source: Primary data

According to the aforementioned table, there are differences in the mean score of the influence of prospect variables among traders of different age groups. The age group 3*1-40 (group 2)* have the highest mean score (11.49) of influence of prospect variables and the age group *51& above (group 4)* have the lowest mean score (9.16) of influence of prospect variables. The ANOVA is applied to test the significance of differences among the mean of different age groups and the result is summarised in Table 6.17 below. The test hypothesis is given below.

> H_0: *There is no significant difference in the influence of prospect variable among equity derivative traders of different age groups*
>
> H_1: *There is significant difference in the influence of prospect variable among equity derivative traders of different age groups*

Table 6.17

Result of One-way ANOVA: Age-wise analysis of influence of prospect variables

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	117.131	3	39.044	5.448	.001
Within Groups	2121.215	296	7.166		
Total	2238.347	299			

Source: Primary data

The one-way ANOVA reveals that there is a statistically significant difference in the mean score of influence of prospect variables among different age groups (F (3, 296) = [5.448], p = .001). Hence, it can be inferred that there is a significant difference in the influence of prospect variables among different age groups of equity derivative traders in Kerala. Since data met the assumption of homogeneity of variances, Tukey's HSD test has been used to check the exact significant difference among different age groups and the result is shown in Table 6.18.

Table 6.18

Age group wise Post Hoc (HSD) analysis for multiple comparisons of influence of prospect variables on the trading decision of equity derivative traders

Age of respondents (I)	Age of respondents (J)	Mean Difference (I-J)	Std. Error	*p*-value	95% Confidence Interval	
					Lower Bound	Upper Bound
Up to 30 (1)	31 - 40	-.15948	.37066	.973	-1.1172	.7982
	41 - 50	.03850	.46325	1.000	-1.1584	1.2354
	51 & above	2.16941*	.60906	.002	.5958	3.7430
31 – 40 (2)	Up to 30	.15948	.37066	.973	-.7982	1.1172
	41 - 50	.19798	.42823	.967	-.9084	1.3044
	51 & above	2.32889*	.58287	.000	.8229	3.8348
41 – 50 (3)	Up to 30	-.03850	.46325	1.000	-1.2354	1.1584
	31 - 40	-.19798	.42823	.967	-1.3044	.9084
	51 & above	2.13091*	.64571	.006	.4626	3.7992
51 & Above (4)	Up to 30	-2.16941*	.60906	.002	-3.7430	-.5958
	31 - 40	-2.32889*	.58287	.000	-3.8348	-.8229
	41 - 50	-2.13091*	.64571	.006	-3.7992	-.4626

Source: Primary data   ** The mean difference is significant at the 5% level*

Table 6.18 shows the result of the HSD test for multiple comparisons and it is found that the mean value of the influence of prospect variable is significantly different between age groups *1 and 4* (p = .002, 95% C.I. = [0.5958, 3.7430]), *2 and 4* (p = .000, 95% C.I. = [.8229, 3.8348]) and 3*and 4* (p = .006, 95% C.I. = [.4626, 3.7992]).

From the above result, it can be concluded that influence of prospect variables is less among traders in the age groups of 51 and above.

6.6.3 Education Qualification-wise Analysis of the Influence of Prospect Variables on the Trading Decisions of Equity Derivative Traders.

The sample used in this study includes equity derivative traders with different educational qualifications. Hence it is important to examine whether there is any difference in the influence of prospect variables among different educational qualification groups. On the basis of education level, the sample respondents are classified into five groups such as SSLC, Higher Secondary, Graduate, Post Graduate, and Professional. The level of education of traders may affect the level of influence of prospect variables on the trading decision. To test the same, descriptive analysis has been done which shows the mean score of influence of prospect variables among traders with different educational qualification. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is applied. The result of the descriptive analysis is summarized in Table 6.19.

Table 6.19

Descriptive statistics of Education qualification -wise analysis of Influence of Prospect variables

Test Variable	Education Group	N	Mean ± SD
Influence of prospect variables	SSLC	13	13.00 ± 1.00
	Higher Secondary	10	12.20 ± 2.29
	Graduate	130	11.26 ± 2.74
	Post Graduate	92	11.67 ± 2.40
	Professional	55	9.25 ± 2.75
	Total	300	11.13 ± 2.74

Source: Primary data

From the above table, it is found that there is a significant difference in the mean score of influence of prospect variables among traders with different educational qualifications. The traders with SSLC have the highest mean score (13) of influence of prospect variables and traders with professional qualification have lowest mean score (9.25) of influence of prospect variables. The ANOVA is applied to test the significance of differences in the influence of prospect variables among traders of different educational qualification groups and the result is summarised in Table 6.20. The test hypothesis is given below.

H_0: *There is no significant difference in the influence of prospect variable among equity derivative traders with different educational qualifications*

H_1: *There is significant difference in the influence of prospect variable among equity derivative traders with different educational qualifications*

Table 6.20

Result of One-way ANOVA: Education - wise analysis of Influence of prospect variables on the trading decision of equity derivative traders

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	279.825	4	69.956	10.54	<.01***
Within Groups	1957.361	295	6.635		
Total	2237.187	299			

Source: Primary data ****The difference is significant at 1% level*

The one-way ANOVA reveals that there is a statistically significant difference in the mean score of influence of prospect variables among traders of different educational qualification groups (F (4, 295) = [10.54], p = <.01). To know the exact significant difference among different education groups Tukey's HSD test has been used and the result is shown in Table 6.21.

Table 6.21

Education qualification wise Post Hoc (HSD) analysis for multiple comparison of the influence of prospect variables

Education Level (I)	Education Level (J)	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
					Lower Bound	Upper Bound
SSLC	Higher Secondary	.80000	1.08347	.947	-2.1738	3.7738
	Graduate	1.73846	.74929	.141	-.3181	3.7951
	Post Graduate	1.32609	.76323	.413	-.7688	3.4209
	Professional	3.74545*	.79438	.000	1.5651	5.9258
Higher Secondary	SSLC	-.80000	1.08347	.947	-3.7738	2.1738
	Graduate	.93846	.84531	.801	-1.3817	3.2586
	Post Graduate	.52609	.85769	.973	-1.8280	2.8802
	Professional	2.94545*	.88552	.009	.5149	5.3760
Graduate	SSLC	-1.73846	.74929	.141	-3.7951	.3181
	Higher Secondary	-.93846	.84531	.801	-3.2586	1.3817
	Post Graduate	-.41237	.35094	.766	-1.3756	.5509
	Professional	2.00699*	.41434	.000	.8697	3.1442
Post Graduate	SSLC	-1.32609	.76323	.413	-3.4209	.7688
	Higher Secondary	-.52609	.85769	.973	-2.8802	1.8280
	Graduate	.41237	.35094	.766	-.5509	1.3756
	Professional	2.41937*	.43904	.000	1.2143	3.6244
Professional	SSLC	-3.74545*	.79438	.000	-5.9258	-1.5651
	Higher Secondary	-2.94545*	.88552	.009	-5.3760	-.5149
	Graduate	-2.00699*	.41434	.000	-3.1442	-.8697
	Post Graduate	-2.41937*	.43904	.000	-3.6244	-1.2143

Source: Primary data ** The mean difference is significant at the 5% level*

Table 6.21 shows the result of Tukey HSD test for multiple comparisons and it is found that the mean value of influence of prospect variables is significantly different between traders possessing educational qualification of *SSLC and Professional* (p = .000, 95% C.I. = [1.5651, 5.9258]), *Higher Secondary and Professional* (p = .009, 95% C.I. = [.5149, 5.3760]), *Graduate and Professional* (p = .000, 95% C.I. = [.8697, 3.1442]), and finally *Postgraduate and Professional* (p = .000, 95% C.I. = [1.2143, 3.6244]). There is no significant difference in mean score of influence of prospect variable between traders having qualification of SSLC to Post graduation. That means there is no significant difference in the influence of prospect variables among traders having qualifications of SSLC, Higher secondary, Graduation, and Post graduation.

6.6.4 Trading Experience-wise Analysis of the Influence of Prospect Variables on the Trading Decision of Equity Derivative Traders

The sample consists of equity derivative traders with varying years of trading experience. Hence it is relevant to examine whether there is any difference in the influence of prospect variables among different trading experience groups. On the basis of years of trading experience, the sample respondents are classified into four groups such as *2 years & below (1)*, *3-5 years (2)*, *5-10 years (3)* and *above 10 years (4).* The number of years of trading experience of equity derivative traders may affect the influence level of prospect variables. To test the same, the descriptive analysis has been done which shows the mean score of influence of prospect variables on traders with different years of trading experience. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The result of descriptive analysis is summarized in Table 6.22.

Table 6.22

Descriptive statistics of trading experience -wise analysis of Influence of prospect variables

Test Variable	Trading experience	N	Mean ± SD
Influence of prospect variables	2 years and below	161	11.45 ± 2.74
	3-5 years	81	10.90 ± 2.61
	5-10 years	32	10.96 ± 2.62
	Above 10 years	26	10.00 ± 2.98
	Total	300	11.13 ± 2.74

Source: Primary data

From table 6.22 it is found that there is a very small difference in the mean score of influence of prospect variables between traders with different years of trading experience. The ANOVA is applied to test the significance of differences in the mean influence of prospect variables among traders with different years of experience and the result is summarised in Table 6.23. The test hypothesis is given below:

H_0: There is no significant difference in the influence of prospect variable among traders according to their trading experience

H_1: There is significant difference in the influence of prospect variable among traders according to their trading experience

Table 6.23

Result of One-way ANOVA: Trading experience - wise analysis of Influence of prospect variables on the trading decision of equity derivative traders

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	55.107	3	18.369		
Within Groups	2182.079	296	7.372	2.49	.060
Total	2237.187	299			

Source: Primary data

The one-way ANOVA result (F (3,296) = [2.49], p = .060) reveals that there is no significant difference in the mean score of influence of prospect variables among traders of different trading experience. Hence, it can be concluded that the trading experience do not affect the influence of prospect variables.

6.6.5 Trading Capital-wise Analysis of the Influence of Prospect Variables on the Trading Decision of Equity Derivative Traders.

The amount of trading capital may affect the level of influence of prospect variables on the trading decisions of equity derivative traders. Hence it is important to examine whether there is any difference in the influence of prospect variables between traders of different trading capital. On the basis of trading capital, the respondents are classified into five groups such as *Below 1 lakh (group1)*, *1-5 lakhs (group2)*, *5-10 lakhs(group3), 10-20 lakhs (group4)* and *Above 20 lakhs (group5)*. To examine the relationship between trading capital and the influence of prospect variables, descriptive analysis has been done which shows the mean score of influence of prospect variables on traders with different amounts of trading capital. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The result of the descriptive analysis is summarized in Table 6.24.

Table 6.24

Descriptive statistics of trading capital -wise analysis of influence of prospect variables

Test Variable	Trading capital	N	Mean ± SD
Influence of Prospect variable	Below 1 lakh	74	11.61 ± 2.54
	1-5 lakhs	136	11.00 ± 2.76
	5-10 lakhs	29	10.76 ± 3.00
	10-20 lakhs	24	10.92 ± 2.95
	Above 20 lakhs	37	11.05 ± 2.69
	Total	300	11.13 ± 2.74

Source: Primary data

From Table 6.24 it is found that there is a very small difference in the mean score of influence of prospect variables among traders with different amounts of trading capital. The ANOVA is applied to test the significance of differences in the mean influence of prospect variables among traders with different amounts of trading capital and the result is summarised in Table 6.25. The test hypothesis is given below:

H_0: There is no significant difference in the influence of prospect variable among traders according to trading capital

H_1: There is significant difference in the influence of prospect variable among traders according to trading capital

Table 6.25

Result of One-way ANOVA: Trading capital - wise analysis of the influence of prospect variables on the trading decision of equity derivative traders

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	24.516	4	6.129		
Within Groups	2212.671	295	7.501	0.817	.515
Total	2237.187	299			

Source: Primary data

The one-way ANOVA result (F (4,295) = [0.817], p = .515) reveals that there is no significant difference in the influence of prospect variable among equity derivative traders with different trading capital. So, it can be concluded that the trading capital of equity derivative traders have no influence on the level of influence of prospect variables.

6.7 Influence of Herding Effect on the Trading Decisions of Equity Derivative Traders in Kerala

In the financial market, the herding effect is defined as the propensity of investor behaviour to imitate that of other investors. Since investors tend to depend more on communal knowledge than on private information, the occurrence of herding is typically carefully considered by professionals. As a result, many promising investment opportunities at the moment may be negatively impacted. Academic researchers also pay attention to herding; because its impacts on stock price changes can influence the attributes of risk and return models and this has impacts on the viewpoints of asset pricing theories *(Tan et al., 2008)*.

Herding can lead to several emotional biases in terms of behaviour, such as conformity, congruity, and cognitive conflict, home bias, and gossip. In the security market, herding investors base their investment decisions on the masses' decisions of buying or selling stocks. In contrast, informed and rational investors usually ignore following the flow of the masses, and this makes the market efficient. Herding, on the other hand, results in an inefficient market situation that is typically identified by speculative bubbles. In general, herding investors act the same way as prehistoric men who had little knowledge and information of the surrounding environment and gathered in groups to support each other and get safety *(Caparrelli et al., 2010).*

There are several elements that impact the herding behaviour of an investor, for example, *general market trend*, *the volume of investment*, *news about companies*, *analyst's recommendations* and so on. The more confident the investors are, the more they rely on their private information for investment decisions. In this case, investors seem to be less interested in herding behaviours. When investors put a large amount of capital into their investment, they tend to follow others' actions to reduce the risks, at least in the way they feel. Besides, the preference for herding also depends on types of investors, for example, individual investors have a tend to follow the crowds in making investment decision more than institutional investors *(Goodfellow et al., 2009).*

(Waweru et al., (2008) propose that herding can drive stock trading and create momentum for stock trading. However, the impact of herding can break down when it reaches a certain level because the cost to follow the herd may increase to get the increasing abnormal returns. *Waweru et al.,(2008)* conclude that buying and selling decisions of an investor are significantly impacted by others' decisions, and herding behaviour helps investors to have a sense of regret aversion for their decisions. For other decisions: choice of stock, length of time to hold stock, and volume of stock to trade, investors seem to be less impacted by herding behaviour. However, these conclusions are given to the case of institutional investors; thus, the result can be different in the case of individual investors because, as mentioned above, individuals tend to herd in their investment more than institutional investors. Therefore, this research will explore the influences of herding on the decision-making of the individual derivative trader based on three herd behavior variables such as *following general market trends, following analysts' recommendations* and *considering news about companies* to assess the impact level of this factor on their decisions. The study findings were summarized using descriptive statistics and are tabulated in Table 6.26.

Table 6.26

Influence of herding effect on the trading decision of equity derivative traders

(n=300)

Statement / Variable	Responses	Frequency	Percent	Mean ± SD	t*	p-value
I consider open interest, volume, etc, to identify existing market trends and trade accordingly	SD	27	9.0	3.63 ± 1.20	9.03	<.01***
	D	16	5.3			
	N	83	27.7			
	A	90	30.0			
	SA	84	28.0			
I consider analysts' recommendations for entering or closing a position in the derivative market.	SD	77	25.7	2.86 ± 1.38	-1.80	.072
	D	34	11.3			
	N	87	29.0			
	A	59	19.7			
	SA	43	14.3			
I always consider news about the companies/event before taking trading decisions in the F&O market	SD	33	11.0	3.52 ± 1.27	7.10	<.01***
	D	21	7.0			
	N	86	28.7			
	A	77	25.7			
	SA	83	27.7			

Source: Primary data #*(SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree)*

**One-sample t-test, Average=3* ****Difference is significant at 1% level*

Table 6.26 shows the influence of herd behaviour on sample derivative traders, the sub variable wise analysis is explained below:

The above table indicates that the mean score obtained for measuring the behaviour of traders to follow the general market trend is 3.63, which is significantly above the mean score of the response scale i.e., 3, and the one-sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 9.03, p = <.01. Hence, it can be concluded that the bias of '*following general market trend'* strongly exists among equity derivative traders in Kerala.

Table 6.26 indicates that the mean score obtained for measuring the behavior of *following analyst's recommendations* is 2.86, which is almost equal to the mean score of the response scale i.e., 3, and the one-sample t-test shows that there is no significant difference in the mean score obtained with the population average score, t (299) = -1.80, p = .072. Hence it can be concluded that the bias of '*following analysts' recommendations'* moderately affects the trading decision of equity derivative traders in Kerala.

Table 6.26 also indicates that the mean score obtained for measuring the behavior of considering *news about the companies/events before taking a trading decision* is 3.52, significantly above the mean score of the response scale i.e. 3, and the one-sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 7.10, p = <.01. Hence it can be concluded that the bias of trading based on '*news about the companies'* significantly influences the decision of equity derivative traders in Kerala.

6.7.1 The Combined Influence of Herd Behaviour on derivative traders is measured by combining the above three variables and classified the total score (3 x 5=15) into three classes. Where Low = 3 to 7, Medium = 8 to 10, and High = 11 to 15. The data is analyzed using one sample t-test with a test value of '2', which is the mean of the three-point response scale. The test hypothesis is given below:

H_0: $\mu = 2$ (The influence of herd behaviour is average)

H_1: $\mu \neq 2$ (The influence of herd behaviour is not average)

The test result is presented in Table 6.27.

Table 6.27

Combined Influence of Herding Effect on the trading decision of equity derivative trader

Variable		Frequency	Percent	Mean ± SD	t*	*p*-value
Influence of Herding Effect	Low	58	19.4	2.26 ± 0.762	5.908	<.01***
	Medium	106	35.3			
	High	136	45.3			
	Total	300	100.0			

Source: Primary data ****Difference is significant at 1% level*

**One-sample t-test, Average=2*

Table 6.27 indicates that the mean score obtained for measuring the influence of herd behaviour is 2.26, which is higher than the mean score of the response scale i.e., 2, the one sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 5.908, p = <.01. Hence it can be concluded that influence of herd behaviour exists among equity derivative traders in Kerala.

6.8 Comparison of the Impact of Herding Effect on Different Demographic Groups of Equity Derivative Traders.

The influence of the herding effect on the trading decisions of equity derivative traders is compared with respect to five demographic variables such as *gender, age, educational qualifications, trading experience and trading capital.* The results are discussed below.

6.8.1 Gender-wise Analysis of the Influence of Herding Effect on the Trading Decision of Equity Derivative Traders.

The influence of the herding effect on male and female equity derivative traders is compared using an independent sample t-test and the result is presented in Table 6.28. The test hypothesis is given below:

H_0: $\mu_1 = \mu_2$ (There is no significant difference in the influence of herding effect between male and female equity derivative traders)

H_1: $\mu_1 \neq \mu_2$ (There is a significant difference in the influence of herding effect between male and female equity derivative traders)

Table 6.28

Gender-wise analysis of the influence of Herding effect on the trading decision of equity derivative traders

Test variable	Group	N	Mean ±	SD	*t*	*p*-value
Influence of Herd Behaviour	Male	264	9.92 ± 2.71	2.76	-1.515	.131
	Female	36	10.64 ±2.47	2.75		

Source: Primary data

From Table 6.28, it can be observed that the mean score of influence of herding effect of male and female traders are 9.92 and 10.64 respectively and indicates very little difference between the mean values. Since the *p*-value (.131) is more than 0.05, it can be inferred that there is no significant difference in the influence of herding effect among male and female equity derivative traders in Kerala.

6.8.2 Age-wise Analysis of the Influence of Herding Effect on the Trading Decision of Equity Derivative Traders.

Traders with different age categories may have differences in the influence of herding effect on their trading decisions. On the basis of age, the sample respondents are classified into four groups such as: *Up to 30 (1)*, *31-40 (2)*, *41-50 (3)* and *51& above (4)*. Hence the data has been classified age-wise and descriptive analysis has been done to know the mean score of traders in different age categories as shown in Table 6.29.

Table 6.29

Age-wise analysis of influence of Herding effect on the trading decision of equity derivative traders

Test Variable	Age Group (in years)	N	Mean ± SD
Influence of Herding Effect	Up to 30	85	10.06 ± 2.88
	31 – 40	135	10.22 ± 2.61
	41 – 50	55	9.58 ± 2.90
	51 & above	25	9.56 ± 1.83
	Total	300	10.00 ± 2.69

Source: Primary data

According to the aforementioned table, there are differences in the mean score of the influence of herding effects among traders of different ages. The age group 3*1-40 (group 2)* have the highest mean score (10.22) and the age group *51& above (group 4)* have the lowest mean score (9.16) of influence of the herding effect. The ANOVA is applied to test the significance of differences among the mean of different age groups and the result is summarised in Table 6.30 below. The test hypothesis is given below.

H_0: There is no significant difference in the influence of herding effect among equity derivative traders of different age groups

H_1: There is a significant difference in the influence of herding effect among equity derivative traders of different age groups

Table 6.30

Result of One-way ANOVA: Age-wise analysis of influence of Herding effect

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	21.416	3	7.139		
Within Groups	2139.581	296	7.228	0.988	.399
Total	2160.997	299			

Source: Primary data

The one-way ANOVA reveals that statistically there is no significant difference in the mean score of influence of herding effect among different age groups (F (3, 296) = [0.988], p = .399). Hence, it can be inferred that there is no significant difference in the influence of herding effect among different age groups of equity derivative traders in Kerala. It can also be inferred that the Influence of herding effect on the trading decision of equity derivative traders are decreasing with increase in age.

6.8.3 Education Qualification wise Analysis of the Influence of Herding Effect on the Trading Decisions of Equity Derivative Traders.

The sample used in this study includes equity derivative traders with different educational qualifications. Hence it is important to examine whether there is any difference in the influence of herding effect among traders with different educational qualifications. On the basis of education level, the sample respondents are classified into five groups such as SSLC, Higher Secondary, Graduate, Post Graduate, and Professional. The level of education of traders may affect the level of influence of herding effect on the trading decision. To test the same, descriptive analysis has been done which shows the mean score of influence of herding effect among traders with different educational qualification. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is applied. The result of the descriptive analysis is summarized in Table 6.31.

Table 6.31

Descriptive statistics of Education qualification-wise analysis of Influence of Herding effect

Test Variable	Education Group	N	Mean ± SD
Influence of Herding effect	SSLC	13	8.69 ± 2.63
	Higher Secondary	10	8.30 ± 1.42
	Graduate	130	9.91 ± 2.80
	Post Graduate	92	10.80 ± 2.51
	Professional	55	9.51 ± 2.54
	Total	300	10.00 ± 2.69

Source: Primary data

From the above table, it is found that there is a significant difference in the mean score of influence of the herding effect among traders with different educational qualifications. The traders with Higher secondary have the lowest mean score (8.30) and traders with Post graduation have the highest mean score (10.80) of influence of the herding effect. The ANOVA is applied to test the significance of differences in the impact of the herding effect among traders of different educational qualifications and the result is summarised in Table 6.32. The test hypothesis is given below.

H_0: There is no significant difference in the influence of herding effect among equity derivative traders with different educational qualifications

H_1: There is significant difference in the influence of herding effect among equity derivative traders with different educational qualifications

Table 6.32

Result of One-way ANOVA: Education-wise analysis of Influence of the Herding effect

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	125.011	4	31.253		
Within Groups	2035.985	295	6.902	4.528	.001
Total	2160.997	299			

Source: Primary data

The one-way ANOVA reveals that there is a statistically significant difference in the mean score of influence of herding effect among traders of different educational qualification groups (F (4, 295) = [4.528], p = .001). To know the exact significant difference between different education groups Tukey's HSD test has been used and the result is shown in Table 6.33.

Table 6.33

Education qualification-wise Post Hoc (HSD) analysis for multiple comparisons of influence of Herding effect

Education Level (I)	Education Level (J)	Mean Difference (I-J)	Std. Error	*p*-value	95% Confidence Interval	
					Lower Bound	Upper Bound
SSLC	Higher Secondary	.39231	1.10502	.997	-2.6407	3.4253
	Graduate	-1.21538	.76419	.505	-3.3129	.8821
	Post Graduate	-2.11204	.77840	.054	-4.2485	.0245
	Professional	-.81678	.81017	.852	-3.0405	1.4069
Higher Secondary	SSLC	-.39231	1.10502	.997	-3.4253	2.6407
	Graduate	-1.60769	.86212	.339	-3.9740	.7586
	Post Graduate	-2.50435^{*}	.87475	**.036**	-4.9053	-.1034
	Professional	-1.20909	.90313	.667	-3.6879	1.2698
Graduate	SSLC	1.21538	.76419	.505	-.8821	3.3129
	Higher Secondary	1.60769	.86212	.339	-.7586	3.9740
	Post Graduate	-.89666	.35792	.092	-1.8791	.0857
	Professional	.39860	.42258	.880	-.7613	1.5585

Education Level (I)	Education Level (J)	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
					Lower Bound	Upper Bound
Post Graduate	SSLC	2.11204	.77840	.054	-.0245	4.2485
	Higher Secondary	2.50435*	.87475	**.036**	.1034	4.9053
	Graduate	.89666	.35792	.092	-.0857	1.8791
	Professional	1.29526*	.44777	**.033**	.0662	2.5243
Professional	SSLC	.81678	.81017	.852	-1.4069	3.0405
	Higher Secondary	1.20909	.90313	.667	-1.2698	3.6879
	Graduate	-.39860	.42258	.880	-1.5585	.7613
	Post Graduate	-1.29526*	.44777	**.033**	-2.5243	-.0662

Source: Primary data ** The mean difference is significant at the 5% level*

Table 6.33 shows the result of Tukey HSD test for multiple comparisons and it is found that the mean value of herding effect levels is significantly different between traders possessing educational qualification of *Higher Secondary and Post graduation* (p = .036, 95% C.I. = [-4.9053, -.1034]), and *Post graduate and Professional* (p = .033, 95% C.I. = [.0662, 2.5243]). There is no significant difference in mean score of influence of herding effects among other groups of traders. From the above results it can also be inferred that the influence of herding effect is less on traders having low education level as compared to traders with higher education qualifications.

6.8.4 Trading Experience-wise Analysis of the Influence of Herding Effect on the Trading Decision of Equity Derivative Traders.

The sample consists of equity derivative traders with varying years of trading experience. Hence it is relevant to examine whether there is any difference in the influence of herding effect among traders having different years of trading experience. On the basis of years of trading experience, the sample respondents are classified into four groups such as *2 years & below (1)*, *3-5 years (2)*, *5-10 years (3)* and *above 10 years (4).* The number of years of trading experience of equity derivative traders may affect the level of influence of herding effect. To test the same, the descriptive analysis has been done which shows the mean score of influence of herding effect on traders with different years of trading experience. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The result of descriptive analysis is summarized in Table 6.34.

Table 6.34

Descriptive statistics of trading experience-wise analysis of Influence of Herding effect

Test Variable	Trading experience	N	Mean ± SD
Influence of prospect variables	2 years and below	161	9.97 ± 2.74
	3-5 years	81	10.23 ± 2.58
	5-10 years	32	9.69 ± 3.23
	Above 10 years	26	9.88 ± 1.90
	Total	300	10.00 ± 2.69

Source: Primary data

From Table 6.34, it is found that there is a very small difference in the mean score of influence of herding effect among traders with different years of trading experience. The ANOVA is applied to test the significance of differences in the mean influence of herding effect among traders with different years of experience and the result is summarised in Table 6.35. The test hypothesis is given below:

H_0: There is no significant difference in the influence of herding effect among traders according to trading experience

H_1: There is significant difference in the influence of herding effect among traders according to trading experience

Table 6.35

Result of One-way ANOVA: Trading experience-wise analysis of Influence of Herding effect on the trading decision of equity derivative traders

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	8.080	3	2.693		
Within Groups	2152.917	296	7.273	0.370	.774
Total	2160.997	299			

Source: Primary data

The one-way ANOVA result (F (3,296) = [0.370], p = .774) reveals that there is no significant difference in the influence of herding effect among equity derivative traders with different years of trading experience. Hence, it can be inferred that the trading experience has no effect on the level of influence of herding behaviour.

6.8.5 Trading Capital-wise Analysis of the Influence of Herding Effect on the Trading Decision of Equity Derivative Traders.

The amount of trading capital may affect the level of impact of herding effect on the trading decisions of equity derivative traders. Hence it is important to examine whether there is any difference in the influence of herding effect among traders of different trading capital. On the basis of trading capital, the respondents are classified into five groups such as *Below 1 lakh (group1)*, *1-5 lakhs (group2)*, *5-10 lakhs(group3), 10-20 lakhs (group4)* and *Above 20 lakhs (group5)*. To examine the relationship between trading capital and the influence of herding effects, descriptive analysis has been done which shows the mean score of influence of herding effect on traders with different amounts of trading capital. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The result of the descriptive analysis is summarized in Table 6.36

Table 6.36

Descriptive statistics of trading capital-wise analysis of influence of Herding effect

Test Variable	Trading capital	N	Mean ± SD
Influence of Prospect variable	Below 1 lakh	74	10.19 ± 2.68
	1-5 lakhs	136	10.15 ± 2.87
	5-10 lakhs	29	9.38 ± 2.74
	10-20 lakhs	24	9.38 ± 2.32
	Above 20 lakhs	37	9.97 ± 2.15
	Total	300	10.00 ± 2.69

Source: Primary data

From table 6.36 it is found that there is a very small difference in the mean score of influence of herding effect among traders with different amounts of trading capital. The ANOVA is applied to test the significance of differences in the mean influence of herding effect among traders with different amounts of trading capital and the result is summarised in Table 6.37. The test hypothesis is given below:

H_0: There is no significant difference in the influence of herding effect among traders according to trading capital

H_1: There is significant difference in the influence of herding effect among traders according to trading capital

Table 6.37

Result of One-way ANOVA: Trading capital-wise analysis of the influence of herding effect on the trading decision of equity derivative traders

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	26.462	4	6.616		
Within Groups	2134.534	295	7.236	0.914	.456
Total	2160.997	299			

Source: Primary data

The one-way ANOVA result (F (4,295) = [0.914], *p* = .456) reveals that there is no significant difference in the influence of herding effect among traders of different trading capital. It can be concluded that the trading capital has no influence on the level of influence of herding effect.

6.9 Influence of Emotional Bias on Equity Derivative Traders

Emotions are complex mental processes and a varied collection of responses. It is a state of psychic or physical reaction that is subjectively experienced as a strong feeling and involves physiological changes that prepare the body for immediate action *(Sulphey, 2014)*. Emotions such as fear, hope greed, attitude, anger, pride, worry, excitement, guilt and mood may also influence investment decision-making. These emotions determine the risk tolerance level of an investor. Further, emotions exert both positive, as well as negative effects on the decision-making process *(Peters & Slovic, 2000)*. According to *Nofsinger (2005),* the influence of emotions on trading decisions is larger for more complex and uncertain situations. *Damasio (1994),* even finds that without emotions reasonable decisions are impossible.

Emotional investors normally follow their intuition or blindly follow their beliefs, and act in accordance with their beliefs about prices *(Sulphey, 2014)*. The emotions most commonly identified as contributing to financial fragility and irrational exuberance include *greed, hope* and *fear (Shefrin, 2002)*. Based on the above literature this study selected three psychological factors such as *greed, hope, and fear* to examine the influence of emotions on the trading decisions of equity derivative traders. The study findings were summarized using descriptive statistics and are tabulated in Table 6.38.

Table 6.38

Influence of Emotions on the trading decisions of equity derivative traders

(n=300)

Statement / Variable	Responses#	Frequency	%	Mean ± SD	t*	p-value
I prefer to trade in F&O as it generates quick profit than trading in the stock market ***(Greed)***	SD	22	7.3	3.66 ± 1.19	9.585	<.01***
	D	21	7.0			
	N	86	28.7			
	A	79	26.3			
	SA	92	30.7			
I sometimes tend to hold on to a losing F&O position with the hope of recovery in price without considering stop-loss ***(Hope)***	SD	20	6.7	3.73 ± 1.16	10.860	<.01***
	D	21	7.0			
	N	70	23.3			
	A	99	33.0			
	SA	90	30.0			
Usually, I square off a profitable position too early due to fear of loss ***(Fear)***	SD	34	11.3	3.41 ± 1.26	5.569	<.01***
	D	38	12.7			
	N	63	21.0			
	A	102	34.0			
	SA	63	21.0			

Source: Primary data #*(SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree)*

**One-sample t-test, Average=3* ****Difference is significant at 1% level*

Table 6.38 shows the influence of emotions on the trading decision of equity derivative traders in Kerala, the variable wise analysis is explained below:

The above table indicates that the mean score obtained for measuring the emotional bias- the *greed* of derivative traders is 3.66, which is significantly above the mean score of the response scale i.e., 3, and the one-sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 9.585, $p = <.01$. Hence, it can be concluded that *the emotion of greed* strongly exists among equity derivative traders in Kerala.

Table 6.38 indicates that the mean score obtained for measuring the emotional bias- *the hope* of derivative trader is 3.73, which is significantly above the mean score of the response scale i.e., 3, and the one-sample t-test shows that that the mean score is statistically significantly higher than the population average score, t (299) = 10.86, $p = <.01$. Hence, it can be concluded that *the emotion of hope* strongly exists among equity derivative traders in Kerala

Table 6.38 also indicates that the mean score obtained for measuring the emotional bias- *fear* of derivative trader is 3.41, which is above the mean score of the response scale i.e., 3, and the one-sample t-test shows that that mean score is statistically significantly higher than the population average score, t (299) = 5.569, $p = <.01$. Hence, it can be concluded that *the emotional bias of fear* exists among equity derivative traders in Kerala

6.9.1 Combined influence of Emotional Bias on the trading decision of equity derivative traders is measured by combining the above three variables and classified the total score (3 x 5=15) into three classes. Where Low = 3 to 7, Medium = 8 to 10, and High = 11 to 15. The data is analyzed using one sample t-test with a test value of '2', which is the mean of the three-point response scale. The test hypothesis is given below:

H_0: $\mu = 2$ (The influence of emotional bias is average)

H_1: $\mu \neq 2$ (The influence of emotional bias is not average)

The test result is presented in the table 6.39.

Table: 6.39

Combined Influence of Emotional bias on the trading decisions of equity derivative traders

Variable		Frequency	Percent	Mean ± SD	t*	p-value
Influence of emotional bias	Low	28	9.3	2.47 ± 0.661	12.227	<.01***
	Medium	104	34.7			
	High	168	56.0			
	Total	300	100.0			

Source: Primary data ****Difference is significant at 1% level*
**One-sample t-test, Average=2*

Table 6.39 indicates that the mean score obtained for measuring the influence of emotional bias is 2.47, which is significantly higher than the mean score of the response scale i.e., 2, the one-sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 12.227, p = <.01. Hence, it can be concluded that influence of emotional bias strongly exists among equity derivative traders in Kerala.

6.10 Comparison of the Influence of Emotional Bias on Different Demographic Groups of Equity Derivative Traders.

The influence of emotional bias on the trading decisions of equity derivative traders is compared with respect to five demographic variables such as *gender, age, educational qualifications, trading experience and trading capital.* The results are discussed below.

6.10.1 Gender-wise Analysis of the Influence of Emotional Bias on the Trading Decision of Equity Derivative Traders.

The influence of the emotional bias on male and female equity derivative traders is compared using an independent sample t-test and the result is presented in Table 6.40. The test hypothesis is given below:

H_0: $\mu_1 = \mu_2$ (There is no significant difference in the influence of emotional bias between male and female equity derivative traders)

H_1: $\mu_1 \neq \mu_2$ (There is significant difference in the influence of emotional bias between male and female equity derivative traders)

Table 6.40

Gender-wise analysis of the influence of Emotional bias on the trading decisions of equity derivative traders

Test variable	Group	N	Mean ±	*t*	*p-value*
Influence of Heuristic Variables	Male	264	10.69 ± 2.53	-2.002	.046
	Female	36	11.58 ± 2.47		

Source: Primary data

From Table 6.40, it can be observed that the mean score of influence of emotional bias on male and female traders are 10.69 and 11.58 respectively and indicates a small difference in the mean score between male and female traders. Since the *p*-value (.046) is less than 0.05, it can be inferred that there is a significant difference in the influence of emotional bias between male and female equity derivative traders in Kerala. As the mean score is higher in the case of female traders it can be concluded that the influence of emotional bias is high on the trading decisions of female traders than male traders.

6.10.2 Age-wise Analysis of the Influence of Emotional Bias on the Trading Decision of Equity Derivative Traders.

Traders with different age categories may have differences in the level of influence of emotional bias on their trading decisions. On the basis of age, the sample respondents are classified into four groups such as: *Up to 30 (1)*, *31-40 (2)*, *41-50 (3)* and *51& above (4)*. Hence the data has been classified age-wise and descriptive analysis has been done to know the mean score of traders in different age categories as shown in Table 6.41.

Table 6.41

Age-wise analysis of influence of Emotional bias on the trading decision of equity derivative traders

Test Variable	Age Group (in years)	N	Mean ± SD
Influence of Emotional bias	Up to 30	85	10.79 ± 2.62
	31 – 40	135	11.16 ± 2.55
	41 – 50	55	10.62 ± 2.21
	51 & above	25	9.24 ± 2.33
	Total	300	10.79 ± 2.54

Source: Primary data

According to the aforementioned table, there are only small differences in the mean score of the influence of emotional bias among traders of different ages. The age group 3*1-40 (group 2)* have the highest mean score (11.16) and the age group *51& above (group 4)* have the lowest mean score (9.24) of influence of emotional bias. The ANOVA is applied to test the significance of differences among the mean of different age groups and the result is summarised in Table 6.42 below. The test hypothesis is given below.

> *H_0: There is no significant difference in the influence of emotional bias among equity derivative traders of different age groups*
>
> *H_1: There is significant difference in the influence of emotional bias among equity derivative traders of different age groups*

Table 6.42

Result of One-way ANOVA: Age-wise analysis of influence of emotional bias

	Sum of Squares	Df	Mean Square	F	*p*-value
Between Groups	79.723	3	26.574	4.267	.006
Within Groups	1843.463	296	6.228		
Total	1923.187	299			

Source: Primary data

The one-way ANOVA reveals that statistically there is significant difference in the mean score of influence of emotional bias among different age groups (F (3, 296) = [4.267], p = .006). Hence, it can be inferred that there is significant difference in the influence of emotional bias among different age groups of equity derivative traders in Kerala. It can also be inferred that the impact of emotional bias on the trading decision of equity derivative traders are decreasing with increase in age. Since data met the assumption of homogeneity of variances, the Tukey's HSD test has been used to check the exact significant difference between different age groups and the result is shown in Table 6.43.

Table 6.43

Age group wise Post Hoc (HSD) analysis for multiple comparison of influence of Emotional bias

Age of respondents (I)	Age of respondents (J)	Mean Difference (I-J)	Std. Error	*p*-value	95% Confidence Interval	
					Lower Bound	Upper Bound
Up to 30 (1)	31 - 40	-.36732	.34555	.712	-1.2601	.5255
	41 - 50	.17005	.43186	.979	-.9457	1.2858
	51 & above	1.54824*	.56779	.034	.0812	3.0152
31 – 40 (2)	Up to 30	.36732	.34555	.712	-.5255	1.2601
	41 - 50	.53737	.39921	.534	-.4941	1.5688
	51 & above	1.91556*	.54337	.003	.5117	3.3194
41 – 50 (3)	Up to 30	-.17005	.43186	.979	-1.2858	.9457
	31 - 40	-.53737	.39921	.534	-1.5688	.4941
	51 & above	1.37818	.60196	.103	-.1771	2.9334
51 & Above (4)	Up to 30	-1.54824*	.56779	.034	-3.0152	-.0812
	31 - 40	-1.91556*	.54337	.003	-3.3194	-.5117
	41 - 50	-1.37818	.60196	.103	-2.9334	.1771

Source: Primary data ** The mean difference is significant at the 5% level*

Table 6.43 shows the result of the HSD test for multiple comparisons and it is found that the mean value of the influence of emotional bias is significantly different between age groups *1 and 4* (p = .034, 95% C.I. = [.0812, 3.0152]), and *2 and 4* (p = .003, 95% C.I. = [.5117, 3.3194]). From the above result, it is evident that the influence of emotional bias is significantly different between traders of age group below 40 and above 40. Thus, it is concluded that the influence of emotional bias is less among traders in the age group of above 41 years as compared to traders of below 40 years.

6.10.3 Education Qualification-wise Analysis of the Influence of Emotional Bias on the Trading Decisions of Equity Derivative Traders.

The sample used in this study includes equity derivative traders with different educational qualifications. Hence it is important to examine whether there is any difference in the influence of emotional bias among traders with different educational qualifications. On the basis of education level, the sample respondents are classified into five groups such as SSLC, Higher Secondary, Graduate, Post Graduate, and Professional. The level of education of traders may affect the level of influence of emotional bias on the trading decision. To test the same, descriptive analysis has been done which shows the mean score of influence of emotional bias among traders with different educational qualification. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is applied. The result of the descriptive analysis is summarized in Table 6.44.

Table 6.44

Descriptive statistics of Education qualification -wise analysis of Influence of Emotional bias

Test Variable	Education Group	N	Mean ± SD
Influence of Emotional bias	SSLC	13	10.08 ± 2.63
	Higher Secondary	10	11.80 ± 2.66
	Graduate	130	10.85 ± 2.63
	Post Graduate	92	10.93 ± 2.50
	Professional	55	10.42 ± 2.31
	Total	300	10.79 ± 2.53

Source: Primary data

From the above table, it is found that there is a small difference in the mean score of influence of the emotional bias between traders with different educational qualifications. The traders with SSLC have the lowest mean score (10.08) and traders with Higher secondary have the highest mean score (11.80) of influence of the emotional bias. The ANOVA is applied to test the significance of differences in the impact of the emotional bias among traders of different educational qualifications and the result is summarised in Table 6.45. The test hypothesis is given below.

H_0: There is no significant difference in the influence of emotional bias among equity derivative traders with different educational qualifications

H_1: There is significant difference in the influence of emotional bias among equity derivative traders with different educational qualifications

Table 6.45

Result of One-way ANOVA: Education-wise analysis of Influence of the Emotional bias

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	26.750	4	6.687	1.040	.387
Within Groups	1896.437	295	6.429		
Total	1923.187	299			

Source: Primary data

The one-way ANOVA reveals that statistically there is no significant difference in the mean score of influence of emotional bias among traders of different educational qualification groups (F (4, 295) = [1.040], p = .387). Hence it can be concluded that educational qualifications of traders do not affect the influence of emotional bias in trading decision of equity derivative traders in Kerala

6.10.4 Trading Experience-wise Analysis of the Influence of Emotional Bias on the Trading Decision of Equity Derivative Traders.

The sample consists of equity derivative traders with varying years of trading experience. Hence it is relevant to examine whether there is any difference in the influence of emotional bias among traders having different years of trading experience. On the basis of years of trading experience, the sample respondents are classified into four groups such as *2 years & below (1)*, *3-5 years (2)*, *5-10 years (3)* and *above 10 years (4)*. The number of years of trading experience of equity derivative traders may affect the level of influence of emotional bias. To test the same, the descriptive analysis has been done which shows the mean score of influence of emotional bias on traders with different years of trading experience. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The result of descriptive analysis is summarized in Table 6.46.

Table 6.46

Descriptive statistics of trading experience-wise analysis of Influence of Emotional bias

Test Variable	Trading experience	N	Mean ± SD
Influence of Emotional bias	2 years and below	161	11.01 ± 2.39
	3-5 years	81	10.40 ± 2.51
	5-10 years	32	11.63 ± 2.31
	Above 10 years	26	9.65 ± 3.25
	Total	300	10.79 ± 2.54

Source: Primary data

From Table 6.46 it is found that there is a difference in the mean score of influence of emotional bias among traders with different years of trading experience. The ANOVA is applied to test the significance of differences in the mean influence of emotions among traders with different years of experience and the result is summarised in Table 6.47. The test hypothesis is given below:

H_0: There is no significant difference in the influence of emotional bias among traders with different trading experience

H_1: There is significant difference in the influence of emotional bias among traders with different trading experience

Table 6.47

Result of One-way ANOVA: Trading experience - wise analysis of Influence of Emotional bias

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	76.469	3	25.490	4.086	.007
Within Groups	1846.718	296	6.239		
Total	1923.187	299			

Source: Primary data

The one-way ANOVA reveals that there is statistically significant difference in mean score of influence of emotional bias among traders of at least two groups with different years of trading experience (F (3,296) = [4.086], p = .007). To know exact significant difference in the influence of emotional bias between different groups of trading experience Tukey's HSD test has been performed and the result is shown in Table 6.48.

Table 6.48

Trading experience wise Post Hoc (HSD) analysis for multiple comparison of influence of Emotional bias

Trading Experience in Derivative (I)	Trading Experience in Derivative (J)	Mean Difference (I-J)	Std. Error	*p*-value	95% Confidence Interval	
					Lower Bound	Upper Bound
2 years and Below (1)	3-5 years	.61736	.34026	.071	-.0523	1.2870
	5-10 years	-.61258	.48344	.206	-1.5640	.3388
	Above 10 years	1.35858*	.52793	.011	.3196	2.3975
3-5 years (2)	2 years and below	-.61736	.34026	.071	-1.2870	.0523
	5-10 years	-1.22994*	.52153	.019	-2.2563	-.2036
	Above 10 years	.74122	.56301	.189	-.3668	1.8492

Trading Experience in Derivative (I)	Trading Experience in Derivative (J)	Mean Difference (I-J)	Std. Error	*p*-value	95% Confidence Interval	
					Lower Bound	Upper Bound
5-10 years (3)	2 years and below	.61258	.48344	.206	-.3388	1.5640
	3-5 years	1.22994*	.52153	.019	.2036	2.2563
	Above 10 years	1.97115*	.65949	.003	.6733	3.2690
Above 10 years (4)	2 years and below	-1.35858*	.52793	.011	-2.3975	-.3196
	3-5 years	-.74122	.56301	.189	-1.8492	.3668
	5-10 years	-1.97115*	.65949	.003	-3.2690	-.6733

Source: Primary data ** The mean difference is significant at the 5% level*

Table 6.48 shows the result of the HSD test for multiple comparisons and it is found that the mean value of the influence of emotional bias is significantly different between traders with a trading experience of 2 *years & below* and *above 10 years* (p = 0.011, 95% C.I. = [.3196, 2.3975]), *3-5 years* and *5-10 years* (p = 0.019, 95% C.I. = [-12.2563, -.2036]) and *5-10 years* and *above 10 years* (p = 0.003, 95% C.I. = [.6733, 3.2690]). There is no significant difference in the influence of emotional bias between traders having trading experience of 2 *years & below* and *3-5 years, 2 years & below and 5-10 years,* and *3-5 years & above 10 years*. From the above results, it can be evident that the influence of emotional bias is minimum for traders having more trading experience.

6.10.5 Trading Capital-wise Analysis of the Influence of Emotional Bias on the Trading Decision of Equity Derivative Traders.

The amount of trading capital may affect the level of impact of emotional bias on the trading decisions of equity derivative traders. Hence it is important to examine whether there is any difference in the influence of emotional bias between traders of different trading capital. On the basis of trading capital, the respondents are classified into five groups such as *Below 1 lakh (group1)*, *1-5 lakhs (group2)*, *5-10 lakhs(group3), 10-20 lakhs (group4)* and *Above 20 lakhs (group5)*. To examine the relationship between trading capital and the influence of emotional bias, descriptive analysis has been done which shows the mean score of influence of emotional bias on traders with different amounts of trading capital. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The result of the descriptive analysis is summarized in Table 6.49.

Table 6.49

Descriptive statistics of trading capital-wise analysis of influence of Emotional bias

Test Variable	Trading capital	N	Mean ± SD
Influence of Emotional bias	Below 1 lakh	74	10.64 ± 2.80
	1-5 lakhs	136	11.07 ± 2.47
	5-10 lakhs	29	10.14 ± 2.00
	10-20 lakhs	24	10.04 ± 2.56
	Above 20 lakhs	37	11.08 ± 2.50
	Total	300	10.79 ± 2.54

Source: Primary data

From Table 6.49 it is found that there is a very small difference in the mean score of influence of emotional bias among traders with different amounts of trading capital. The ANOVA is applied to test the significance of differences in the mean influence of emotional bias among traders with different amounts of trading capital and the result is summarised in Table 6.50. The test hypothesis is given below:

H_0: *There is no significant difference in the influence of emotional bias among traders according to trading capital*

H_1: *There is significant difference in the influence of emotional bias among traders according to trading capital*

Table 6.50

Result of One-way ANOVA: Trading capital-wise analysis of the influence of Emotional bias

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	41.610	4	10.402	1.631	.166
Within Groups	1881.577	295	6.378		
Total	1923.187	299			

Source: Primary data

The one-way ANOVA result (F (4,295) = [1.631], p = .166) reveals that there is statistically no significant difference in the influence of emotional bias among the traders of different trading capital. Hence, it can be inferred that the trading capital do not affect the influence of emotional bias.

6.11 Influence of Market Impact Bias on the Trading Decisions of Equity Derivative Traders

DeBondt & Richard H. Thaler, (1995) state that financial markets can be affected by investors' behaviours in the way of behavioral finance. *Waweru et al., (2008)* identified the factors of the market that have an impact on investors' decision making: Price changes, market information, past trends of stocks, customer preference, over-reaction to price changes, and fundamentals of underlying stocks. Normally, changes in market information, fundamentals of the underlying stock and stock price can cause over/under-reaction to the price change. These changes are empirically proven to have a high influence on the decision-making behaviour of investors. Researchers convince that over-reaction *(DeBondt & Thaler, 1985)* or under-reaction *(Lai et al., 2001)* to news may result in different trading strategies by investors and hence influence their investment decisions. According to *(Waweru et al., 2008),* market information has a significant influence on investors' decisions, and as a result, investors tend to focus on well-known stocks and other newsworthy events that are based on stock market information. Moreover, *Barber & Odean, (2000)* emphasize that investors are impacted by events in the stock market which grab their attention, even when they do not know if these events can result in good future investment performance. These investors totally rely on the information quality of the market or stocks that they have when making decisions of investment.

Change in the stock price in this context can be considered an attention-grabbing occurrence in the market by investors. Many investors tend to focus on popular stocks or hot stocks in the market *(Waweru et al., 2008)*. *Odean, (1999)* proposes that investors usually choose the stocks that attract their attention. Besides, the stock selection also depends on the investors' preferences. Momentum investors may prefer stocks that have good recent performance while rational investors tend to sell the past losers and this may help them to postpone taxes. In contrast, behavioral investors prefer selling their past winners to postpone the regret related to a loss that they can meet for their stock trading decisions *(Shefrin & Statman, 1985)*.

In general, market factors are not included in behavioral factors because they are external factors influencing investors' behaviors. However, the market factors influence the behavioral investors (as mentioned above) and rational investors in different ways, so that it is not adequate if market factors are not listed when considering the behavioral factors impacting the investment decisions. Together with the research of *Waweru et al. (2008)*, this research treats the market factors fairly as behavioral factors influencing the trading decisions of equity derivative traders in Kerala. Based on the above literature this study selected two market factors such as *market sentiments* and *past trends of stocks* to examine the influence of market-related factors on the trading decisions of equity derivative traders The study findings were summarized using descriptive statistics and are tabulated in Table 6.51.

Table 6.51

Influence of market impact on the trading decisions of equity derivative traders

(n=300)

Statement / Variable	Responses#	Frequency	%	Mean ± SD	t*	p-value
I consider ***market sentiments*** before making trading decision in the F&O market	SD	12	4.0	3.94 ± 1.06	15.38	<.01***
	D	9	3.0			
	N	78	26.0			
	A	87	29.0			
	SA	114	38.0			
I consider ***past trends of stocks*** under consideration for my trading decision in the F&O market	SD	13	4.3	3.84 ± 1.11	13.08	<.01***
	D	21	7.0			
	N	71	23.7			
	A	92	30.7			
	SA	103	34.3			

Source: Primary data #*(SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree)*
**One-sample t-test, Average=3* ****Difference is significant at 1% level*

Table 6.51, shows the influence of market-related factors on the trading decision of equity derivative traders in Kerala, the variable wise analysis is explained below:

The above table indicates that the mean score obtained for measuring the influence of *market sentiments* is 3.94, which is significantly above the mean score of the response scale i.e., 3, and the one-sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 15.383, p = <.01. Hence it can be concluded that *the influence of market sentiment* strongly exists among equity derivative traders in Kerala.

Table 6.51 also shows that the mean score obtained for measuring the influence of *past trends of stocks* is 3.84, which is significantly above the mean score of the response scale i.e. 3, and the one-sample t-test shows that the mean score is statistically significantly higher than the population average score, t(299) = 13.08, p = <.01. Hence it can be concluded that *the influence of past trends of stocks* strongly exists among equity derivative traders in Kerala. The combined influence of market factors on the trading decision of equity derivative traders is discussed below.

6.11.1 Overall Influence of Market Impact on the trading decision of equity derivative traders is measured by combining the above two variables and classifying the total score (2 x 5=10) into three classes. Where Low = 2 to 5, Medium = 6 to 7, and High = 8 to 10. The data is analyzed using one-sample t-test with a test value of '2', which is the mean of the three-point response scale. The test hypothesis is given below:

H_0: $\mu = 2$ (The influence of market impact on trading decisions is average)

H_1: $\mu \neq 2$ (The influence of market impact on trading decisions not average)

The test result is presented in the Table 6.52.

Table 6.52

Combined Influence of Market impact on the trading decisions of equity derivative traders

Variable		Frequency	Percent	Mean ± SD	t*	p-value
Influence of market impact	Low	29	9.7	2.50 ± 0.667	12.985	<.01***
	Medium	92	30.7			
	High	179	59.6			
	Total	300	100.0			

Source: Primary data *** *Difference is significant at 1% level*
* *One-sample t-test, Average=2*

Table 6.52 indicates that the mean score obtained for measuring the influence of market-related factors is 2.50, which is significantly higher than the mean score of the response scale i.e., 2, the one-sample t-test shows that mean score is statistically significantly higher than the population average score, t (299) = 12.985, p = <.01. Hence, it can be concluded that influence of market-related factors strongly exists among equity derivative traders in Kerala.

6.12 Comparison of the Influence of Market Impact on Different Demographic Groups of Equity Derivative Traders

The influence of market impact on the trading decisions of equity derivative traders is compared with respect to five demographic variables such as *gender, age, educational qualifications, trading experience and trading capital.* The results are discussed below.

6.12.1 Gender-wise Analysis of the Influence of Market Impact Bias on the Trading Decision of Equity Derivative Traders.

The influence of the market impact on male and female equity derivative traders is compared using an independent sample t-test and the result is presented in Table 6.53. The test hypothesis is given below:

H_0: $\mu_1 = \mu_2$ (There is no significant difference in the influence of market impact between male and female equity derivative traders)

H_1: $\mu_1 \neq \mu_2$ (There is significant difference in the influence of market impact between male and female equity derivative traders)

Table 6.53

Gender-wise analysis of influence of Market impact on trading decision of equity derivative traders

Test variable	**Group**	**N**	**Mean ± SD**	***t***	***p-value***
Influence of Market impact	Male	264	7.69 ± 1.83	-2.339	.020
	Female	36	8.44 ± 1.78		

Source: Primary data *** *Difference is significant at 5% level*

From Table 6.53, it can be observed that the mean score of influence of market impact on trading decisions of male and female traders are 7.69 and 8.44 respectively and indicates that influence of market impact is higher on female traders than male traders. Since the *p*-value (.020) is less than 0.05, it can be inferred that there is significant difference in the influence of market impact among male and female equity derivative traders in Kerala.

6.12.2 Age-wise Analysis of the Influence of Market Impact on the Trading Decision of Equity Derivative Traders.

Traders with different age categories may have differences in the influence of market impact on their trading decisions. On the basis of age, the sample respondents are classified into four groups such as: *Up to 30 (1)*, *31-40 (2)*, *41-50 (3)* and *51& above (4)*. Hence the data has been classified age-wise and descriptive analysis has been done to know the mean score of traders in different age categories as shown in Table 6.54.

Table 6.54

Age-wise analysis of influence of Market impact on the trading decision of equity derivative traders

Test Variable	Age Group (in years)	N	Mean ± SD
Influence of market impact	Up to 30	85	7.73 ± 2.06
	31 – 40	135	7.75 ± 1.86
	41 – 50	55	7.93 ± 1.45
	51 & above	25	7.76 ± 1.81
	Total	300	7.77 ± 1.84

Source: Primary data

According to the aforementioned table, there is a very small difference in the mean score of the influence of market impact among traders of different age groups. The age group *41-50 (Group 3)* have the highest mean score (7.93) and the age group *Up to 30 (Group 1)* have the lowest mean score (7.73) of influence of the market impact. The ANOVA is applied to test the significance of differences among the mean of different age groups and the result is summarised in Table 6.55 below. The test hypothesis is given below.

> *H_0: There is no significant difference in the influence of market impact among equity derivative traders of different age groups*

> *H_1: There is significant difference in the influence of market impact among equity derivative traders of different age groups*

Table 6.55

Result of One-way ANOVA: Age-wise analysis of influence of market impact

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	1.554	3	0.518	0.152	.929
Within Groups	1010.483	296	3.414		
Total	1012.037	299			

Source: Primary data

The one-way ANOVA reveals that statistically there is no significant difference in the mean score of influence of market impact between traders of different age groups (F (3, 296) = [0.152], p = .929). Hence, it can be inferred that there is no significant difference in the influence of market impact between different age groups of equity derivative traders in Kerala.

6.12.3 Education Qualification-wise Analysis of the Influence of Market Impact on the Trading Decisions of Equity Derivative Traders.

The sample used in this study includes equity derivative traders with different educational qualifications. Hence it is important to examine whether there is any difference in the influence of market impact among traders with different educational qualifications. On the basis of education level, the sample respondents are classified into five groups such as SSLC, Higher Secondary, Graduate, Post Graduate, and Professional. The level of education of traders may affect the level of influence of market impact on the trading decision. To test the same, descriptive analysis has been done which shows the mean score of influence of market impact among traders with different educational qualification. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is applied. The result of the descriptive analysis is summarized in Table 6.56.

Table 6.56

Descriptive statistics of Education qualification -wise analysis of Influence of Market impact

Test Variable	Education Group	N	Mean ± SD
Influence of Market impact	SSLC	13	7.00 ± 2.24
	Higher Secondary	10	7.30 ± 2.26
	Graduate	130	7.77 ± 1.99
	Post Graduate	92	8.25 ± 1.33
	Professional	55	7.27 ± 1.87
	Total	300	7.77 ± 1.84

Source: Primary data

From the above table, it is found that there is a significant difference in the mean score of influence of the market impact between traders with different educational qualifications. The traders with SSLC have the lowest mean score (7.00) and traders with Post graduation have the highest mean score (8.25) of influence of the market impact. The ANOVA is applied to test the significance of differences in the impact of the market variables among traders of different educational qualifications and the result is summarised in Table 6.57. The test hypothesis is given below.

H_0: There is no significant difference in the influence of market impact among equity derivative traders of different educational qualifications

H_1: There is significant difference in the influence of market impact among equity derivative traders of different educational qualifications

Table 6.57

Result of One-way ANOVA: Education-wise analysis of Influence of the Market impact

	Sum of Squares	**df**	**Mean Square**	**F**	***p*-value**
Between Groups	44.701	4	11.175		
Within Groups	967.336	295	3.279	3.408	.010
Total	1012.037	299			

Source: Primary data *[***]Difference is significant at 5% level*

The one-way ANOVA reveals that there is a statistically significant difference in the mean score of influence of market impact among traders of different educational qualification groups (F (4, 295) = [3.408], p = .010). To know the exact significant difference between different education groups Tukey's HSD test has been used and the result is shown in Table 6.58.

Table 6.58

Education qualification wise Post Hoc (HSD) analysis for multiple comparisons of influence of market impact

Education Level (I)	Education Level (J)	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
					Lower Bound	Upper Bound
SSLC	Higher Secondary	-.30000	.76168	.694	-1.7990	1.1990
	Graduate	-.76923	.52675	.145	-1.8059	.2674
	Post Graduate	-1.25000*	.53655	.020	-2.3059	-.1941
	Professional	-.27273	.55844	.626	-1.3718	.8263
Higher Secondary	SSLC	.30000	.76168	.694	-1.1990	1.7990
	Graduate	-.46923	.59425	.430	-1.6387	.7003
	Post Graduate	-.95000	.60295	.116	-2.1366	.2366
	Professional	.02727	.62252	.965	-1.1979	1.2524
Graduate	SSLC	.76923	.52675	.145	-.2674	1.8059
	Higher Secondary	.46923	.59425	.430	-.7003	1.6387
	Post Graduate	-.48077	.24671	.052	-.9663	.0048
	Professional	.49650	.29128	.089	-.0767	1.0698
Post Graduate	SSLC	1.25000*	.53655	.020	.1941	2.3059
	Higher Secondary	.95000	.60295	.116	-.2366	2.1366
	Graduate	.48077	.24671	.052	-.0048	.9663
	Professional	.97727*	.30865	.002	.3698	1.5847
Professional	SSLC	.27273	.55844	.626	-.8263	1.3718
	Higher Secondary	-.02727	.62252	.965	-1.2524	1.1979
	Graduate	-.49650	.29128	.089	-1.0698	.0767
	Post Graduate	-.97727*	.30865	.002	-1.5847	-.3698

Source: Primary data * *The mean difference is significant at the 0.05 level*

Table 6.58 shows the result of Tukey HSD test for multiple comparisons and it is found that the mean value of influence of market impact is significantly different between traders possessing educational qualification of *SSLC and Post graduation* (p = .020, 95% C.I. = [-2.3059, -.1941]), and *Post graduate and Professional* (p = .002, 95% C.I. = [.3698, 1.5847]). There is no significant difference in mean score of influence of market impact between other groups of traders.

6.12.4 Trading Experience-wise Analysis of the Influence of Market Impact on the Trading Decision of Equity Derivative Traders.

The sample consists of equity derivative traders with varying years of trading experience. Hence it is relevant to examine whether there is any difference in the influence of market impact among traders having different years of trading experience. On the basis of years of trading experience, the sample respondents are classified into four groups such as *2 years & below (1)*, *3-5 years (2)*, *5-10 years (3)* and *above 10 years (4).* The number of years of trading experience of equity derivative traders may affect the level of influence of market impact. To test the same, the descriptive analysis has been done which shows the mean score of influence of market impact on traders with different years of trading experience. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The result of descriptive analysis is summarized in Table 6.59.

Table 6.59

Descriptive statistics of trading experience -wise analysis of Influence of Market impact

Test Variable	Trading experience	N	Mean ± SD
Influence of prospect variables	2 years and below	161	7.66 ± 1.97
	3-5 years	81	7.72 ± 1.64
	5-10 years	32	8.13 ± 1.75
	Above 10 years	26	8.23 ± 1.75
	Total	300	7.78 ± 1.84

Source: Primary data

From Table 6.59, it is found that there is a very small difference in the mean score of influence of market impact among traders with different years of trading experience. The ANOVA is applied to test the significance of differences in the mean influence of market impact among traders with different years of experience and the result is summarised in Table 6.60. The test hypothesis is given below:

H_0: There is no significant difference in the influence of market impact bias among traders according to trading experience

H_1: There is significant difference in the influence of market impact bias among traders according to trading experience

Table 6.60

Result of One-way ANOVA: Trading experience - wise analysis of Influence of Market impact on the trading decision of equity derivative traders

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	11.564	3	3.855		
Within Groups	1000.473	296	3.380	1.140	.333
Total	1012.037	299			

Source: Primary data

The one-way ANOVA result (F (3,296) = [1.140], p = .333) reveals that there is no significant difference in the mean score of influence of market impact among the four groups of derivative traders with different years of trading experiences. Hence, it can be inferred that the trading experience has no effect on the market impact bias of equity derivative trades.

6.12.5 Trading Capital-wise Analysis of the Influence of Market Impact on the Trading Decision of Equity Derivative Traders.

The amount of trading capital may affect the level of influence of market impact on the trading decisions of equity derivative traders. Hence it is important to examine whether there is any difference in the influence of market impact between traders of different trading capital. On the basis of trading capital, the respondents are classified into five groups such as *Below 1 lakh (group1)*, *1-5 lakhs (group2)*, *5-10 lakhs(group3), 10-20 lakhs (group4)* and *Above 20 lakhs (group5)*. To examine the relationship between trading capital and the influence of market impact, descriptive analysis has been done which shows the mean score of influence of market impact on traders with different amounts of trading capital. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The result of the descriptive analysis is summarized in Table 6.61.

Table 6.61

Descriptive statistics of trading capital-wise analysis of influence of Market impact

Test Variable	Trading capital	N	Mean ± SD
Influence of market impact	Below 1 lakh	74	7.55 ± 1.90
	1-5 lakhs	136	7.91 ± 1.86
	5-10 lakhs	29	7.24 ± 1.86
	10-20 lakhs	24	7.67 ± 1.69
	Above 20 lakhs	37	8.22 ± 1.67
	Total	300	7.78 ± 1.84

Source: Primary data

From Table 6.61 it is found that there is a very small difference in the mean score of influence of market impact among traders with different amounts of trading capital. The ANOVA is applied to test the significance of differences in the mean influence of market impact among traders with different amounts of trading capital and the result is summarised in Table 6.62. The test hypothesis given below:

H_0: There is no significant difference in the influence of market impact bias among traders according to trading capital

H_1: There is significant difference in the influence of market impact bias among traders according to trading capital

Table 6.62

Result of One-way ANOVA: Trading capital - wise analysis of the influence of Market impact on the trading decision of equity derivative traders

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	21.898	4	5.474	1.631	.166
Within Groups	990.139	295	3.356		
Total	1012.037	299			

Source: Primary data

The one-way ANOVA result ($F(4,295) = [1.631]$, $p = .166$) reveals that there is no significant difference in the influence of market impact bias among the four groups of derivative traders using different trading capital. Hence, it can be inferred that the trading capital has no effect on the level of market impact bias.

6.13 Influence of Behavioural Biases on the Trading Decisions of Equity Derivative Traders in Kerala.

The influence of behavioural bias on the trading decisions of equity derivative traders is measured by combining all 15 variables used for examining the behavioural bias and classifying the total score (15 x 5=75) into three classes. Where Low = 15 to 38, Medium = 39 to 51, and High = 52 to 75. Based on the influence level of behavioural biases, equity derivative traders are classified into three categories, category-1 represents traders with a low influence of behavioural bias, category-2 represents traders with a medium influence of behavioural bias, and category-3 represents traders with a high-level influence of behavioural bias. The data is analyzed using one sample t-test with a test value of '2', the mean of the three-point response scale. The test hypothesis is given below:

H_0: $\mu = 2$ (The influence of behavioural bias is average)

H_1: $\mu \neq 2$ (The influence of behavioural bias is not average)

The test result is presented in Table 6.63.

Table 6.63

Influence of Behavioural biases on the trading decisions of equity derivative traders

Variable	Level of Influence	Category	Frequency	Percent	Mean ± SD	t^*	*p*-value
Influence of behavioural factors	Low	Category 1	13	4.3	2.61 ± 0.571	18.393	<.01***
	Medium	Category 2	92	30.7			
	High	Category 3	195	65.0			
	Total		300	100.0			

Source: Primary data ***Difference is significant at 1% level

*One-sample t-test, Test value=2

Table 6.63 indicates that the mean score obtained for measuring the influence of behavioural factors is 2.61, which is higher than the mean score of the response scale i.e. 2, the one sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 18.393, p = <.01. Hence it can be concluded that influence of behavioural factors strongly exists among equity derivative traders in Kerala.

6.14 Comparison of Influence of Behavioural Biases among Different Demographic Groups of Traders

The influence of behavioural factors on the trading decisions of derivative traders is examined by combining all five groups of behavioural biases, viz; heuristics variables, prospect variables, herding effect, emotional bias and market impact factors. The influence of behavioural factors is compared with respect to five demographic variables such as *gender, age, education level, trading experience and trading capital.* Since the distribution was found normal parametric tests (ANOVA, t-test, etc) are used to compare the level of influence of behavioural biases among traders of different demographic groups. The analysis and results are presented below.

6.14.1 Gender-wise Analysis of the Influence of Behavioural Biases on the Trading Decisions of Equity Derivative Traders.

The sample selected for this study includes male and female equity derivative traders, hence it is relevant to examine whether there are any differences in the influence of behavioural factors between male and female derivative traders. The male and female traders may have differences in the influence of behavioural biases. To test the same, descriptive analysis has been done which shows the mean score of male and female traders with regards to the influence of behavioural factors. To find out the statistical significance of the difference in mean score independent sample t-testis also applied. The test hypothesis is given below and the result is summarised in Table 6.64.

H_0: *$\mu 1 = \mu 2$ (There is no significant difference in the influence of behavioural factors among male and female traders)*

H_1: *$\mu 1 \neq \mu 2$ (There is significant difference in the influence of behavioural factors among male and female traders)*

Table 6.64

Gender-wise analysis of Influence of behavioural factors

Test variable	Group	N	Mean ± SD	t	*p*-value	Remarks
Influence of Behavioural factors	Male	264	53.51 ± 8.14	-1.595	.112	Equal variances assumed
	Female	36	55.83 ± 8.47			

Source: Primary data

Levene's Test for Equality of Variances gives a *p*-value of .638, therefore equal variance is accepted and results are interpreted accordingly. From Table 6.64, it can be observed that the mean score of influence of behavioural factors on trading decision of male and female traders are 53.51 and 55.83 respectively and indicates very little difference between the mean values. Since the *p*-value (.112) is more than 0.05, it can be inferred that there is no significant difference in the influence of behavioural factors between male and female equity derivative traders in Kerala.

6.14.2 Age-wise Analysis of the Influence of Behavioural Factors on the Trading Decision of Equity Derivative Traders

Traders with different age categories may have differences in the influence of behavioural factors on their trading decisions. On the basis of age, the sample respondents are classified into four groups such as: *Up to 30 (1)*, *31-40 (2)*, *41-50 (3)* and *51& above (4)*. Hence the data has been classified age-wise and descriptive analysis has been done to know the mean score of investors in different age categories as shown in Table 6.65.

Table 6.65

Age-wise analysis of Influence of Behavioural factors on the trading decision of equity derivative traders

Test Variable	Age Group (in years)	N	Mean ± SD
Influence of behavioural factors	Up to 30	85	54.00 ± 7.86
	31 – 40	135	54.23 ± 8.93
	41 – 50	55	53.36 ± 7.41
	51 & above	25	49.52 ± 5.45
	Total	300	53.79 ± 8.20

Source: Primary data

From the above table, it is found that there is a difference in the mean score of influence of behavioural factors for traders in different age categories. The age group 3*1-40 (group 2)* have the highest mean score of influence of behavioural factors and the age group *51& above (group 4)* have a lowest mean score of influence of behavioural factors about the derivative market. The ANOVA is applied to test the significance of difference among the mean of different age groups and the result is summarised in Table 6.66. The test hypothesis is given below:

H_0: There is no significant difference in the influence of behavioural factors among traders of different age groups

H_1: There is significant difference in the influence of behavioural factors among traders of different age groups

Table 6.66

Result of One-way ANOVA: Age-wise analysis of influence of behavioural factors

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	564.738	3	188.246	2.850	.038**
Within Groups	19550.449	296	66.049		
Total	20115.187	299			

Source: Primary data *** The mean difference is significant at the 5% level.*

The one-way ANOVA reveals that there is a statistically significant difference in the mean score influence of behavioural factors between at least two age groups (F (3, 296) = [2.850], p = .038). Since data met the assumption of homogeneity of variances, the LSD test has been used to check the exact significant difference between different age groups and the result is shown in Table 6.67.

Table 6.67

Age group wise Post Hoc (LSD) analysis for multiple comparison of influence of Behavioural factors

Age of respondents (I)	Age of respondents (J)	Mean Difference (I-J)	Std. Error	*p*-value	95% Confidence Interval	
					Lower Bound	Upper Bound
Up to 30 *(1)*	31 - 40	-.62963	1.12530	.576	-2.8442	1.5850
	41 - 50	.63636	1.40639	.651	-2.1314	3.4042
	51 & above	4.48000*	1.84905	.016*	.8410	8.1190
31 – 40 *(2)*	Up to 30	.62963	1.12530	.576	-1.5850	2.8442
	41 - 50	1.26599	1.30005	.331	-1.2925	3.8245
	51 & above	5.10963*	1.76952	.004*	1.6272	8.5921
41 – 50 *(3)*	Up to 30	-.63636	1.40639	.651	-3.4042	2.1314
	31 - 40	-1.26599	1.30005	.331	-3.8245	1.2925
	51 & above	3.84364	1.96032	.051	-.0143	7.7016
51 & Above *(4)*	Up to 30	-4.48000*	1.84905	.016*	-8.1190	-.8410
	31 - 40	-5.10963*	1.76952	.004*	-8.5921	-1.6272
	41 - 50	-3.84364	1.96032	.051	-7.7016	.0143

Source: Primary data   ** The mean difference is significant at the 5% level*

Table 6.67 shows the result of the LSD test for multiple comparisons and it is found that the mean value of the influence of behavioural factor is significantly different between age groups *1 and 4* (p = .016, 95% C.I. = [0.8410, 8.1190]), and *2 and 4* (p = .004, 95% C.I. = [1.6272, 8.5921]). There is no significant difference in mean scores of behavioural bias between *1 and 2*, *1 and 3*, *2 and 3,* and *3 and 4 age groups*.

6.14.3 Education Qualification-wise Analysis of the Influence of Behavioural Factors on the Trading Decisions of Equity Derivative Traders.

The sample selected for this study includes equity derivative traders with different educational qualifications. Hence it is important to examine whether there is any difference in the influence of behavioural factors among different educational qualification groups. On the basis of education level, the sample respondents are classified into five groups such as SSLC, Higher Secondary, Graduate, Post Graduate, and Professional. The level of education of traders may affect the level of influence of behavioural factors on the trading decision. To test the same, descriptive analysis has been done which shows the mean score of influence of behavioural factors among traders with different educational qualification. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is applied. The result of the descriptive analysis is summarized in Table 6.68.

Table 6.68

Descriptive statistics of Education qualification-wise analysis of Influence of Behavioural factors

Test Variable	Education Group	N	Mean ± SD
Influence of behavioural factors	SSLC	13	50.23 ± 9.37
	Higher Secondary	10	51.80 ± 6.63
	Graduate	130	53.96 ± 8.37
	Post Graduate	92	55.39 ± 7.29
	Professional	55	51.93 ± 8.78
	Total	300	53.79 ± 8.20

Source: Primary data

From the above table, it is found that there is a difference in the mean score of influence of behavioural factors among traders with different educational qualifications. The traders with post-graduation are having the highest mean score (55.39) of influence of behavioural factors and traders with SSLC is having lowest mean score (50.23) of influence of behavioural factors. The ANOVA is applied to test the significance of differences in the influence of behavioural factors among traders of different educational qualification groups and the result is summarised in Table 6.69. The test hypothesis is given below:

H_0: There is no significant difference in the influence of behavioural factors among traders with different educational qualifications

H_1: There is significant difference in the influence of behavioural factors among traders with different educational qualifications

Table 6.69

Result of One-way ANOVA: Education-wise analysis of Influence of behavioural factors on the trading decision of equity derivative traders

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	634.849	4	158.712		
Within Groups	19480.338	295	66.035	2.403	.049**
Total	20115.187	299			

Source: Primary data ***The mean difference is significant at the 5% level*

The one-way ANOVA reveals that there is a statistically significant difference in the mean score of influence of behavioural factors between traders of at least two educational qualification groups (F (4, 295) = [2.403], p = .049). To know the exact significant difference in the influence of behavioural factors between traders of different groups of educational qualifications LSD test has been used and the result is shown in Table 6.70.

Table 6.70

Education qualification wise Post Hoc (LSD) analysis for multiple comparison of Influence of Behavioural factors

Education Level (I)	Education Level (J)	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
					Lower Bound	Upper Bound
SSLC	Higher Secondary	-1.56923	3.41806	.647	-8.2961	5.1576
	Graduate	-3.73077	2.36381	.116	-8.3828	.9213
	Post Graduate	-5.16054*	2.40778	.033*	-9.8991	-.4219
	Professional	-1.69650	2.50604	.499	-6.6285	3.2355
Higher Secondary	SSLC	1.56923	3.41806	.647	-5.1576	8.2961
	Graduate	-2.16154	2.66673	.418	-7.4098	3.0867
	Post Graduate	-3.59130	2.70579	.185	-8.9164	1.7338
	Professional	-.12727	2.79359	.964	-5.6252	5.3706
Graduate	SSLC	3.73077	2.36381	.116	-.9213	8.3828
	Higher Secondary	2.16154	2.66673	.418	-3.0867	7.4098
	Post Graduate	-1.42977	1.10713	.198	-3.6086	.7491
	Professional	2.03427	1.30713	.121	-.5382	4.6068
Post Graduate	SSLC	5.16054*	2.40778	.033*	.4219	9.8991
	Higher Secondary	3.59130	2.70579	.185	-1.7338	8.9164
	Graduate	1.42977	1.10713	.198	-.7491	3.6086
	Professional	3.46403*	1.38507	.013*	.7382	6.1899
Professional	SSLC	1.69650	2.50604	.499	-3.2355	6.6285
	Higher Secondary	.12727	2.79359	.964	-5.3706	5.6252
	Graduate	-2.03427	1.30713	.121	-4.6068	.5382
	Post Graduate	-3.46403*	1.38507	.013*	-6.1899	-.7382

Source: Primary data ** The mean difference is significant at the 5% level*

Table 6.70 shows the result of the LSD test for multiple comparisons and it is found that the mean value of the influence of behavioural factors is significantly different between traders possessing educational qualification of *SSLC and Post graduation* (p = .033, 95% C.I. = [-9.8991, -.4219]), and *Post graduation and Professional degree* (p = .013, 95% C.I. = [.7382, 6.1899]). There is no significant difference in the influence of behavioural factors between traders of SSLC and higher secondary, SSLC and graduates, SSLC and professional degree, higher secondary and graduates, higher secondary and postgraduates, higher secondary and professionals, graduates and post graduates, graduates and professionals.

6.14.4 Trading Experience-wise Analysis of the Influence of Behavioural Factors on the Trading Decision of Equity Derivative Traders.

The sample includes equity derivative traders with varying years of trading experience. Hence it is relevant to examine whether there is any difference in the influence of behavioural factors among different trading experience groups. On the basis of years of trading experience, the sample respondents are classified into four groups such as *2 years & below (1)*, *3-5 years (2)*, *5-10 years (3)* and *above 10 years (4)*. The number of years of trading experience of equity derivative traders may affect the level of influence of behavioural bias. To test the same, the descriptive analysis has been done which shows the mean score of influence of behavioural factors on traders with different years of trading experience. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The result of descriptive analysis is summarized in Table 6.71.

Table 6.71

Descriptive statistics of trading experience -wise analysis of Influence of Behavioural factors

Test Variable	Trading experience	N	Mean ± SD
Influence of behavioural factors	2 years and below	161	54.21 ± 8.13
	3-5 years	81	53.41 ± 8.19
	5-10 years	32	54.31 ± 7.68
	Above 10 years	26	51.81 ± 9.38
	Total	300	53.79 ± 8.20

Source: Primary data

From Table 6.71, it is found that there is a very small difference in the mean score of influence of behavioural factors among traders with different years of trading experience. The ANOVA is applied to test the significance of differences in the mean influence of behavioural factors among traders with different years of experience and the result is summarised in Table 6.72. The test hypothesis is given below:

H_0: There is no significant difference in the influence of behavioural factors among traders with different trading experience

H_1: There is significant difference in the influence of behavioural factors among traders with different trading experience

Table 6.72

Result of One-way ANOVA: Trading experience - wise analysis of Influence of behavioural factors on the trading decision of equity derivative traders

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	150.482	3	50.161		
Within Groups	19964.705	296	67.448	.744	.527
Total	20115.187	299			

Source: Primary data

The one-way ANOVA result (F (3,296) = [.744], p = .527) reveals that there is no significant difference in the influence of behavioural factors among the derivative traders of different trading experience. Hence, it can be inferred that the trading experience has no effect on the level of influence of behavioural bias.

6.14.5 Trading Capital-wise Analysis of the Influence of Behavioural Factors on the Trading Decision of Equity Derivative Traders.

The amount of trading capital may affect the level of influence of behavioural factors on the trading decisions of derivative traders. Hence it is important to examine whether there is any difference in the influence of behavioural factors between traders of different trading capital. On the basis of trading capital, the sample respondents are classified into five groups such as *Below 1 lakh (group1)*, *1-5 lakhs (group2)*, *5-10 lakhs(group3), 10-20 lakhs (group4)* and *Above 20 lakhs (group5)*. To examine the relationship between trading capital and the influence of behavioural factors, descriptive analysis has been done which shows the mean score of influence of behavioural factors on traders with different amounts of trading capital. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The result of the descriptive analysis is summarized in Table 6.73.

Table 6.73

Descriptive statistics of trading capital-wise analysis of Influence of Behavioural factors

Test Variable	Trading capital	N	Mean ± SD
Influence of behavioural factors	Below 1 lakh	74	54.04 ± 8.07
	1-5 lakhs	136	54.60 ± 9.09
	5-10 lakhs	29	51.48 ± 8.83
	10-20 lakhs	24	52.04 ± 6.75
	Above 20 lakhs	37	53.86 ± 8.06
	Total	**300**	**53.86 ± 8.54**

Source: Primary data

From Table 6.73, it is found that there is a minimal difference in the mean score of influence of behavioural factors among traders with different amounts of trading capital. The ANOVA is applied to test the significance of differences in the mean influence of behavioural factors among traders with different amounts of trading capital. The result is summarised in Table 6.74. The test hypothesis is given below:

H_0: There is no significant difference in the influence of behavioural factors among traders of different trading capital

H_1: There is significant difference in the influence of behavioural factors among traders of different trading capital

Table 6.74

Result of One-way ANOVA: Trading capital-wise analysis of the influence of Behavioural factors on the trading decision of equity derivative trader.

	Sum of Squares	Df	Mean Square	F	*p*-value
Between Groups	319.237	4	79.809	1.095	.359
Within Groups	21494.160	295	72.862		
Total	21813.397	299			

Source: Primary data

The one-way ANOVA result (F (4,295) = [1.095], p = .359) reveals that there is no significant difference in the behavioural bias among derivative traders of different trading capital. Hence, it can be inferred that the trading capital has no effect on the influence of behavioural bias.

6.14.6 The Knowledge-wise Analysis of the Influence of Behavioural Biases on the Trading Decisions of Equity Derivative Traders.

The equity derivative traders included in this study are grouped into three categories based on the score of knowledge level. Category 1 represents traders with very little knowledge about derivative market. Category 2 represents traders with moderate knowledge about derivative market, and Category 3 represents traders with high level of knowledge about derivative market. It is interesting to examine whether there is any difference in the influence of behavioural factors among traders with different categories of knowledge level. To test the same, descriptive analysis has been done which shows the mean score of influence of behavioural factors among traders with different categories of knowledge level. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is applied. The result of the descriptive analysis is summarized in Table 6.75.

Table 6.75

Knowledge-wise analysis of the influence of Behavioural biases

Test Variable	Category of Traders based on Knowledge Level	N	Mean ± SD
Influence of behavioural factors	Category 1 (Low)	52	41.08 ± 10.22
	Category 2 (Medium)	101	37.00 ± 7.21
	Category 3 (High)	147	33.97 ± 7.67
	Total	300	36.22 ± 8.41

Source: Primary data

From the above table, it is found that there is a difference in the mean score of influence of behavioural factors among traders with different levels of Knowledge. The traders with a high level of Knowledge (Category 3) are having the lowest mean score (33.97) of influence of behavioural bias and traders with Low level of knowledge (Category 1) have the highest mean score (41.08) of influence of behavioural biases. The ANOVA is applied to test the significance of differences in the influence of behavioural biases among traders of different category of knowledge level. The result is summarised in Table 6.76. The test hypothesis is given below:

H_0: There is no significant difference in the influence of behavioural factors among traders with different knowledge levels

H_1: There is significant difference in the influence of behavioural factors among traders of different knowledge levels

Table 6.76

Result of One-way ANOVA: Knowledge-wise analysis of Influence of Behavioural biases on the trading decisions of equity derivative traders

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	2030.453	2	1015.227		
Within Groups	19111.583	297	64.349	15.77	<.01***
Total	21142.037	299			

Source: Primary data *** *The difference is significant at the 1% level*

The one-way ANOVA reveals that there is a statistically significant difference in the mean score of influence of behavioural biases among traders of at least two categories of knowledge level (F (2, 297) = [15.77], p = <.01). To know the exact significant difference in the influence of behavioural factors among traders of different categories of knowledge level Tukey's HSD test has been used and the result is shown in Table 6.77.

Table 6.77

Knowledge-wise Post Hoc (HSD) analysis for multiple comparisons of Influence of Behavioural factors

Knowledge Level Category (I)	Knowledge Level Category (J)	Mean Difference (I-J)	Std. Error	*p*-value	95% Confidence Interval	
					Lower Bound	Upper Bound
Category 1 (Low)	Medium	4.07692*	1.36916	.009	.8518	7.3020
	High	7.10413*	1.29430	.000	4.0554	10.1529
Category 2 (Medium)	Low	-4.07693*	1.36916	.009	-7.3020	-.8518
	High	3.02721*	1.03676	.011	.5851	5.4693
Category 3 (High)	Low	-7.10413*	1.29430	.000	-10.1529	-4.0554
	Medium	-3.02721*	1.03676	.011	-5.4693	-.5851

Source: Primary data * *The mean difference is significant at the 5% level*

Table 6.77 shows the result of the Tukey's HSD test for multiple comparisons and it is found that the mean value of the influence of behavioural factors is significantly different among traders of different categories of knowledge levels. From the above analysis, it can be concluded that there is significant difference in the influence of behavioural factors among traders belonging different categories of knowledge level about derivative market. It is also found that influence of behavioural bias is high among traders in the category of low level of knowledge about derivative market and low among traders in the category of high knowledge level.

6.15 Conclusion

This chapter examined the influence of behavioural biases on the trading decisions of equity derivative traders in Kerala. Based on the literature review this study divided the behavioural factors influencing the investors' decision-making into five groups: *heuristic, prospect, herding, emotions* and *market impact.* The influence of behavioural factors on the trading decisions of equity derivative traders has been studied using 15 variables in the above five groups of variables, and the influence of each of these behavioural factors has been compared with five demographic variables such as *gender, age, education level, trading experience, and trading capital.* The distribution of data relating to the influence of behavioural factors was found to be normal and therefore parametric tests were applied to examine the relationship between variables.

The influence of heuristic variables has been examined using four variables and it is found that the heuristic variables strongly influence the trading decision of equity derivative traders in Kerala, and there is no significant difference in the influence of heuristic variables between different demographic groups of equity derivative traders in Kerala. The influence of prospect variables has been examined using three variables and it is found that the prospect variables strongly influence the trading decision of equity derivative traders in Kerala, and it was also found that the age and education of derivative traders have a significant impact on the influence of prospect variables, while gender, trading experience and trading capital does not affect the influence of prospect variable on the trading decisions of equity derivative traders in Kerala.

The influence of the herding effect has been examined using three variables and it is found that the herding effect strongly influences the trading decision of equity derivative traders in Kerala, and it was also found that the education level of traders has a significant impact on the influence of herding effect, whereas gender, age, trading experience and trading capital does not affect the influence of herding effect on the trading decisions of equity derivative traders in Kerala.

The influence of emotional bias has been examined using three variables and it is found that emotional bias strongly influences the trading decision of equity derivative traders in Kerala, and it was also found that gender, age and trading experience of traders have a significant impact on the influence of emotional bias, whereas education level and trading capital does not affect the influence of emotional bias on the trading decisions of equity derivative traders in Kerala.

The influence of market impact has been examined using two variables and it is found that the market impact strongly influences the trading decision of equity derivative traders in Kerala, and it was also found that the gender and education level of traders has a significant impact on the influence of market impact, whereas age, trading experience and trading capital does not affect the influence of market impact on the trading decisions of equity derivative traders in Kerala.

By analysing the overall influence of behavioural factors on the trading decisions of equity derivative traders, it is found that the influence of behavioural bias strongly exists among equity derivative traders in Kerala. So, it can be concluded that the trading decisions of equity derivative traders in Kerala have been significantly influenced by the behavioural biases. The influence of behavioural biases on the trading performance of equity derivative traders has been analyzed and discussed in the next chapter.

REFERENCES

Barber, B. M., & Odean, T. (2000). Trading Is Hazardous to Your Wealth : The Common Stock Investment Performance of Individual Investors. *The Journal of Finance*, *55*(2), 773–806. https://doi.org/10.2139/ssrn.219228

Barberis, N., & Huang, M. (2001). Mental Accounting , Loss Aversion , and Individual Stock Returns. *The Journal of Finance*, *56*(4), 1247–1292. https://doi.org/10.2307/2697796

Barberis, N., & Thaler, R. (2003). A survey of Behavioral Finance. In M. H. and R. S. G.M. Constantinides (Ed.), *Handbook of the Economics ofFinance* (pp. 1052–1114). Elsevier Science B.V. http://houdekpetr.cz/!data/public_html/papers/economics_psychology/Barberis Thaler 2003.pdf

Caparrelli, F., Arcangelis, A. M. D., Cassuto, A., Caparrelli, F., Arcangelis, A. M. D., & Cassuto, A. (2010). Herding in the Italian Stock Market : A Case of Behavioral Finance. *Journal of Behavioral Finance*, *5*(4), 222–230. https://doi.org/10.1207/s15427579jpfm0504

Damasio, A. R. (1994). *Descartes' Error: Emotion, Reason and the Human Brain*. Avon Books, New York.

DeBondt, W. F. M., & Richard H. Thaler. (1995). Chapter 13 Financial Decision-Making in Markets and Firms : A Behavioral Perspective. In *Handbooks in Operations Research and Management Science* (Vol. 9, pp. 385–410). Elsevier Science B.V. https://doi.org///doi.org/10.1016/S0927-0507(05)80057-X.

DeBondt, W. F. M., & Thaler, R. (1985). Does the Stock Market Overreact ? *The Journal of Finance*, *40*(3), 793–805. https://doi.org/10.2307/2327804

Evans, D. A. (2006). Subject Perceptions of Confidence and Predictive Validity in Financial Information Cues Subject Perceptions of Confidence and Predictive Validity in Financial Information Cues. *Journal of Behavioral Finance*, *7*(1), 12–28. https://doi.org/10.1207/s15427579jpfm0701

Filbeck, G., Hatfield, P., & Horvath, P. (2005). Risk Aversion and Personality Type. *The Journal of Behavioral Finance*, *6*(4), 170–180. https://doi.org/10.1207/s15427579jpfm0604

Fogel, S. O. C., & Berry, T. (2006). The Disposition Effect and Individual Investor Decisions: The Roles of Regret and Counterfactual Alternatives. *Journal of Behavioral Finance*, *7*(2), 107–116. https://doi.org/10.1207/s15427579jpfm0702

Goodfellow, C., Bohl, M. T., & Gebka, B. (2009). International Review of Financial Analysis Together we invest ? Individual and institutional investors ' trading behaviour in Poland. *International Review of Financial Analysis*, *18*(4), 212–221. https://doi.org/10.1016/j.irfa.2009.03.002

Hvide, H. K. (2002). Pragmatic beliefs and overconfidence. *Journal of Economic Behavior and Organization*, *48*(1), 15–28. https://doi.org/10.1016/S0167-2681(01)00221-9

Kahneman, D., & Riepe, M. W. (1998). Aspects of Investor Psychology. *The Journal of Portfolio Management*, *24*(4), 52–65. https://doi.org/DOI: https://doi.org/10.3905/jpm.1998.409643

Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, *47*(2), 263–292. https://doi.org/10.2307/1914185

Kempf, A., & Ruenzi, S. (2006). Status Quo Bias and the Number of Alternatives : An Empirical Illustration from the Mutual Fund Industry. *Journal of Behavioral Finance*, *7*(4), 204–213. https://doi.org/10.1207/s15427579jpfm0704

Lai, M., Low, K. L. T., & Lai, M. (2001). Are Malaysian Investors Rational ? *The Journal of Psychology and Financial Markets*, *2*(4), 210–215. https://doi.org/10.1207/S15327760JPFM0204_5

Lehenkari, M., & Perttunen, J. (2004). Holding on to the Losers : Finnish Evidence Holding on to the Losers : Finnish Evidence. *Journal of Behavioral Finance*, *5*(2), 116–126. https://doi.org/10.1207/s15427579jpfm0502

Nofsinger, J. R. (2005). Social Mood and Financial Economics. *Journal of Behavioral Finance*, *6*(3), 144–160. https://doi.org/10.1207/s15427579jpfm0603_4

Oberlechner, T., & Osler, C. (2008). Overconfidence in Currency Markets. *SSRN Electronic Journal*, 1–39. https://doi.org/10.2139/ssrn.1108787

Odean, T. (1998). Are Investors Reluctant to Realize Their Losses ? *The Journal of Finance*, *53*(5), 1775–1798. https://doi.org/10.1111/0022-1082.00072

Odean, T. (1999). Do Investors Trade Too Much ? *The American Economic Review*, *89*(5), 1279–1298.

Peters, E., & Slovic, P. (2000). The Springs of Action: Affective and Analytical Information Processing in Choice. *Personality and Social Psychology Bulletin2*, *26*(12), 1465–1475. https://doi.org/10.1177/01461672002612002

Plous, S. (1993). *The Psychology of Judgment and Decision Making*. Mcgraw-Hill Book Company.

Richard H. Thaler. (1993). *Advances in Behavioural Finance* (Volume 1). Russell Sage Foundation.

Ritter, J. R. (2003). Behavioral finance. *Pacific Basin Finance Journal*, *11*, 429–437. https://doi.org/10.1016/S0927-538X(03)00048-9

Shefrin, H. (2002). *Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing*. Oxford University Press. https://doi.org/10.1093/0195161211.001.0001

Shefrin, H., & Statman, M. (1985). The Disposition to Sell Winners Too Early and Ride Losers Too Long : Theory and Evidence. *The Journal of Finance*, *40*(3), 777–790. https://doi.org/10.1111/j.1540-6261.1985.tb05002.x

Shiller, R. (1999). Human Behavior and the Efficiency of the Financial System. *Handbook of Macroeconomics*, *1*(1), 1305–1340.

Shiller, R. J. (2000). *Irrational Exuberance*. Princeton University Press.

Statman, M. (1999). Behavioral Finance : Past Battles and Future Engagements. *Financial Analysts Journal*, *55*(6), 18–27. https://doi.org/10.2469/faj.v55.n6.2311

Sulphey, M. M. (2014). *Behavioural Finance* (First). PHI Learning Private Limited.

Tan, L., Chiang, T. C., Mason, J. R., & Nelling, E. (2008). Herding behavior in Chinese stock markets : An examination of A and B shares. *Pacific Basin Finance Journal*, *16*, 61–77. https://doi.org/10.1016/j.pacfin.2007.04.004

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, *185*(4157), 1124–1131. https://doi.org/10.4324/9781912282562

Waweru, N. M., Munyoki, E., & Uliana, E. (2008). The effects of behavioural factors in investment decision-making : a survey of institutional investors operating at the Nairobi Stock Exchange. *International Journal of Business and Emerging Markets*, *1*(1), 24–41. https://doi.org/DOI:10.1504/IJBEM.2008.019243

Waweru, N. M., Mwangi, G. G., & Parkinson, J. M. (2014). Behavioural factors influencing investment decisions in the Kenyan property market. *Afro-Asian Journal of Finance and Accounting*, *4*(1), 26–49. https://doi.org/10.1504/AAJFA.2014.059500

7.1 Introduction

This chapter examines the impact of option trading on individual investor performance and satisfaction. The objective of reviewing the trading performance of equity derivative traders in Kerala is to shed light on whether individual investors understand the risk and return characteristics of these more complex securities, and whether they can use these instruments successfully. *Barber & Odean, (2000)* has shown that excessive trading by individual investors leads to substantial losses on their common stock investments. This study, therefore, examines both the absolute returns of futures and options traders and their opinion about their return and trading satisfaction. The study also analyses the impact of knowledge, trading strategies, and behavioural factors on the trading performance of equity derivative traders.

7.2 Trading Performance of Equity Derivative Traders in Kerala

The term 'trading performance' refers to a method of evaluating how a trader is doing his trades. Trading performance can be expressed in many forms and complex algorithms, but it is essentially the mechanism used to evaluate a trader's return and risk tolerance or lack thereof. All types of traders can be measured from day traders, to swing traders and everything in between *(Hill, 2015). Lin & Swanson, (2003)* measure investment performance using three criteria of returns (raw returns, risk-adjusted returns, and momentum-adjusted returns) through five-time horizons (daily, weekly, monthly, quarterly and annually). They recognize that investors achieve excellent performance, which exists in the short run and is partially driven by short-term price momentum rather than by risk-taking. *Oberlechner & Osler, (2008*) identified the level of impact of overconfidence on investment performance which is measured by investment return rate and trading experience. The investors evaluate the return rate in comparison to their peers' profit rates. An Investor's trading experience is considered a criterion of the duration an investor has existed in the security market. These researchers find that the investment profit is not impacted by over-confidence; however, overconfidence can impact the trading experience of individual investors.

In conclusion, there are numerous ways to assess the performance of equity investment. The prior authors mainly use the secondary data of investors' results in the security markets to measure the stock investment performance (*(Lin & Swanson, 2003), (Kim & Nofsinger, 2003)* and so on). However, this research asks the equity derivative traders to evaluate their trading performance, so that the measurements of trading performance follow the research of *Oberlechner & Osler, (2008)* for the investment return rate. More specifically, the return rate of equity traders is evaluated by the objective and subjective viewpoints of individual traders. The subjective assessment of traders is made by asking them to compare their current real return rates to their expected return rates while the objective evaluation is done by the comparison between the real return rates and the average return rate of the security market. *Luong & Ha, (2011)* suggests that investment satisfaction has a strong connection with return rates; therefore, the satisfaction level of investment decisions is proposed as a criterion to measure investment performance. Based on the above literature, the investment return rate and investment satisfaction levels are suggested as criteria for measuring the performance of investments in this study. Three statements each were asked to respondents to measure the performance and satisfaction of equity derivative traders in Kerala and the descriptive statistics of results are presented in tables 7.1, 7.2 and 7.3. Besides the above, the winning ratio, average annual return and trading experience etc. were also analyzed and reported in this chapter.

7.2.1 Analysis of Return of Equity Derivative Traders in Kerala

The return from derivative trading is examined using three statements concerning *current return and expected return*, *current return and market return*, and *the consistency in return.* The return achieved by the derivative traders is measured using the above three variables on a five-point scale and analyzed using one sample t-test with a test value of '3', which is the mean of the 5-point response scale. The test hypothesis is given below:

H_0: μ = 3 (The return from derivative trading is average)

H_1: μ ≠ 3 (The return from derivative trading is not average)

The test results of trading return variables are summarized in Table 7.1.

Table 7.1

Trading return of equity derivative traders in Kerala

(n=300)

Variable	Responses#	Frequency	%	Mean ± SD	t*	*p*-value
The rate of return of my F&O trade meets my expectation	SD	26	8.7	3.36 ± 1.09	5.67	<.01***
	DA	28	9.3			
	N	98	32.7			
	A	108	36.0			
	SA	40	13.3			
My rate of return from F&O trade is higher than the average rate of return realized from equity market investments	SD	28	9.3	3.29 ± 1.19	4.31	<.01***
	DA	45	15.0			
	N	89	29.7			
	A	86	28.7			
	SA	52	17.3			
I am getting a consistent return from F&O trading in the last year	SD	26	8.7	3.64 ± 1.25	8.84	<.01***
	DA	27	9.0			
	N	70	23.3			
	A	84	28.0			
	SA	93	31.0			

Source: Primary data #*(SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree)*
**One sample t-test, Average=3* ****The difference is significant at 1% level*

Table 7.1 shows the trading performance of equity derivative traders and it can be inferred that the return achieved by 18 per cent of respondents is less than their expectation, whereas 49.3 percentage derivative traders realized a return higher than their expectation. The mean score obtained for measuring the rate of return in comparison to expectation is 3.36, which is above the mean of the response scale. The one-sample t-test indicates that the mean score is significantly higher than the average score, $t = 5.67$, $p = <.01$. Hence, it can be concluded that the return realized by the majority of the equity derivative traders meets their expectations.

Table 7.1 shows, 46% of respondents say that their rate of return from F&O trade is higher than the average rate of return realized from the equity market, whereas 24.3% of respondents replied that their rate of return is less than the return from the equity market. The mean score obtained for measuring the rate of return in comparison to market return is 3.29, which is above the mean of the response scale. The one-sample t-test indicates that the mean score is significantly higher than the average score, $t = 4.31$, $p = <.01$. Hence, it can be concluded that the return realized by the majority of the equity derivative traders is higher than the return realized from the equity market.

Regarding consistency in return, 59% of traders have reported that they are getting a consistent return from F&O trading in the last year and 17.7% are not getting returns consistently in the last year. The one-sample t-test also indicates that the mean score of all three variables used for measuring trading performance is greater than the average value. The one-sample t-test indicates that the mean score is significantly higher than the average score, $t = 8.84$, $p = <.01$. Hence, it can be concluded that the majority of the equity derivative traders are getting consistent returns from derivative trading.

7.2.2 Analysis of Trading Satisfaction of Equity Derivative Traders in Kerala

The trading satisfaction of equity derivative traders was also examined for measuring trading performance in this study. The trading satisfaction of derivative traders is measured using the three variables on a five-point scale and analyzed using one sample t-test with a test value of '3', which is the mean of the 5-point response scale. The test hypothesis is given below:

H0: $\mu = 3$ (The trading satisfaction is average)

H1: $\mu \neq 3$ (The trading satisfaction is not average)

The descriptive statistics and test results of trading satisfaction of equity derivative traders are presented in Table 7.2.

Table 7.2

Trading satisfaction of equity derivative traders in Kerala

(n=300)

Variable	Responses#	Frequency	%	Mean ± SD	t*	p-value
Are you satisfied with the return realized from Futures and Options trading	SD	29	9.7	3.43 ± 1.25	5.94	<.01***
	D	32	10.7			
	N	74	24.6			
	A	93	31.0			
	SA	72	24.0			
Are you satisfied with the hedging efficiency of Futures/options contract	SD	25	8.3	3.40 ± 1.14	6.07	<.01***
	D	25	8.3			
	N	103	34.3			
	A	92	30.7			
	SA	55	18.4			
Are you satisfied with your broker's competency and service	SD	10	3.3	3.76 ± 1.08	12.19	<.01***
	D	24	8.0			
	N	73	24.3			
	A	104	34.7			
	SA	89	29.7			

Source: Primary data #*(SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree)*

One sample t-test, Average=3 ****The difference is significant at 1% level*

Table 7.2, shows the trading satisfaction of equity derivative traders in Kerala the variable wise analysis and results are explained below:

From the above table, it can be observed that 55 per cent of respondents are satisfied with the return realized from derivative trading, whereas 20.4 percentage derivative traders are not satisfied with the return received from trading derivatives. The mean score obtained for measuring the satisfaction on return received is 3.43, which is above the mean of the response scale, and the one-sample t-test also indicates that the mean score is significantly higher than the average score, t = 5.94, *p*= <.01. Hence, it can be concluded that the majority of the equity derivative traders are satisfied with the return achieved from trading derivatives.

With regard to the hedging efficiency of equity derivatives, 49.1 per cent of traders are satisfied and 16.6 per cent of traders are not satisfied. The mean value is 3.40, which is above the mean of the response scale, and the one-sample t-test also indicates that the mean score is significantly higher than the average score, t = 6.07, p= <.01. Hence, it can be concluded that the majority of the equity derivative traders are satisfied with the hedging efficiency of equity derivatives.

Satisfaction with respect to the broker's competency and service shows that 64.4 per cent of traders are satisfied and 11.3 per cent of traders are not satisfied with the broker's competency and service. The mean value (3.76) is above the mean of the response scale, and the one-sample t-test indicates that the mean score is significantly higher than the average score, t = 12.19, p= <.01, indicates that the majority of the equity derivative traders are satisfied with the broker's competency and services.

The above analysis indicates that the mean score of all three variables used for measuring trading satisfaction is greater than the average value. Hence, it can be concluded that the trading satisfaction of equity derivative traders in Kerala is high.

7.2.3 Analysis of Overall Trading Performance of Equity Derivative Traders

The overall trading performance of equity derivative traders is measured by combining the above six variables and classifying the total score (6 x 5=30) into three classes. Where Low = 6 to 15, Medium = 16 to 20, and High = 21 to 30. The data is analyzed using one sample t-test with a test value of '2', which is the mean of the three-point response scale. The test hypothesis is given below:

H_0: $\mu = 2$ (The trading performance is average

H_1: $\mu \neq 2$ (The trading performance is not average)

The test result is presented in Table 7.3

Table 7.3

Overall Trading performance of equity derivative traders

Variable		Frequency	Per cent	Mean ± SD	t	*p*-value
Trading Performance	Low	57	19.0	2.27 ± 0.763	6.281	<.01***
	Average	103	34.3			
	High	140	46.7			
	Total	300	100.0			

Source: Primary data ****Difference is significant at 1% level*

Table 7.3 indicates that the mean score obtained for measuring the trading performance is 2.27, which is above the mean score of the response scale i.e., 2, the one sample t-test shows that the mean score is statistically significantly higher than the population average score, t (299) = 6.281, *p* = <.01. Hence, it can be concluded that trading performance of equity derivative traders in Kerala is above average.

7.3 Comparison of Trading Performance with Different Demographic Variables

The trading performance of equity derivative traders is compared concerning seven demographic variables such as *area, gender, age, education, occupation, trading experience and trading capital.* Since the distribution was found normal, parametric tests (ANOVA, t-test, etc) are used to compare the trading performance of equity derivative traders with different demographic variables. The analysis and results are presented below.

7.3.1 Area-wise Analysis of Trading Performance of Equity Derivative Traders

The sample selected in this study includes equity derivative traders from urban and rural areas, hence it is relevant to examine whether there is any difference in the trading performance of traders belonging to urban and rural areas. Here we need to compare the mean trading performance of two groups of traders such as urban and rural. Independent samples t-test is used to test whether two population means are different. This procedure is an inferential statistical hypothesis test, meaning it uses samples to draw conclusions about populations. The test hypothesis is given below:

H_0: $\mu 1 = \mu 2$ (There is no significant difference in the trading performance among traders of urban and rural areas)

H_1: $\mu 1 \neq \mu 2$ (There is a significant difference in the trading performance among traders of urban and rural areas)

The result of the independent sample t-test is summarised in Table 7.4.

Table 7.4

Area-wise analysis of Trading Performance of equity derivative traders

Test variable	Group	N	Mean ± SD	t	*p*-value	Remarks
Trading performance	Urban	156	19.95 ± 4.47	-0.450	.653	Equal variances not assumed
	Rural	144	20.21 ± 5.42			

Source: Primary data

Levene's Test for Equality of Variances gives a *p*-value of .001, therefore equal variance is not accepted and results are interpreted accordingly. From Table 7.4, it can be observed that the mean score of trading performance of urban and rural traders are 19.95 and 20.21 respectively and indicates very little difference between the mean values. The Independent sample t-test is used to check whether the difference in the mean score is significant or not, between urban and rural traders concerning trading performance. Since the *p*-value (0.653) of 't' is more than 0.05, it can be inferred that there is no significant difference in the trading performance between traders of urban and rural areas.

7.3.2 Gender-wise Analysis of the Trading Performance of Equity Derivative Traders

The sample selected for this study includes male and female equity derivative traders, hence it is relevant to examine whether there are any differences in the trading performance between male and female derivative traders. To test the same, descriptive analysis has been done which shows the mean score of male and female traders about the trading performance. To find out the statistical significance of the difference in mean score independent sample t-testis also applied. The test hypothesis is given below and the result is summarized in Table 7.5.

H_0: $\mu 1 = \mu 2$ (There is no significant difference in the trading performance between male and female traders)

H_1: $\mu 1 \neq \mu 2$ (There is a significant difference in the trading performance between male and female traders)

Table 7.5

Gender-wise analysis of Trading Performance of equity derivative traders

Test variable	Group	N	Mean ± SD	t	*p*-value	Remarks
Trading Performance	Male	264	19.89 ± 5.01	-1.671	.096	Equal variances assumed
	Female	36	21.36 ± 4.31			

Source: Primary data

Levene's Test for Equality of Variances gives a *p*-value of 0.270, therefore equal variance is accepted and results are interpreted accordingly. From Table 7.5, it can be observed that the mean score of trading performance of male and female traders are 19.89 and 21.36 respectively and indicates very little difference between the mean values. Since the *p*-value (.096) is more than 0.05, it can be inferred that there is no significant difference in the trading performance between male and female equity derivative traders in Kerala.

7.3.3 Age-wise Analysis of the Trading Performance of Equity Derivative Traders in Kerala

The trading performance of equity derivative traders may vary with different age categories of traders. This aspect is also examined in this study. Based on age, the sample respondents are classified into four groups such as: *Up to 30 (1)*, *31-40 (2)*, *41-50 (3)* and *51& above (4)*. Hence the data has been classified age-wise and descriptive analysis has been done to know the mean score of trading performance between traders in different age categories as shown in Table 7.6.

Table 7.6

Age-wise analysis of Trading Performance of equity derivative traders

Test Variable	Age Group (in years)	N	Mean ± SD
Trading Performance	Up to 30	85	20.09 ± 5.22
	31 – 40	135	20.10± 5.20
	41 – 50	55	20.51 ± 4.45
	51 & Above	25	18.88 ± 3.44
	Total	300	20.07 ± 4.94

Source: Primary data

From Table 7.6, it is found that there is little difference in the mean score of influence of behavioural biases among traders of different age categories. The age group 4*1-50 (group 3)* is having the highest mean score, and the age group *51& above (group 4)* is having the lowest mean score of trading performance. The ANOVA is applied to test the significance of differences in the mean score of trading performance among different age groups and the result is summarised in Table 7.7. The test hypothesis is given below:

> H_0: *There is no significant difference in the trading performance of equity derivative traders according to their age groups*

> H_1: *There is significant difference in the trading performance of equity derivative traders according to their age groups*

Table 7.7

Result of One-way ANOVA: Age-wise analysis of Trading performance

	Sum of Squares	Df	Mean Square	F	*p*-value
Between Groups	46.206	3	15.402	.627	.598
Within Groups	7266.181	296	24.548		
Total	7312.387	299			

Source: Primary data

The one-way ANOVA reveals that there is statistically no significant difference in the mean score influence of trading performance between at least two age groups (F (3, 296) = [.627], *p* = .598). Hence, it can be concluded that there is no significant difference in the trading performance among traders in different age groups.

7.3.4 Education Qualification-wise Analysis of the Trading Performance of Equity Derivative Traders in Kerala

The sample selected for this study includes equity derivative traders with different educational qualifications. Hence it is important to examine whether there is any difference in the trading performance between traders having different educational qualifications. Based on education level, the respondents are classified into five groups such as SSLC, Higher Secondary, Graduate, Post Graduate, and Professional. The level of education of traders may influence the trading performance of equity derivative traders. To test the same, descriptive analysis has been done which shows the mean score of trading performance of traders with different educational qualifications. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is applied. The result of the descriptive analysis is summarized in Table 7.8.

Table 7.8

Descriptive statistics of Education qualification-wise analysis of trading performance

Test Variable	Education Group	N	Mean ± SD
Trading Performance	SSLC	13	16.46 ± 4.67
	Higher Secondary	10	17.40 ± 4.55
	Graduate	130	20.40 ± 5.19
	Post Graduate	92	21.26 ± 4.32
	Professional	55	18.65 ± 4.67
	Total	300	20.07 ± 4.94

Source: Primary data

From Table 7.8, it is found that there is a difference in the mean score of trading performance among traders with different educational qualifications. The traders with post-graduation have the highest mean score (21.26) and traders with SSLC have the lowest mean score (16.46) of trading performance. The ANOVA is applied to test the significance of differences in the trading performance between traders of different educational qualification groups and the result is summarised in Table 7.9. The test hypothesis is given below:

H_0: There is no significant difference in the trading performance of equity derivative traders according to their educational qualifications

H_1: There is significant difference in the trading performance of equity derivative traders according to their educational qualifications

Table 7.9

Result of One-way ANOVA: Education-wise analysis of the trading performance of equity derivative traders

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	495.380	4	123.845		
Within Groups	6817.006	295	23.108	5.36	<.01***
Total	7312.387	299			

Source: Primary data ****The difference is significant at the 1% level*

The One-way ANOVA reveals that there is a statistically significant difference in the mean score of trading performance between traders of at least two educational qualification groups (F (4, 295) = [5.36], p = <.01). To know the exact significant difference in trading performance between traders of different groups of educational qualifications Tukey's HSD test has been used and the result is shown in Table 7.10

Table 7.10

Education qualification wise Post Hoc (HSD) analysis for multiple comparisons of trading performance

Education Level (I)	Education Level (J)	Mean Difference (I-J)	Std. Error	*p*-value	95% Confidence Interval	
					Lower Bound	Upper Bound
SSLC	Higher Secondary	-.93846	2.02199	.990	-6.4883	4.6113
	Graduate	-3.93846*	1.39833	.041	-7.7765	-.1004
	Post Graduate	-4.79933*	1.42434	.008	-8.7088	-.8899
	Professional	-2.19301	1.48247	.577	-6.2620	1.8760

Education Level (I)	**Education Level (J)**	**Mean Difference (I-J)**	**Std. Error**	***p*-value**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
Higher Secondary	SSLC	.93846	2.02199	.990	-4.6113	6.4883
	Graduate	-3.00000	1.57753	.319	-7.3299	1.3299
	Post Graduate	-3.86087	1.60063	.115	-8.2542	.5324
	Professional	-1.25455	1.65257	.942	-5.7904	3.2813
Graduate	SSLC	3.93846*	1.39833	.041	.1004	7.7765
	Higher Secondary	3.00000	1.57753	.319	-1.3299	7.3299
	Post Graduate	-.86087	.65493	.682	-2.6585	.9367
	Professional	1.74545	.77325	.162	-.3769	3.8678
Post Graduate	SSLC	4.79933*	1.42434	.008	.8899	8.7088
	Higher Secondary	3.86087	1.60063	.115	-.5324	8.2542
	Graduate	.86087	.65493	.682	-.9367	2.6585
	Professional	2.60632*	.81935	.014	.3574	4.8552
Professional	SSLC	2.19301	1.48247	.577	-1.8760	6.2620
	Higher Secondary	1.25455	1.65257	.942	-3.2813	5.7904
	Graduate	-1.74545	.77325	.162	-3.8678	.3769
	Post Graduate	-2.60632*	.81935	.014	-4.8552	-.3574

Source: Primary data *The mean difference is significant at the 5% level*

Table 7.10, shows the result of Tukey's HSD test for multiple comparisons and it is found that the mean value of the trading performance is significantly different between traders possessing educational qualification of *SSLC and Graduation* (*p* = .041, 95% C.I. = [-7.7765, -.1004]), *SSLC and Post graduation* (*p* = .008, 95% C.I. = [-8.7088, -.8899]), and *Post graduation and Professional degree* (*p* = .014, 95% C.I. = [.3574, 4.8552]). There is no significant difference in the trading performance between traders of *SSLC and higher secondary*, *SSLC and professional degree*, *higher secondary and graduates*, *higher secondary and postgraduates*, *higher secondary and professionals*, *graduates and postgraduates*, *graduates and professionals*.

7.3.5 Occupation-wise Analysis of the Trading Performance of Equity Derivative Traders

The sample selected for this study includes equity derivative traders with different occupational groups. Hence it is important to examine whether there is any difference in the trading performance among traders doing different occupations. Based on occupation, the respondents are classified into six groups such as Govt. employees, Private employees, Professionals, Self-employed, Businessmen and Full-time traders. The occupation of traders may influence the trading performance of equity derivative traders. To test the same, descriptive analysis has been done which shows the mean score of trading performance of traders with different occupational groups. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is applied. The result of the descriptive analysis is summarized in Table 7.11.

Table 7.11

Descriptive statistics of Occupation -wise analysis of trading performance

Test Variable	Education Group	N	Mean ± SD
Trading Performance	Govt. Employee	38	19.03 ± 4.49
	Private sector employee	97	20.45 ± 4.95
	Professional	46	19.91 ± 5.29
	Self-employed	37	20.03 ± 4.99
	Business	52	20.75 ± 4.56
	Full-time trader	30	19.30 ± 5.52
	Total	300	20.07 ± 4.94

Source: Primary data

From Table 7.11, it is found that there are little differences in the mean score of trading performance among traders with different occupational groups. The traders doing business have the highest mean score (20.75) and traders of govt. employees have the lowest mean score (19.03) for trading performance. The ANOVA is applied to test the significance of differences in the trading performance among traders of different occupation groups and the result is summarised in Table 7.12. The test hypothesis is given below:

H_0: There is no significant difference in the trading performance of equity derivative traders according to their occupational status

H_1: There is significant difference in the trading performance of equity derivative traders according to their occupational status

Table 7.12

Result of One-way ANOVA: Occupation - wise analysis of Trading Performance of equity derivative traders

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	98.697	5	19.739		
Within Groups	7213.690	294	24.536	.804	.547
Total	7312.387	299			

Source: Primary data

The one-way ANOVA reveals that there is statistically no significant difference in the mean score of trading performance between traders of different occupational groups (F (5, 294) = [.804], p = .547). Hence, it can be concluded that the occupation of traders has no impact on the trading performance of equity derivative traders in Kerala.

7.3.6 Trading Experience-wise Analysis of the Trading Performance of Equity Derivative Traders

The sample includes equity derivative traders with varying years of trading experience. Hence it is relevant to examine whether there is any difference in the trading performance among traders of different trading experience groups. Based on years of trading experience, the sample respondents are classified into four groups such as *2 years & below (1)*, *3-5 years (2)*, *5-10 years (3)* and *above 10 years (4).* The number of years of trading experience of equity derivative traders may affect their trading performance. To test the same, descriptive analysis has been done which shows the mean score of trading performance of traders with different years of trading experience. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The result of the descriptive analysis is summarized in Table 7.13.

Table 7.13

Descriptive statistics of trading experience -wise analysis of Trading Performance

Test Variable	Trading experience	N	Mean ± SD
Trading Performance	2 years and Below	161	19.82 ± 5.22
	3-5 years	81	20.62 ± 4.36
	5-10 years	32	21.09 ± 4.93
	Above 10 years	26	18.65 ± 4.73
	Total	300	20.07 ± 4.94

Source: Primary data

From Table 7.13, it is found that there is a very small difference in the trading performance between traders with different years of trading experience. The ANOVA is applied to test the significance of the difference in the mean trading performance between traders with different years of experience and the result is summarised in Table 7.14. The test hypothesis is given below:

H_0: There is no significant difference in the trading performance of equity derivative traders according to their trading experience

H_1: There is significant difference in the trading performance of equity derivative traders according to their trading experience

Table 7.14

Result of One-way ANOVA: Trading experience - wise analysis of Trading Performance

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	119.517	3	39.839	1.639	.180
Within Groups	7192.870	296	24.300		
Total	7312.387	299			

Source: Primary data

The one-way ANOVA result (F (3,296) = [1.639], p = .180) reveals that there is no significant difference in trading performance among derivative traders of different years of trading experiences. Hence, it can be inferred that the trading experience is not an important factor in determining trading performance.

7.3.7 Trading Capital-wise Analysis of Trading Performance of Equity Derivative Traders

The amount of trading capital may affect the trading performance of derivative traders. Hence it is important to examine whether there is any difference in the trading performance between traders of different trading capital. On the basis of trading capital the sample, respondents are classified into five groups such as: *Below 1 lakh (group1)*, *1-5 lakhs (group2)*, *5-10 lakhs(group3), 10-20 lakhs (group4)* and *Above 20 lakhs (group5)*. To examine the relationship between trading capital and trading performance, descriptive analysis has been done which shows the mean score of trading performance with different amounts of trading capital. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is performed. The result of the descriptive analysis is summarized in Table 7.15.

Table 7.15

Descriptive statistics of trading capital -wise analysis Trading Performance

Test Variable	Trading capital	N	Mean ± SD
Trading Performance	Below 1 lakh	74	19.12 ± 5.04
	1-5 lakhs	136	20.94 ± 5.14
	5-10 lakhs	29	21.21 ± 3.89
	10-20 lakhs	24	22.67 ± 3.53
	Above 20 lakhs	37	23.73 ± 3.35
	Total	300	21.00 ± 4.89

Source: Primary data

From Table 7.15, it is found that there is a small difference in the mean score of trading performance among traders with different amounts of trading capital. The ANOVA is applied to test the significance of differences in the mean trading performance among traders with different amounts of trading capital and the result is summarised in Table 7.16. The test hypothesis is given below:

H_0: There is no significant difference in the trading performance of equity derivative traders according to their trading capital

H_1: There is significant difference in the trading performance of equity derivative traders according to their trading capital

Table 7.16

Result of One-way ANOVA: Trading capital - wise analysis of trading performance

	Sum of Squares	Df	Mean Square	F	*p*-value
Between Groups	605.176	4	151.294	6.821	<.01***
Within Groups	6542.824	295	22.179		
Total	7148.000	299			

Source: Primary data ****The difference is significant at 1% level.*

The one-way ANOVA result (F (4,295) = [6.821], $p \leq .01$) reveals that there is a statistically significant difference in the mean score of trading performance between traders of at least two groups with different trading capital. To know the exact significant difference in trading performance between traders with different trading capital Tukey's HSD test has been performed and the result is shown in Table 7.17.

Table 7.17

Trading capital-wise Post Hoc (LSD) analysis for multiple comparisons of trading performance

Trading Capital (I)	Trading Capital (J)	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
					Lower Bound	Upper Bound
Below 1 lakh (Group1)	1-5 lakhs	-1.81955	.68029	.060	-3.6868	.0477
	5-10 lakhs	-2.08527	1.03175	.258	-4.9172	.7466
	10-20 lakhs	-3.54505*	1.10628	.013	-6.5815	-.5086
	Above 20 lakhs	-4.60811*	.94824	.000	-7.2108	-2.0055
1-5 lakhs (Group2)	Below 1 lakh	1.81955	.68029	.060	-.0477	3.6868
	5-10 lakhs	-.26572	.96326	.999	-2.9096	2.3782
	10-20 lakhs	-1.72549	1.04269	.464	-4.5874	1.1364
	Above 20 lakhs	-2.78855*	.87322	.013	-5.1853	-.3918
5-10 lakhs (Group3)	Below 1 lakh	2.08527	1.03175	.258	-.7466	4.9172
	1-5 lakhs	.26572	.96326	.999	-2.3782	2.9096
	10-20 lakhs	-1.45977	1.29959	.794	-5.0268	2.1072
	Above 20 lakhs	-2.52283	1.16800	.198	-5.7287	.6830

Trading Capital (I)	Trading Capital (J)	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
					Lower Bound	Upper Bound
10-20 lakhs (Group4)	Below 1 lakh	3.54505*	1.10628	.013	.5086	6.5815
	1-5 lakhs	1.72549	1.04269	.464	-1.1364	4.5874
	5-10 lakhs	1.45977	1.29959	.794	-2.1072	5.0268
	Above 20 lakhs	-1.06306	1.23433	.911	-4.4509	2.3248
Above 20 lakhs (Group5)	Below 1 lakh	4.60811*	.94824	.000	2.0055	7.2108
	1-5 lakhs	2.78855*	.87322	.013	.3918	5.1853
	5-10 lakhs	2.52283	1.16800	.198	-.6830	5.7287
	10-20 lakhs	1.06306	1.23433	.911	-2.3248	4.4509

Source: Primary data   * *The mean difference is significant at the 5% level*

Table 7.17, shows the result of Tukey's HSD test for multiple comparisons and it is found that the mean value of trading performance is significantly different between traders with trading capital of *below 1 lakh* and *10-20 lakhs (group 1 and group 4)* (p = .013, 95% C.I. = [-6.5815, -.5086]), *below 1 lakh* and *above 20 lakhs (group 1 and group 5)* (p = .000, 95% C.I. = [-7.2108, -2.0055]). There is no statistically significant difference in mean trading performance between traders of all other groups such as *groups 1 and 2, groups 1 and 3*, *groups 2 and 3*, *groups 2 and 4*, *groups 3 and 4*, *groups 3 and 5* and finally between *groups 4 and 5*. Since there is a difference in trading performance between traders of different trading capital, it is relevant to study the correlation between trading performance and trading capital the following table shows the result of the correlation analysis between trading performance and trading capital of equity derivative traders in Kerala.

7.3.8 Correlation Analysis of Trading Performance and Amount of Trading Capital

A correlation analysis is conducted between the trading performance of equity derivative traders and the amount of their trading capital to know their direction and degree of relationship. The results have been summarized in Table 7.18. The hypothesis of the significance test for correlation is stated below.

H_0: r = 0 ("There is no relationship between trading performance and amount of trading capital")

H_1: r ≠ 0 ("There is a relationship between trading performance and amount of trading capital ")

Table 7.18

Correlation between Trading Performance and amount of Trading Capital

Variable		Trading Performance	Trading Capital
Trading Performance	Pearson Correlation	1	.283
	p-value		$<.01^{***}$
	N	300	300
Trading Capital	Pearson Correlation	.283	1
	p-value	$<.01^{***}$	
	N	300	300

Source: Primary data ****The correlation is significant at the 1% level*

Table 7.18 shows that the correlation coefficient between trading performance and the amount of trading capital is 0.283, which indicates that there is a positive correlation between trading performance and the amount of trading capital used by equity derivative traders. It suggests that greater trading performance will be accompanied by more trading capital. It means that when the amount of trading capital increases, trading performance will also grow.

7.4 Analysis of Trading Performance According to Level of Knowledge of Equity Derivative Traders

The level of knowledge of traders about the derivative markets may affect their trading performance. The equity derivative traders included in this study are grouped into three categories based on their knowledge level. *Category-1* represents traders with a low level of Knowledge about derivative market. *Category-2* represents traders with *moderate level of knowledge* about the derivative market, and *Category 3* represents traders with a *high level of knowledge* about the derivative market. It is interesting to examine whether there is any difference in the trading performance among traders of different levels of knowledge about the derivative market. To test the same, descriptive analysis has been done which shows the mean score of trading performance of traders with different categories of knowledge levels. To find out the statistical significance of the difference in mean score, One-way Analysis of Variance (ANOVA) is applied. The result of the descriptive analysis is summarized in Table 7.19.

Table 7.19

Descriptive Statistics of influence of Level of Knowledge on Trading Performance

Test Variable	Category of Traders based on Knowledge Level	N	Mean ± SD
Trading Performance	Category 1 (Low)	52	17.52 ± 5.75
	Category 2 (Medium)	101	19.49 ± 4.56
	Category 3 (High)	147	23.27 ± 3.48
	Total	300	21.00 ± 4.89

Source: Primary data

From Table 7.19, it is found that there are differences in the mean score of trading performance among traders of different categories of knowledge levels. The ANOVA is applied to test the significance of differences in the mean trading performance between traders with different levels of knowledge about the derivative market and the result is summarised in Table 7.20. The test hypothesis is given below:

H_0: There is no significant difference in the trading performance of equity derivative traders with different knowledge levels.

H_1: There is significant difference in the trading performance of equity derivative traders with different knowledge levels.

Table 7.20

Result of One-way ANOVA: Influence of Level of Knowledge of Traders on trading performance

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	1620.676	2	810.338	43.542	<.01***
Within Groups	5527.324	297	18.611		
Total	7148.000	299			

Source: Primary data ******The difference is significant at the 1% level***

The one-way ANOVA result ($F(2,297) = [43.542]$, $p < .01$) reveals that there is a statistically significant difference in the mean score of trading performance between traders of at least two categories of knowledge level. To know the exact significant difference in trading performance between traders with different categories of knowledge levels Tukey's HSD test has been performed and the result is shown in Table 7.21.

Table 7.21

Knowledge Level-wise Post Hoc (HSD) analysis for multiple comparisons of Trading performance

Knowledge Level Category (I)	Knowledge Level Category (J)	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
					Lower Bound	Upper Bound
Category 1 (Low)	Medium	-1.96592*	.73631	.022	-3.7003	-.2315
	High	-5.75288*	.69606	.000	-7.3925	-4.1133
Category 2 (Medium)	Low	1.96592*	.73631	.022	.2315	3.7003
	High	-3.78696*	.55755	.000	-5.1003	-2.4736
Category 3 (High)	Low	5.75288*	.69606	.000	4.1133	7.3925
	Medium	3.78696*	.55755	.000	2.4736	5.1003

Source: Primary data *The mean difference is significant at the 5% level*

Table 7.21 shows the result of Tukey's HSD test for multiple comparisons and it is found that the mean value of the trading performance is significantly different between traders of different categories of knowledge levels. From the above analysis, it can be concluded that there is a significant difference in the trading performance among traders belonging to different categories of knowledge levels. It is also found that the trading performance is high among traders in the category of the high level of knowledge about the derivative market and low among traders in the category of low knowledge levels. Therefore, it is evident that the level of knowledge of traders has a positive impact on their trading performance.

7.5 Analysis of the Influence Trading Strategies on the Trading Performance of Equity Derivative Traders

The use of trading techniques and strategies may affect the trading performance of equity derivative traders. Derivative traders generally adopt certain techniques and strategies while trading in the derivative market. These techniques include deciding stop-loss position, using options strategy builder software, using Algorithmic trading, etc. In this study 11 statements were used for measuring the use of trading techniques and strategies. The equity derivative traders included in this study are grouped into three categories based on the use of trading techniques and strategies. *Category-1* represents traders with *very little use* of trading techniques and strategies. *Category-2* represents traders moderately *using* trading techniques, and *Category 3* represents traders *highly using* trading techniques and strategies specified in this study. It is interesting to examine whether there is any difference in the trading performance between traders of different levels of using these trading techniques. To test the same, descriptive analysis has been done which shows the mean score of trading performance of traders with different categories of trading techniques. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is applied. The result of the descriptive analysis is summarized in Table 7.22.

Table 7.22

Descriptive Statistics of the influence of trading strategies on trading performance

Test Variable	Category of Traders based on trading strategies	N	Mean ± SD
Trading Performance	Category 1 (Basic)	62	17.08 ± 5.08
	Category 2 (Moderate)	123	20.48 ± 4.51
	Category 3 (Advanced)	115	23.67 ± 3.36
	Total	300	21.00 ± 4.89

Source: Primary data

From Table 7.22, it is found that there are differences in the mean score of trading performance among traders using different categories of trading strategies. The

ANOVA is applied to test the significance of differences in the mean trading performance between traders with different trading strategies and the result is summarised in Table 7.23. The test hypothesis is given below:

H_0: There is no significant difference in the trading performance of equity derivative traders with different levels of trading strategies

H_1: There is significant difference in the trading performance of equity derivative traders with different levels of trading strategies

Table 7.23

Result of One-way ANOVA: Impact of trading strategies of traders on trading performance

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	1805.261	2	902.630	50.177	<.01***
Within Groups	5342.739	297	17.989		
Total	7148.000	299			

Source: Primary data ****The difference is significant at 1% level*

The one-way ANOVA result ($F(2,297) = [50.177]$, $p < .01$) reveals that there is a statistically significant difference in the mean score of trading performance between traders of at least two categories of trading strategies. To know the exact significant difference in trading performance between traders with different categories of trading strategies Tukey's HSD test has been performed and the result is shown in Table 7.24.

Table 7.24

Trading Strategy-wise Post Hoc (HSD) analysis for multiple comparisons of Trading Performance

Trading strategy (I)	Trading strategy (J)	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
					Lower Bound	Upper Bound
Category 1 (Low)	Medium	-3.39903*	.66060	.000	-4.9551	-1.8430
	High	-6.58892*	.66826	.000	-8.1630	-5.0148
Category 2 (Medium)	Low	3.39903*	.66060	.000	1.8430	4.9551
	High	-3.18989*	.55016	.000	-4.4858	-1.8940
Category 3 (High)	Low	6.58892*	.66826	.000	5.0148	8.1630
	Medium	3.18989*	.55016	.000	1.8940	4.4858

Source: Primary data **The mean difference is significant at the 5% level*

Table 7.24, shows the result of Tukey's HSD test for multiple comparisons and it is found that the mean value of the trading performance is significantly different between traders of different categories of trading strategies. From the above analysis, it can be concluded that there is a significant difference in the trading performance between traders belonging to different categories of trading strategies. It is also found that the trading performance is high among traders in the category of the high level of using trading strategies and low among traders in the category of low use of trading strategies. Therefore it is evident that the use of trading strategies has a positive impact on their trading performance.

7.6 Analysis of the Influence of Behavioural Biases on the Trading Performance of Equity Derivative Traders.

The behavioural biases of a trader may affect his trading performance. Based on the influence level of behavioural biases, equity derivative traders are classified into three categories, *category-1* represents traders with a *low influence* of behavioural bias, *category-2* represents traders with a *medium influence* of behavioural bias, and *category-3* represents traders with a *high-level influence* of behavioural bias. It is interesting to examine whether there is any difference in the trading performance between traders of different levels behavioural of bias. To test the same, descriptive analysis has been done which shows the mean score of trading performance of traders with different categories of influence of behavioural bias. To find out the statistical significance of the difference in mean score One-way Analysis of Variance (ANOVA) is applied. The result of the descriptive analysis is summarized in Table 7.25.

Table 7.25

Descriptive Statistics of the influence of Behavioural Biases on the Trading Performance

Test Variable	Category of Traders based on the influence of behavioural bias	N	Mean ± SD
Trading Performance	Category 1 (Low Bias)	13	26.54 ± 2.60
	Category 2 (Moderate bias)	92	19.53 ± 4.45
	Category 3 (High bias)	195	20.79 ± 4.88
	Total	300	20.66 ± 4.87

Source: Primary data

From Table 7.25, it is found that there are differences in the mean score of trading performance between traders in the different categories of behavioural bias. The ANOVA is applied to test the significance of differences in the mean trading performance between traders with different levels of influence of behavioural biases and the result is summarised in Table 7.26. The test hypothesis is given below:

> *H_0: There is no significant difference in the trading performance of equity derivative traders with different levels of behavioural bias*

> *H_1: There is significant difference in the trading performance of equity derivative traders with different levels of behavioural bias*

Table 7.26

Result of One-way ANOVA: Influence of Behavioural Biases of Traders on the Trading Performance

	Sum of Squares	df	Mean Square	F	*p*-value
Between Groups	569.709	2	284.854	12.988	<.01***
Within Groups	6513.928	297	21.932		
Total	7083.637	299			

Source: Primary data *** *The difference is significant at 1% level*

The one-way ANOVA result (F (2,297) = [12.988], $p < .01$) reveals that there is a statistically significant difference in the mean score of trading performance between at least two categories of traders with different levels of influence of behavioural bias. To know the exact significant difference in trading performance between traders with different levels of behavioural bias, Tukey's HSD test has been performed and the result is shown in Table 7.27.

Table 7.27

Level of Behavioural Bias-wise Post Hoc (HSD) analysis for multiple comparisons of Trading Performance

Level of behavioural bias (I)	Level of behavioural bias (J)	Mean Difference (I-J)	Std. Error	*p*-value	95% Confidence Interval	
					Lower Bound	Upper Bound
Category 1 (Low)	Medium	7.00585*	1.38763	.000	3.7373	10.2744
	High	5.74359*	1.34149	.000	2.5837	8.9035
Category 2 (Medium)	Low	-7.00585*	1.38763	.000	-10.2744	-3.7373
	High	-1.26226	.59234	.085	-2.6575	.1330
Category 3 (High)	Low	-5.74359*	1.34149	.000	-8.9035	-2.5837
	Medium	1.26226	.59234	.085	-.1330	2.6575

Source: Primary data *The mean difference is significant at the 5% level*

Table 7.27 shows the result of Tukey's HSD test for multiple comparisons and it is found that the mean value of the trading performance is significantly different between traders of different categories of influence of behavioural bias. From the above analysis, it can be concluded that there is a significant difference in the trading performance between traders belonging to different categories of behavioural bias. It is also found that trading performance is high among traders in the category of the low level of influence of behavioural factors. Therefore, it is evident that behavioural bias has a negative impact on their trading performance.

7.7 Profitability analysis of the trading experience of equity derivative traders

Profitability analysis of trading experience is conducted by using three statements relating to the type of contract, type of trade and type of strategy used by equity derivative traders. The descriptive statistics of the result are presented in Table 7.28.

Table 7.28

Profitability analysis of trading experience of equity derivative traders

(n=300)

Statement	Response	Frequency	Per cent
In your experience which derivative contract gives more return	Index Futures	40	13.3
	Stock Futures	25	8.3
	Index Options	172	57.3
	Stock options	49	16.3
	No answer	14	4.7
In your experience which type of trade gives more return	Intra-day trade	126	42.0
	Over-night trade	39	13.0
	Swing trade	102	34.0
	Roll-over trade	19	6.3
	No answer	14	4.7
In your experience which trading strategy gives more return	Basic Strategy	179	59.7
	Income strategy	39	13.0
	Vertical spread strategy	18	6.0
	Volatility strategy	24	8.0
	Sideways strategy	36	12.0
	Leverage strategy	1	.3
	Synthetic strategy	3	1.0

Source: Primary data

Table 7.28, shows the profitability of the trading experience of equity derivative traders with regard to the type of contract, trade and strategies used. The result shows that 57.3 per cent of traders opined that the index options are the most profitable trading instrument. As 42 per cent of respondents replied that intra-day trade is the most profitable type of trade and with regard to the type of strategy majority think that basic strategy gives more profit.

7.8 Winning Ratio of Equity Derivative Traders

Analysing the winning ratio of equity derivative traders is a crucial aspect of performance evaluation in this field. The winning ratio, also known as the success ratio, provides insights into the effectiveness and profitability of a trader’s strategy. The winning ratio is a measure that calculates the ratio of the number of won opportunities to the number of lost opportunities in trades. It focuses on the number of wins and losses rather than considering the monetary value of each win or loss *(Srivastav, 2018).* The winning ratio is often used to assess the trader's overall success probability and performance *(Hill, 2015)*. The relevance of analysing the winning ratio lies in its ability to reveal the trader's ability to generate consistent profits over a period of time. A high winning ratio suggests that the trader has a greater propensity to generate profitable trades, indicating a higher level of skill in selecting favourable positions or timing market movements. Conversely, a low winning ratio may indicate inefficiencies in the trader's strategy or potential issues with risk management. The formula used for the calculation of the winning ratio is given below:

$$\text{Winning Ratio} = \frac{\text{No. of Winning Trade per month}}{\text{Total No. of trade executed per month}} \times 100$$

Table 7.29 shows the descriptive statistics of the winning ratio of equity derivatives traders.

Table 7.29

Winning Ratio of Equity Derivatives Traders

Winning Ratio (%)	Frequency	Percent	Mean ± SD
0-20	14	4.7	56.19 ± 17.70
21-40	46	15.3	
41-60	132	44.0	
61-80	92	30.7	
81-100	16	5.3	
Total	300	100.0	

Source: Primary Data

Table 7.29 shows that the average winning ratio of equity derivatives traders is 56.19. It indicates that more than 50 percent of trade executed by equity derivatives traders are successful trades. The success ratio of the majority of traders is in the range of 41-60 per cent. Only 5 per cent of traders reported a success ratio of more than 80 per cent, and 20 per cent of traders reported that their success ratio is less than 40 per cent.

From the above analysis, it can be inferred that on average six out of ten trade executed by equity derivatives trader results in success.

7.9 Average Return of Equity Derivative Traders

In the fast-paced world of financial markets, equity derivative trading stands out as one of the most dynamic and complex arenas for investors. Analysing the performance of equity derivative traders becomes paramount in assessing their effectiveness and profitability. The objective of this section is to delve into the concept of average return analysis, a crucial tool used to evaluate the performance of equity derivative traders. By examining the average returns generated by traders over a specific period we can gain valuable insights into their trading strategies, the risk management techniques, and overall efficiency in capturing market opportunities. Here monthly average return is considered for analysing trading performance. A descriptive analysis of the monthly average return of equity derivatives traders is done and the result has been summarised in Table 7.30 below.

Table 7.30 shows the descriptive statistics of the average monthly return of equity derivatives traders.

Table 7.30

Average monthly return of Equity Derivatives Traders

Monthly Return (%)	Frequency	Per cent	Mean ± SD
Below 0	35	11.7	
1-5	155	51.7	
6-10	49	16.3	7.38 ± 9.50
Above 10	61	20.3	
Total	300	100.0	

Source: Primary Data

Table 7.30 shows that the majority of equity derivatives traders' average monthly return is in the range of 1-5 per cent. 11. 7 per cent of respondents reported that their average return is less than 0 per cent, which means that they have incurred losses from trading equity derivatives. Whereas 20 per cent traders have achieved a return of more than 10 per cent in one month, which means that 20 per cent equity derivatives traders have achieved a return of more than 100 per cent in a year. The above analysis also shows that the average monthly return of equity derivatives traders is 7.38 per cent. The return analysis is just one piece of the puzzle when evaluating equity derivatives traders. It should be considered alongside other relevant factors, trading satisfaction, and qualitative information to gain a holistic understanding of their performance and potential for success in the dynamic world of equity derivative trading.

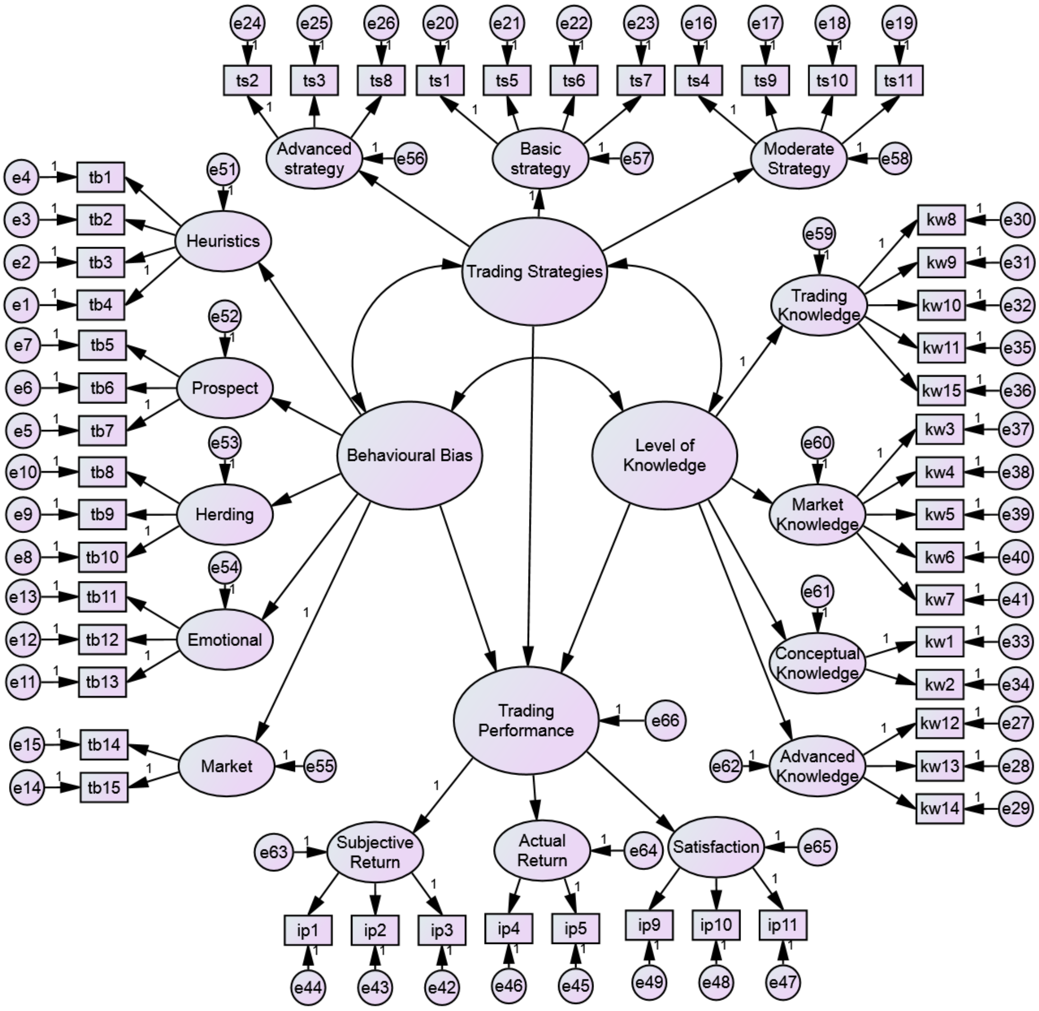
7.10 Analysis of the Impact of Trading Knowledge, Trading Strategies and Behavioural Biases on Trading Performance of Equity Derivative Traders using Structural Equation Modeling (SEM)

Structural Equation Modelling (SEM) represents the causal processes under a study by a series of regression equations and these causal relations are modelled pictorially using a path diagram to enable a clear conceptualization of theory under study *(Byrne, 2010)*. Structural Equation Modelling takes a hypothesis-testing approach to confirm the causal relationship between the variables *(Fan et al., 2016)*. SEM represents relationships among the observed and unobserved variables using path diagrams. Ovals represent the latent variables, while the rectangle or squares represent measured variables. Residuals (errors) are always unobserved and represented by circles *(Joseph F. Hair, William C. Black, Barry J. Babin, 2010)*.

In order to examine the impact of Trading Knowledge, Trading Strategies and Behavioural Biases on Trading Performance the following structural model is proposed. This is a simple model and only the direct relationship between dependent and independent variables are studied under this model. This model is developed before data collection based on literature review. Figures 7.1 represent the proposed structural models for the three independent variables (Trading Knowledge, Trading Strategies and Behavioural Biases) and one dependent variable (Trading Performance).

Figure 7.1

The Path diagram of the proposed Trading Performance Modal



Source: Primary Data

Figure 7.1 represents the path diagram of the proposed SEM Model (Trading Performance Model), and it is the graphical equivalent of simultaneous regression equations that relates the dependent and independent variables.

7.10.1 Hypotheses of Trading Performance Model

The path diagram visually portrays the relationship between the variables. The following hypotheses are tested using a Structural Equation Model of Trading Performance (The model showing the impact of trading knowledge, trading strategies and behavioural biases on the trading performance of equity derivative traders):

$H0_1$: The level of knowledge of equity derivative traders does not have a significant contribution to the trading performance.

$H1_1$: The level of knowledge of equity derivative traders significantly contributes to the trading performance.

$H0_2$: The trading strategy of equity derivative traders does not have a significant contribution to the trading performance.

$H1_2$: The trading strategy of equity derivative traders significantly contribute to the trading performance.

$H0_3$: The behavioural biases of equity derivative traders do not have a significant impact on trading performance.

$H1_3$: The behavioural biases of equity derivative traders significantly influence the trading performance.

All the above hypotheses are tested using Structural Equation Model which can be labelled as the Trading Performance Model (TPM).

7.10.2 Model Fit Indices of Trading Performance Model (TPM)

The structural equation model using Amos produces several indices of fit like a measure of goodness of fit, badness of fit, incremental fit, comparative fit and parsimony fit etc. The most important Model Fit Indices are considered and reported here. Table 7.31 shows the result of the model fit analysis.

Table 7.31

Summary of the Model Fit Indices- The Trading Performance Model (TPM)

Sl. No.	Indices	Value Obtained	Suggested Value
1	**CMIN/DF**	2.637	< 5.00 *(Hair, et al., 2010)*
2	**GFI** (Goodness of Fit Index)	0.901	> 0.90 *(Hair, et al., 2010)*
3	**AGFI** (Adjusted Goodness of Fit Index)	0.869	> 0.80 *(Hair, et al., 2010)*
4	**CFI** (Comparative Fit Index)	0.925	> 0.90 *(Hu & Bentler, 1999)*
5	**RMSEA** (Root Mean Square Error of Approximation)	0.074	< 0.08 *(Hair, et al., 2010)*

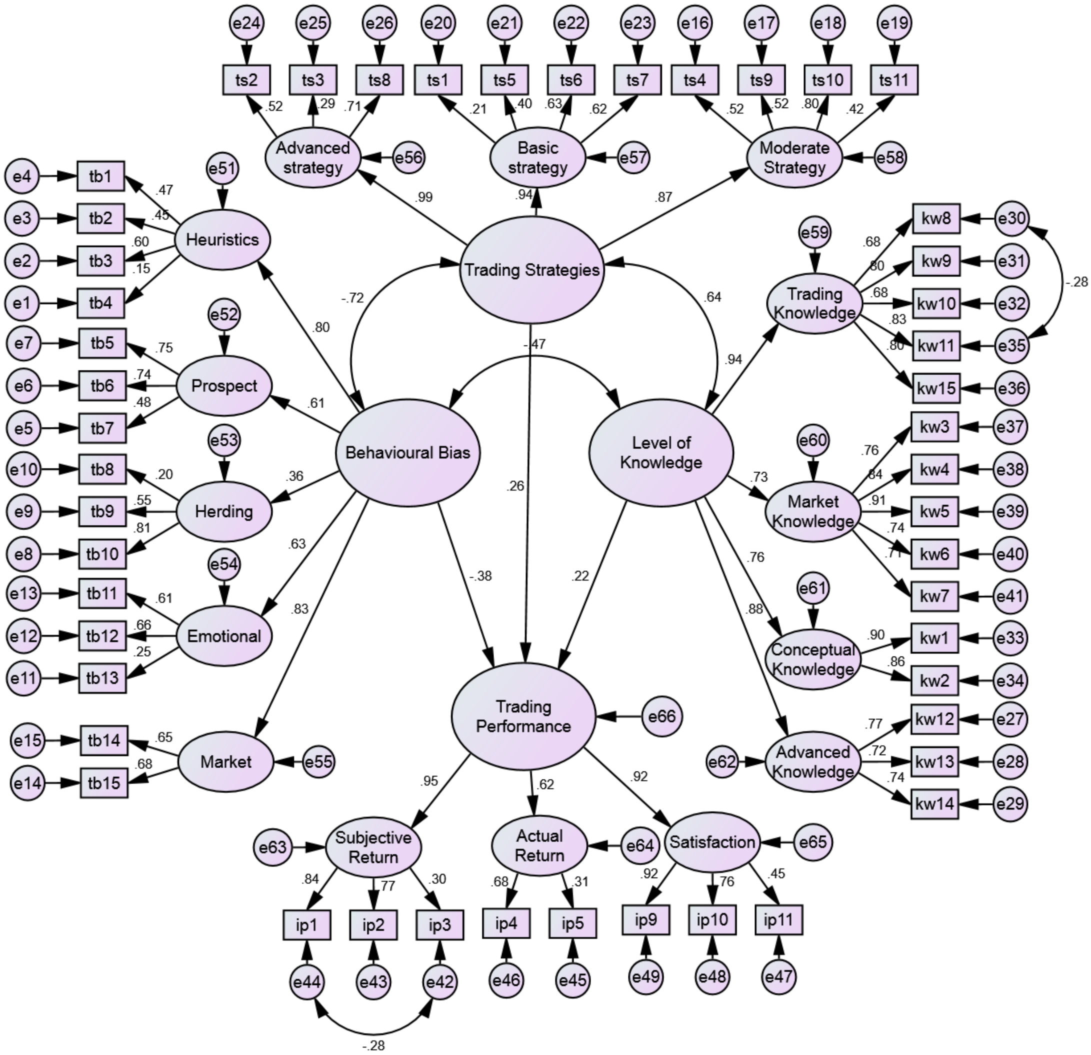
Source: Literature Review and Primary Data

Table 7.31 illustrates the model fit summary of the Trading Performance Model. It can be observed that the values of fit indices such as CMIN/DF, GFI, AGFI, CFI and RMSEA are within the recommended values. These fit indices are considered as the absolute indices that determine how well a sample data fits to the model. It can be observed that the Chi-square to the degree of freedom ratio (CMIN/DF) is as low as 2.637 indicating a very good fit. The Goodness of Fit Index (GFI) is 0.901, which is above the recommended value of 0.90. Though the Adjusted Goodness of Fit Index (AGFI) is 0.869, it is not above .900, a value above .800 is also acceptable when all other fit indices are above the recommended value *(Hair, et al., 2010)*. The Comparative Fit Index (CFI) is 0.925, which is above the recommended value of 0.90, and finally, the Root Mean Square Error of Approximation (RMSEA) is 0.074, which is less than .08 indicating a good fit. Therefore, it can be established that the sample data fit well to the model.

Figure 7.2 illustrates the path diagram of the final Trading Performance Model.

Figure 7.2

Path diagram of final Trading Performance Modal showing the Impact of Trading Knowledge, Trading Strategies and Behavioural Biases on Trading Performance of Equity Derivative Traders



Source: Primary Data

Figure 7.2 illustrates the path diagram for Trading Performance Model. They visually portray the relationships between the variables. The rectangular boxes represent the measured variables and the oval shapes represent the latent variables (factors). One-sided arrows from the factors explain the factor loadings (estimates). The two-sided arrows represent the error covariances. The residuals or errors are represented by small circles. 'Knowledge Level', 'Trading Strategies' and 'Behavioural biases' are independent variables and Trading performance is dependent variable in this model. The one-sided arrows from exogenous variables to endogenous variables represent the hypothesized relationship between these variables which are tested using the SEM model. The values of standardized regression coefficients (estimates) are also represented in the path diagram for each relationship.

7.10.3 The Result of Hypotheses Testing under Trading Performance (SEM) Model

The hypothesis is formulated and tested to examine the impact of the independent variables on the dependent variable. The independent variables in the trading performance model are Trading Knowledge, Trading Strategies and the Influence of Behavioural biases, and the dependent variable is Trading Performance. The results of tests of hypotheses are summarized in Table 7.32.

Table 7.32

Hypotheses Tests Results: Trading Performance Model

Hypotheses#	**Path**	***B***	***p-value***	**Result**
$H1_1$: The level of knowledge of equity derivative traders significantly contribute to the trading performance	Knowledge→ Performance	0.226	.012**	Supported
$H1_2$: The trading strategy of equity derivative traders significantly contribute to the trading performance	Strategy→ Performance	0.261	.036**	Supported
$H1_3$: The behavioural biases of equity derivative traders significantly influence the trading performance.	Behavioual bias→ Performance	-0.385	.005***	Supported

Source: Primary Data ***, **The relation is significant at 1% and 5% level respectively*

#All hypotheses are alternative hypotheses

Table 7.32 shows the path-wise standardized regression coefficients and their respective *p*-values. The aim of this analysis is to understand the cause-and-effect relationship between the independent variables and the dependent variable. Based on the Standardized coefficient, influence of behavioural bias on Trading Performance (-0.385) is the most influencing path in this SEM model, followed by Trading Strategy (0.261), and Trading Knowledge (0.226). Since the *p*-values of all three paths are <.05, the alternative hypotheses are accepted, and found that all three independent variables are significantly contributing to the trading performance.

The relationship between trading knowledge and trading performance is examined and shows that, the path coefficient of standardized direct effect of 'Trading Knowledge' on 'Trading Performance' is 0.226 (p<.05), which indicates a significant positive influence of Trading Knowledge on Trading Performance. It means that a 1-point increase in the *"Trading Knowledge"* leads to a 0.226-point increase in the '*Trading Performance'*.

Similarly, the above table illustrates the causal relationship between '*Trading Strategy*' and '*Trading Performance'*. The regression coefficient of standardized direct effect of '*Trading Strategy*' on '*Trading Performance'* is 0.261 with *p*-value of .036. Since the path coefficient is positive and significant at 5% level of significance, the causal relationship is established between Trading Strategy and Trading Performance. Moreover, if the Trading Strategy goes up by 1-point; there will be a simultaneous increase in the Trading Performance by 0.261-point.

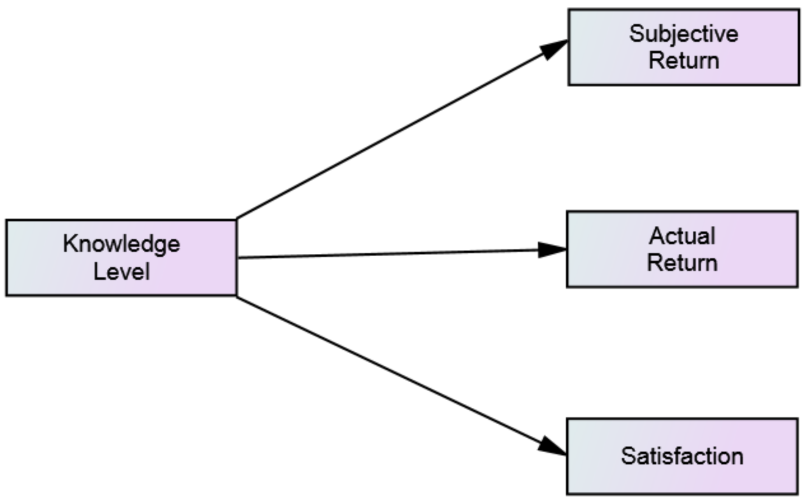
Finally, the beta coefficient of standardized direct effect of '*Behavioural Biases'* on *'Trading Performance'* -0.385 (p<.01) explains the significant negative influence of Behavioural bias on the Trading performance. This means that, when Behavioural bias goes up by 1 standard deviation; the Trading performance goes down by 0.385 standard deviation. More clearly, a 1-point increase in the influence of behavioural bias cause 0.385-point decrease in the Trading Performance.

7.11 Analysis of the Impact of Trading Knowledge on Trading Performance of Equity Derivative Traders (The Knowledge-Performance Model)

In order examine the impact of Trading Knowledge on Trading Performance the following structural model is proposed. Figures 7.3 represent the proposed structural models for the one independent variable (Trading Knowledge) and three dependent variables (Subjective Return, Actual Return and Trading Satisfaction).

Figure 7.3

The proposed model of impact of Trading Knowledge on different factors of Trading Performance



Source: Primary Data

Figure 7.3 representing the path diagram of the proposed SEM Model (The Knowledge-Performance Model), it is the graphical equivalent of simultaneous regression equations that relates the dependent and independent variables.

7.11.1 Hypotheses of The Knowledge- Performance Structural Equation Model

The path diagram visually portrays the relationship between the variables. The following hypotheses are tested using a Structural Equation Model of Trading Knowledge-wise impact on different dimensions of Trading Performance (The model showing the influence of trading knowledge, on Subjective return, Actual return and Trading satisfaction of equity derivative traders):

$H0_4$: The level of knowledge of equity derivative traders does not have a significant contribution to the subjective return.

$H1_4$: The level of knowledge of equity derivative traders significantly contributes to the subjective return.

$H0_5$: The level of knowledge of equity derivative traders does not have a significant contribution to the actual return.

$H1_5$: The level of knowledge of equity derivative traders significantly contributes to the actual return.

$H0_6$: The level of knowledge of equity derivative traders does not have a significant contribution to the trading satisfaction.

$H1_6$: The level of knowledge of equity derivative traders significantly contributes to trading satisfaction.

The above hypotheses are tested using Structural Equation Model which can be labeled as 'The Knowledge–Performance Model'.

7.11.2 Model Fit Indices of The Knowledge-Performance Model

The structural equation model using Amos produces several indices of fit like measure of goodness of fit, badness of fit, incremental fit, comparative fit and parsimony fit etc. The most important Model Fit Indices are considered and reported here. Table 7.33 shows the result of model fit analysis.

Table 7.33

Summary of Model Fit Indices- The Knowledge-Performance Model

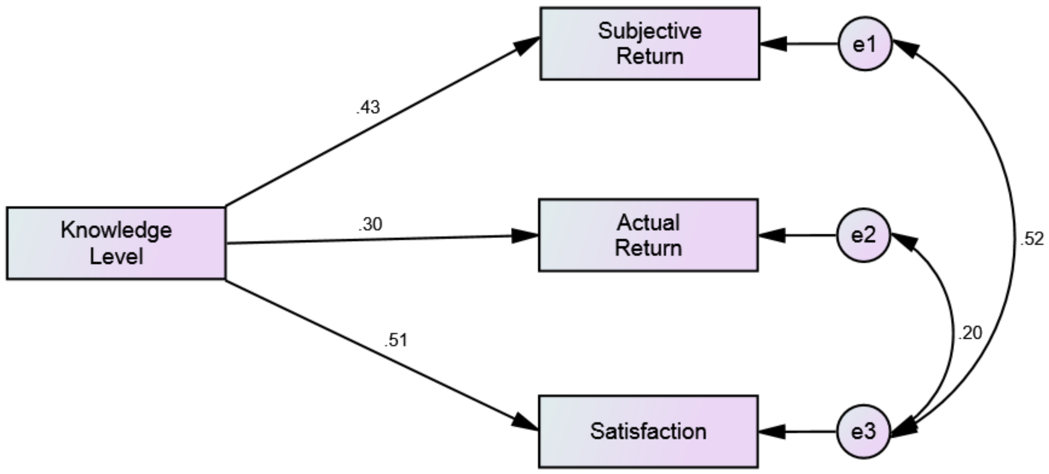
Sl. No.	Indices	Value Obtained	Suggested Value
1	**CMIN/DF**	2.859	< 5.00 *(Hair, et al., 2010)*
2	**GFI** (Goodness of Fit Index)	0.979	> 0.90 *(Hair, et al., 2010)*
3	**AGFI** (Adjusted Goodness of Fit Index)	0.800	> 0.80 *(Hair, et al., 2010)*
4	**CFI** (Comparative Fit Index)	0.961	> 0.90 *(Hu & Bentler, 1999)*
5	**RMSEA** (Root Mean Square Error of Approximation)	0.079	< 0.08 *(Hair, et al., 2010)*

Source: Literature Review and Primary data

Table 7.33 illustrates the model fit summary of Trading Knowledge- Performance Model. It can be observed that the values of fit indices such as CMIN/DF, GFI, AGFI, CFI and RMSEA are within the recommended values. These fit indices are considered as the absolute indices that determine how well a sample data fits to a model. It can be observed that the Chi-square to the degree of freedom ratio (CMIN/DF) is as low as 2.859 indicating a very good fit. The Goodness of Fit Index (GFI) is 0.979, which is above the recommended value of 0.9. The Adjusted Goodness of Fit Index (AGFI) is 0.800, which is also acceptable. The Comparative Fit Index (CFI) is 0.961, which is above the recommended value of 0.9. The Root Mean Square Error of Approximation (RMSEA) is 0.079, which less than .08 indicating a good fit. Therefore it can be established that the sample data fits well to the model. Fig 7.4 illustrates the path diagram of Trading Knowledge – Performance Model.

Figure 7.4

Path diagram - the influence of trading knowledge on, different dimensions of trading performance of equity derivative traders



Source: Primary Data

Figure 7.4 illustrates the path diagram for Trading Knowledge-Performance Model. They visually portray the causal relationships between the variables. The rectangular boxes represent the measured variables. One sided arrows from the factors explain the factor loadings (estimates). The two sided arrows represent the error covariances. The residuals or errors are represented by small circles. 'Knowledge Level' is the independent variables and 'Subjective return', 'Actual return' and 'Satisfaction' are the dependent variables in this model. The one-sided arrows from exogenous variables to endogenous variables represent the hypothesized relationship between these variables which are tested using the SEM model. The values of standardized regression coefficients (estimates) are also represented in the path diagram for each relationship.

7.11.3 The Result of Hypotheses Testing under Trading Knowledge-Performance Model

The hypothesis is formulated and tested to examine the impact of the independent variable on the dependent variable. The independent variable in this model is Trading

Knowledge and dependent variables are different dimensions of Influence of Behavioural biases. The results of tests of hypotheses are summarized in Table 7.34.

Table 7.34

Hypotheses Tests Results: Trading Knowledge-Performance Model

Hypotheses#	**Path**	**β**	***p*-value**	**Result**
$H1_4$: The level of knowledge of equity derivative traders significantly contribute to the subjective return	Knowledge→ Subjective return	0.433	<.01***	Supported
$H1_5$: The level of knowledge of equity derivative traders significantly contribute to the actual return	Knowledge → Actual return	0.296	<.01***	Supported
$H1_6$: The level of knowledge of equity derivative traders significantly contribute to the trading satisfaction	Knowledge → Satisfaction	0.506	<.01***	Supported

Source: Primary Data ****The relation is significant at 1% level*
#All hypotheses are alternative hypotheses

Table 7.34 shows the path-wise standardized regression coefficients and their respective *p*-values. Based on the Standardized coefficient, the influence of trading Knowledge on the trading satisfaction (0.506) is the most influencing path in this SEM model, followed by subjective return (0.433), and actual return (0.296). Since the *p*-values of all three paths are <.05, the alternative hypotheses are accepted and found that the independent variable is significantly contributing to all the dependent variable of trading performance.

Table 7.34 exhibits the cause-and-effect relationship between *Trading Knowledge* and the three dimensions of *Trading Performance*. The beta coefficient of standardized direct effect of *'Trading Knowledge'* on *'Subjective return'* is 0.433 with *p*-value <.01. Since the path coefficient is positive and significant at 1% level, the causal relationship is established between Trading Knowledge and Subjective return. This means that 1-point increase in *"Trading knowledge"* leads to 0.433-point increase in the subjective return.

The standardized regression coefficient of *'Trading knowledge'* on *'Actual return'* is 0.296 (p<.01) explains significant positive causal relationship between the Trading Knowledge and Actual return. More clearly, when Trading knowledge increased by 1 standard deviation; the Actual return also increased by 0.296 standard deviation.

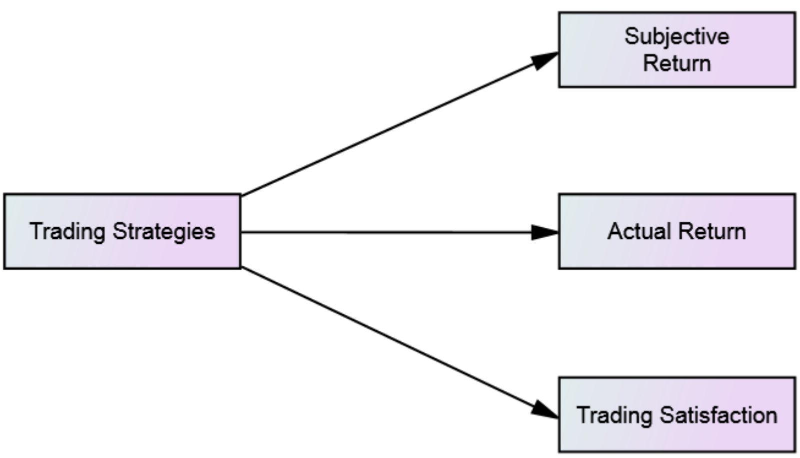
Finally, the path coefficient of the direct effect of *Trading Knowledge* on *'Trading Satisfaction'* " is 0.506 with p-value of <.01, indicating significant positive cause-and-effect relationship between the Trading Knowledge and Trading Satisfaction. This means that, when Trading Knowledge goes up by 1 percent, the Trading Satisfaction also goes up by 0.506 percent.

7.12 Analysis of Impact of Trading Strategies on Trading Performance of Equity Derivative Traders (The Strategy- Performance Model)

In order examine the impact of Trading strategies on trading performance the following structural model is proposed. Figure 7.5 represent the proposed structural models for the one independent variable (Trading Strategy) and three dependent variables (Subjective Return, Actual Return and Trading Satisfaction)

Figure 7.5

The proposed model of the impact of Trading Strategies on different factors of Trading Performance



Source: Primary Data

Figure 7.5 represents the path diagram of the proposed SEM Model (Trading strategy-Trading Performance Model) is the graphical equivalent of simultaneous regression equations that relates the dependent (Trading performance) and independent (Trading strategies) variables.

7.12.1 Hypotheses of Trading Strategy- Performance Model

The path diagram visually portrays the relationship between the variables. The following hypotheses are tested using a Structural Equation Model of Trading strategy wise impact on different dimensions of Trading Performance (The model showing the influence of trading strategies, on Subjective return, Actual return and Trading satisfaction of equity derivative traders):

$H0_7$: The Trading Strategies of equity derivative traders do not have a significant contribution to the subjective return of equity derivative traders.

$H1_7$: The Trading Strategies of equity derivative traders significantly contributes to the subjective return.

$H0_8$: The Trading Strategies of equity derivative traders do not have a significant contribution to the actual return.

$H1_8$: The Trading Strategies of equity derivative traders significantly contributes to the actual return.

$H0_9$: The Trading Strategies of equity derivative traders do not have a significant contribution to the trading satisfaction.

$H1_9$: The Trading Strategies of equity derivative traders significantly contributes to trading satisfaction.

The above hypotheses are tested using Structural Equation Model which can be labelled as 'The Strategy –Performance Model'.

7.12.2 Model Fit Indices of Trading Strategy- Performance Model

The structural equation model using AMOS produces several indices of fit like measure of goodness of fit, badness of fit, incremental fit, comparative fit and parsimony fit etc. The most important Model Fit Indices are considered and reported here. Table 7.35 shows the result of model fit analysis.

Table 7.35

Model Fit Indices- The Trading Strategy-Performance Model

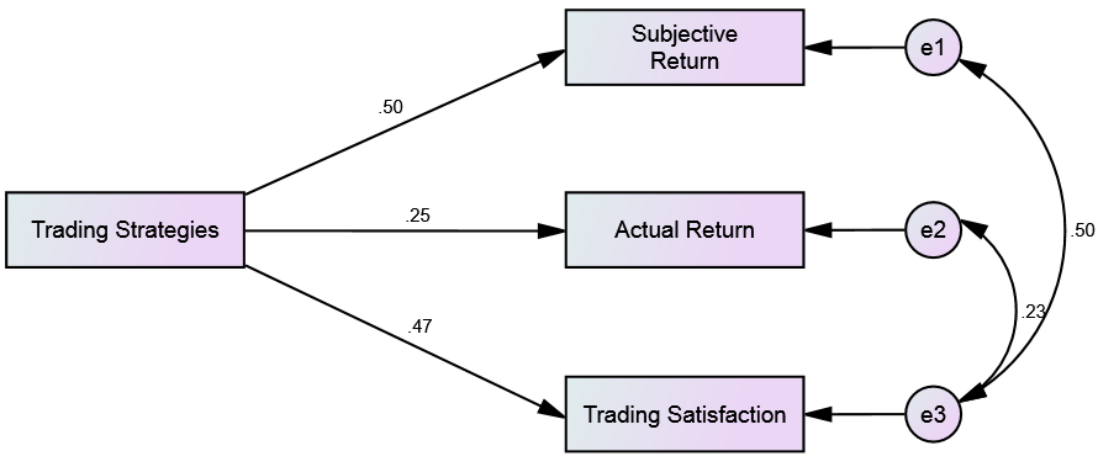
Sl. No.	Indices	Value Obtained	Suggested Value
1	**CMIN/DF**	4.226	< 5.00 *(Hair, et al., 2010)*
2	**GFI** (Goodness of Fit Index)	0.977	> 0.90 *(Hair, et al., 2010)*
3	**AGFI** (Adjusted Goodness of Fit Index)	0.877	> 0.80 *(Hair, et al., 2010)*
4	**CFI** (Comparative Fit Index)	0.957	> 0.90 *(Hu & Bentler, 1999)*
5	**RMSEA** (Root Mean Square Error of Approximation)	0.078	< 0.08 *(Hair, et al., 2010)*

Source: Literature Review and Primary Data

Table 7.35 illustrates the model fit summary of Trading Strategy- Performance Model. It can be observed that the values of fit indices such as CMIN/DF, GFI, AGFI, CFI and RMSEA are within the recommended values. These fit indices are considered as the absolute indices that determine how well a sample data fits to a model. It can be observed that the Chi-square to the degree of freedom ratio (CMIN/DF) is as low as 4.226 indicating an acceptable fit. The Goodness of Fit Index (GFI) is 0.977, which is above the recommended value of 0.90. The Adjusted Goodness of Fit Index (AGFI) is 0.877 is not above .900, but a value above .800 is also acceptable when all other fit indices are above the recommended value. The Comparative Fit Index (CFI) is 0.957, which is above the recommended value of 0.90, and finally the Root Mean Square Error of Approximation (RMSEA) is 0.078, which is also less than .08 indicating a good fit. Therefore it can be established that the sample data fits well to the model. Fig 7.6 illustrates the path diagram of Trading Strategy – Performance Model.

Figure 7.6

Path diagram - The Impact of Trading Strategies on different dimensions of trading performance of equity derivative traders



Source: Primary Data

Figure 7.6 illustrates the path diagram for Trading Strategy-Performance Model. They visually portray the causal relationships between the variables. The rectangular boxes represent the measured variables. One sided arrows from the factors explain the factor loadings (estimates). The two sided arrows represent the error covariances. The residuals or errors are represented by small circles. 'Trading Strategy' is the independent variables and 'Subjective return', 'Actual return' and 'Satisfaction' are the dependent variables in this model. The one-sided arrows from exogenous variables to endogenous variables represent the hypothesized relationship between these variables which are tested using the SEM model. The values of standardized regression coefficients (estimates) are also represented in the path diagram for each relationship.

7.12.3 The Result of Hypotheses Testing under Trading Strategy-Performance Model

The hypothesis is formulated and tested to examine the impact of the trading strategy on the trading performance. The independent variable in this model is Trading strategy and dependent variables are different dimensions of Trading performance. The results of tests of hypotheses are summarized in Table 7.36.

Table 7.36

Hypotheses Tests Results: Trading Strategy-Performance Model

Hypothesis#	**Path**	***β***	***p-value***	**Result**
H1$_7$: The trading strategies of equity derivative traders significantly contribute to the subjective return	Strategy→ Subjective return	0.501	<.01***	Supported
H1$_8$: The trading strategy of equity derivative traders significantly contribute to the actual return	Strategy → Actual return	0.247	<.01***	Supported
H1$_9$: The trading strategy of equity derivative traders significantly contribute to the trading satisfaction	Strategy → Satisfaction	0.474	<.01***	Supported

Source: Primary Data *** *The difference is significant at 1% level*
#*All hypotheses are alternative hypotheses*

Table 7.36 shows the path-wise standardized regression coefficients and their respective *p*-values. Based on the Standardized coefficient, impact of trading strategy on subjective return (0.501) is most influencing path in this SEM model, followed by trading satisfaction (0.474), and actual return (0.247). Since the *p*-values of all three paths are <.05, the alternative hypotheses are accepted and found that the independent variable is significantly contributing to all the dependent variable of trading performance.

Table 7.36 exhibits the causal relationship between *Trading Strategy* and three dimensions of *Trading Performance*. The beta coefficient of standardized direct effect of *'Trading Strategy'* on *'Subjective return'* is 0.501 with *p*-value <.01. Since the path coefficient is positive and significant at 1% level, the causal relationship is established between Trading Strategy and Subjective return. This explains that 1-point increase in *"Trading Strategy"* leads to 0.501-point increase in the subjective return.

The standardized regression coefficient of *'Trading Strategy'* on *'Actual return*' is 0.247 (*p*<.01), which indicates significant positive causal relationship between

Trading Strategy and Actual return. More clearly, when Trading strategy increased by 1 standard deviation; the Actual return also increased by 0.247 standard deviation.

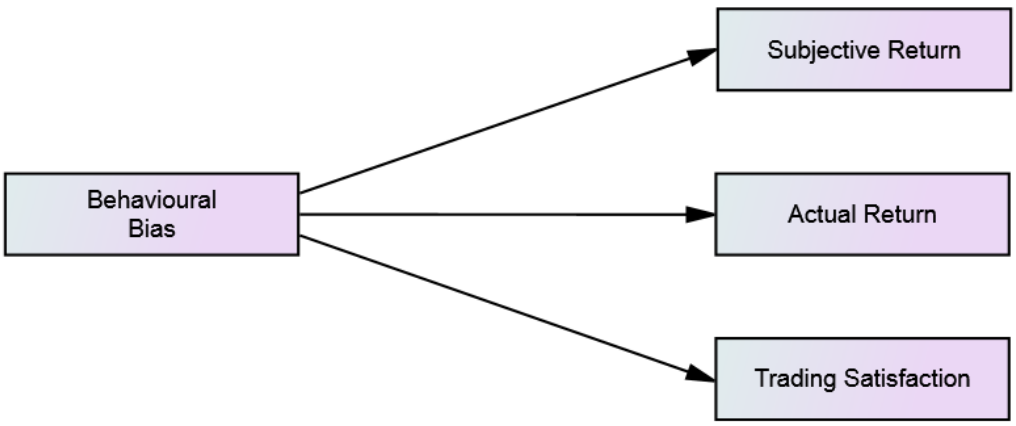
Finally, the path coefficient of the direct effect of *Trading Strategy* on *'Trading Satisfaction'* is 0.474 with *p*-value of <.01, indicating significant positive cause-and-effect relationship between the Trading Strategy and Trading Satisfaction. This means that, when Trading Strategy goes up by 1-point, the Trading Satisfaction also goes up by 0.474-point.

7.13 Analysis of the Impact of Behavioural Bias on the Trading Performance of Equity Derivative Traders (Trading Bias- Performance Model)

In order examine the influence of behavioural bias on trading performance the following structural model is proposed. Figures 7.7 represent the proposed structural models for the one independent variable (Influence of Behavioural bias) and three dependent variables (Subjective Return, Actual Return and Trading Satisfaction)

Figure 7.7

The proposed model of Impact of Behavioural Bias on different factors of Trading Performance



Source: Primary Data

Figure 7.7 representing the path diagram of the proposed SEM Model (Trading Bias-Trading Performance Model) is the graphical equivalent of simultaneous regression equations that relates the dependent and independent variables.

7.13.1 Hypotheses of Trading Bias- Performance Structural Equation Model

The path diagram visually portrays the relationship between the variables. The following hypotheses are tested using a Structural Equation Model of Trading bias wise impact on different dimensions of Trading Performance (The model showing the influence of trading bias on Subjective return, Actual return and Trading satisfaction of equity derivative traders):

$H0_{10}$: The Trading biases of equity derivative traders do not have a significant impact on the subjective return.

$H1_{10}$: The Trading biases of equity derivative traders have a significant impact on the subjective return.

$H0_{11}$: The Trading biases of equity derivative traders do not have a significant impact on the actual return.

$H1_{11}$: The Trading biases of equity derivative traders have significant impact on the actual return.

$H0_{12}$: The Trading biases of equity derivative traders do not have a significant impact on the trading satisfaction.

$H1_{12}$: The Trading biases of equity derivative traders has significant impact on the trading satisfaction.

The above hypotheses are tested using Structural Equation Model which can be labelled as the Trading Bias –Performance Model.

7.13.2 Model Fit Indices of Trading Bias- Performance Model

The structural equation model using Amos produces several indices of fit like measure of goodness of fit, badness of fit, incremental fit, comparative fit, etc. The most important Model Fit Indices are considered and reported here. Table 7.37 shows the result of model fit analysis.

Table 7.37

Model Fit Indices- The Trading bias - Performance Model

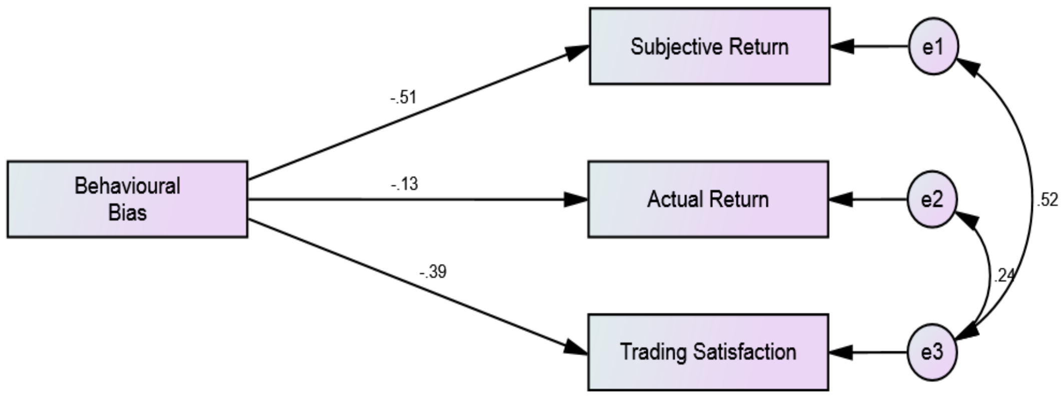
Sl. No.	Indices	Value Obtained	Suggested Value
1	**CMIN/DF**	4.047	< 5.00 *(Hair, et al., 2010)*
2	**GFI** (Goodness of Fit Index)	0.963	> 0.90 *(Hair, et al., 2010)*
3	**AGFI** (Adjusted Goodness of Fit Index)	0.828	> 0.80 *(Hair, et al., 2010)*
4	**CFI** (Comparative Fit Index)	0.923	> 0.90 *(Hu & Bentler, 1999)*
5	**RMSEA** (Root Mean Square Error of Approximation)	0.077	< 0.08 *(Hair, et al., 2010)*

Source: Literature Review and Primary data

Table 7.37 illustrates the model fit summary of Trading Strategy- Performance Model. It can be observed that the values of fit indices such as CMIN/DF, GFI, AGFI, CFI and RMSEA are within the recommended values. These fit indices are considered as the absolute indices that determine how well a sample data fits to a model. It can be observed that the Chi-square to the degree of freedom ratio (CMIN/DF) is 4.047 indicating an acceptable fit. The Goodness of Fit Index (GFI) is 0.963 and is above the recommended value of 0.90. The Adjusted Goodness of Fit Index (AGFI) is 0.828, which is above 0.800. The Comparative Fit Index (CFI) is 0.923 and is above the recommended value of 0.90. The Root Mean Square Error of Approximation (RMSEA) is 0.077, which is also less than .08 indicating a good fit. Therefore it can be established that the sample data fits well to the model. Fig 7.8 illustrates the path diagram of Trading bias – Performance Model.

Figure 7.8

Path diagram - The influence of Trading Bias on different dimensions of Trading Performance of equity derivative traders.



Source: Primary Data

Figure 7.8 illustrates the path diagram for Trading bias – Performance Model. They visually portray the relationships between the variables. 'Behavioural biases' is the independent variable and, subjective return, actual return and satisfaction are dependent variables in this model. The one-sided arrows from exogenous variables to endogenous variables represent the hypothesized relationship between these variables which are tested using the SEM model. The values of standardized regression coefficients (estimates) are also represented in the path diagram for each relationship.

7.13.3 Result of Hypotheses Testing under Trading Performance Model

The hypothesis is formulated and tested to examine the impact of the independent variables on the dependent variable. The independent variable in this model is Trading bias, whereas dependent variables are different dimensions of trading performance. The results of tests of hypotheses are summarized in Table 7.38.

Table 7.38

Hypotheses Tests Results: Trading bias - Performance Model

Hypothesis#	Path	β	p-value	Result
H1₁₀: The trading biases of equity derivative traders significantly influence to the subjective return	Behavioural bias→ Subjective return	-0.511	<.01***	Supported
H1₁₁: The trading biases of equity derivative traders significantly influence to the actual return	Behavioural bias →Actual return	-0.133	.021**	Supported
H1₁₂: The behavioural biases of equity derivative traders significantly influence the trading satisfaction	Behavioual bias → satisfaction	-0.393	<.01***	Supported

Source: Primary Data ***,** *The relationship is significant at 1% and 5% level respectively*
All hypotheses are alternative hypotheses

Table 7.38 illustrated the path-wise standardized regression coefficients and their respective *p*-values. Based on the Standardized coefficient, impact of behavioural bias on subjective return (-0.511) is most influencing path in this SEM model, followed by trading satisfaction (-0.393), and actual return (-0.133). Since the *p*-values of all three paths are <.05, the alternative hypotheses are accepted and found that the independent variable is significantly contributing to all the dependent variable of trading performance.

Table 7.36 exhibits the causal relationship between Behavioural Bias and three dimensions of *Trading Performance*. The beta coefficient of standardized direct effect of *Behavioural bias* on *'Subjective return'* is -0.511 with *p*-value <.01. Since the path coefficient is negative and significant at 1% level, inverse causal relationship is established between Behavioural bias and Subjective return. This explains that 1-point increase in *"Behavioural bias"* leads to 0.511-point decrease in subjective return.

The standardized regression coefficient of *Trading bias* on *'Actual return'* is -0.133 (*p*=.021), which indicates significant negative causal relationship between Behavioural bias and Actual return. More clearly, when trading bias increase by 1 standard deviation; the Actual return decrease by 0.133 standard deviation.

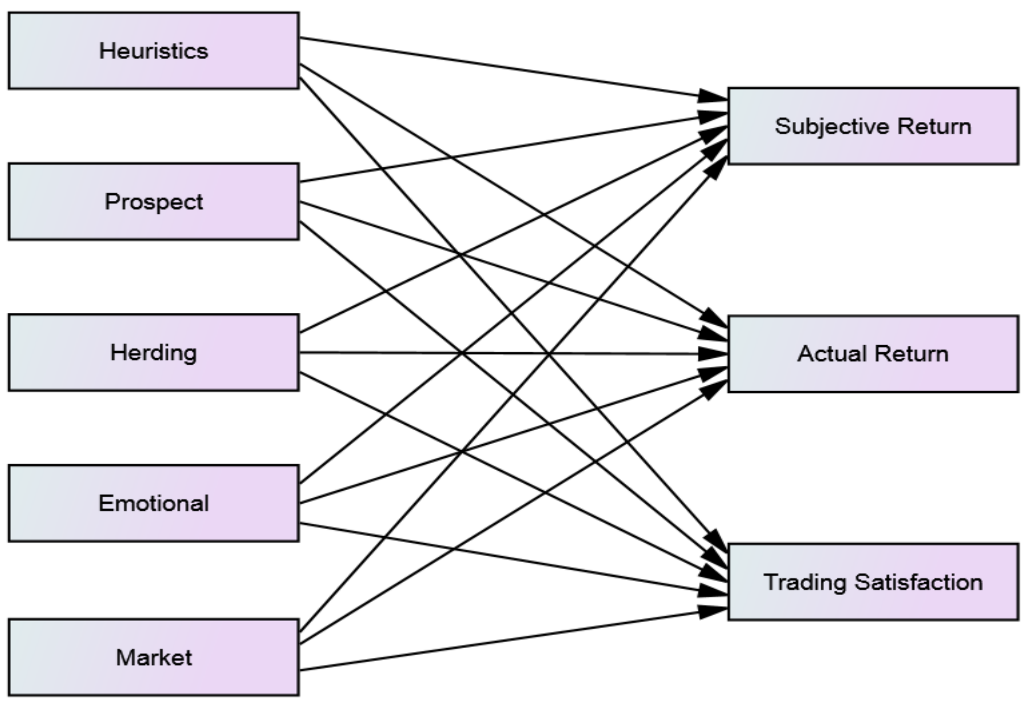
Finally, the path coefficient of the direct effect of Behavioural bias on *'Trading Satisfaction'* is -0.393 with p-value of <.01, indicating significant negative cause-and-effect relationship between Behavioural bias and Trading Satisfaction. This means that, when Behavioural bias goes up by 1-point, the Trading Satisfaction goes down by 0.393-point.

7.14 Dimension-wise Analysis of the Impact of Behavioural Bias on Trading Performance of Equity Derivative Traders

In order examine the dimension-wise influence of behavioural bias on trading performance the following structural model is proposed. Figures 7.9 represent the proposed structural model which includes five independent variables (Heuristics, Prospect, Herding, Emotional and Market impact) and three dependent variables (Subjective Return, Actual Return and Trading Satisfaction)

Figure 7.9

The proposed model of Dimension-wise impact of behavioural bias on different factors of Trading performance



Source: Primary Data

Figure 7.9 representing the path diagram of the proposed SEM Model of the dimension-wise impact of behavioural bias on the trading performance. It is the graphical equivalent of simultaneous regression equations that relates the dependent and independent variables.

7.14.1 Hypotheses of the Dimension-wise analysis of Behavioural Bias on Trading Performance

The path diagram (Fig. 7.9) visually portrays the relationship between the variables included in the model. The following hypotheses are tested using a Structural Equation Model concerning the dimension-wise analysis of impact of Trading bias on different dimensions of Trading Performance (The model showing the influence of different dimensions of trading bias on Subjective return, Actual return and Trading satisfaction of equity derivative traders):

$H0_{13}$: The heuristics variable does not have a significant impact on the subjective return of equity derivative traders

$H1_{13}$: The heuristics variable has a significant impact on the subjective return of equity derivative traders

$H0_{14}$: The heuristics variable does not have a significant impact on the actual return of equity derivative traders

$H1_{14}$: The heuristics variable has a significant impact on the actual return of equity derivative traders

$H0_{15}$: The heuristics variable does not have a significant impact on the trading satisfaction of equity derivative traders

$H1_{15}$: The heuristics variable has a significant impact on the trading satisfaction of equity derivative traders

$H0_{16}$: The prospect variable does not have a significant impact on the subjective return of equity derivative traders

$H1_{16}$: The prospect variable has a significant impact on the subjective return of equity derivative traders

$H0_{17}$: The prospect variable does not have a significant impact on the actual return of equity derivative traders

$H1_{17}$: The prospect variable has a significant impact on the actual return of equity derivative traders

$H0_{18}$: The prospect variable does not have a significant impact on the trading satisfaction of equity derivative traders

$H1_{18}$: The prospect variable has a significant impact on the trading satisfaction of equity derivative traders

$H0_{19}$: The herd behaviour does not have a significant impact on the subjective return of equity derivative traders

$H1_{19}$: The herd behaviour has a significant impact on the subjective return of equity derivative traders

$H0_{20}$: The herd behaviour does not have a significant impact on the actual return of equity derivative traders

$H1_{20}$: The herd behaviour has a significant impact on the actual return of equity derivative traders

$H0_{21}$: The herd behaviour does not have a significant impact on the trading satisfaction of equity derivative traders

$H1_{21}$: The herd behaviour has a significant impact on the trading satisfaction of equity derivative traders

$H0_{22}$: The emotional bias does not have a significant impact on the subjective return of equity derivative traders

$H1_{22}$: The emotional bias has a significant impact on the subjective return of equity derivative traders

$H0_{23}$: The emotional bias does not have a significant impact on the actual return of equity derivative traders

$H1_{23}$: The emotional bias has a significant impact on the actual return of equity derivative traders

$H0_{24}$: The emotional bias does not have a significant impact on the trading satisfaction of equity derivative traders

$H1_{24}$: The emotional bias has a significant impact on the trading satisfaction of equity derivative traders

$H0_{25}$: The market impact bias does not have a significant impact on the subjective return of equity derivative traders

$H1_{25}$: The market impact bias has a significant impact on the subjective return of equity derivative traders

$H0_{26}$: The market impact bias does not have a significant impact on the actual return of equity derivative traders

$H1_{26}$: The market impact bias has a significant impact on the actual return of equity derivative traders

$H0_{27}$: The market impact bias does not have a significant impact on the trading satisfaction of equity derivative traders

$H1_{27}$: The market impact bias has a significant impact on the trading satisfaction of equity derivative traders

The above hypotheses are tested using Structural Equation Modelling.

7.14.2 Model Fit Indices of Structural Equation Model analysing Dimension wise impact of Trading Bias on trading performance

The structural equation model using AMOS produces several indices of fit like measure of goodness of fit, badness of fit, incremental fit, comparative fit, etc. The most important Model Fit Indices are considered and reported here. Table 7.39 shows the result of model fit analysis.

Table 7.39

Model Fit Indices- The Dimension-wise Model of Impact of Behavioural bias on Trading Performance

Sl. No.	Indices	Value Obtained	Suggested Value
1	**CMIN/DF**	3.177	< 5.00 *(Hair, et al., 2010)*
2	**GFI** (Goodness of Fit Index)	0.982	> 0.90 *(Hair, et al., 2010)*
3	**AGFI** (Adjusted Goodness of Fit Index)	0.841	> 0.80 *(Hair, et al., 2010)*
4	**CFI** (Comparative Fit Index)	0.957	> 0.90 *(Hu & Bentler, 1999)*
5	**RMSEA** (Root Mean Square Error of Approximation)	0.072	< 0.08 *(Hair, et al., 2010)*

Source: Literature Review and Primary data

Table 7.39 illustrates the model fit summary of the dimension-wise model of the impact of behavioural bias on trading performance. It can be observed that the values of fit indices such as CMIN/DF, GFI, AGFI, CFI and RMSEA are within the recommended values. These fit indices are considered as the absolute indices that determine how well a sample data fits to a model. It can be observed that the Chi-square to the degree of freedom ratio (CMIN/DF) is 3.177, which is below the recommended value of 5. The Goodness of Fit Index (GFI) is 0.982, which is above the recommended value of 0.90. The Adjusted Goodness of Fit Index (AGFI) is 0.841 and it is above 0.800. The Comparative Fit Index (CFI) is 0.957, that is also above the recommended value of 0.90. The Root Mean Square Error of Approximation (RMSEA) is 0.072, which is also less than .08 indicating a good fit. Therefore it can be established that the sample data fits well to the model. Figure 7.10 illustrates the path diagram of the SEM model concerning the dimension-wise impact of trading bias on trading performance.

Figure 7.10

Path diagram - The dimension-wise Impact of Behavioural bias on different trading performance.

Source: Primary Data

Fig 7.10 illustrates the path diagram of the SEM model examining the dimension-wise impact of Behavioural Bias on the Trading Performance. They visually portray the relationships between the dependent and independent variables. ‘Heuristic variables’, ‘Prospect variables’, Herd behaviour, Emotional Bias and ‘Market impact’ are independent variables and Subjective return, Actual return and Trading Satisfaction are dependent variables in this model. The one-sided arrows from exogenous variables to endogenous variables represent the hypothesized relationship between these variables, which are tested using the SEM model. The values of standardized regression coefficients (estimates) are also represented in the path diagram for each relationship.

7.14.3 Results of Hypotheses Testing under the SEM model of Dimension-wise impact of behavioural bias on different factors of Trading performance

The hypothesis is formulated and tested to examine the impact of the independent variables *(Heuristic, Prospect, Herding, Emotional and Market impact)* on the dependent variables *(Subjective return, Actual return and Trading satisfaction).*

The results of tests of hypotheses are summarized in Table 7.40.

Table 7.40

Hypotheses Tests Results: The Dimension-wise impact of Behavioural Bias on the Trading Performance Model

Hypotheses#	Path	β	p-value	Result
$H1_{13}$: The heuristics variables have a significant impact on the subjective return of equity derivative traders	Heuristics bias →Subjective return	-0.129	.023**	Supported
$H1_{14}$: The heuristics variables have a significant impact on the actual return of equity derivative traders	Heuristics bias → Actual Return	0.035	.597	Not Supported
$H1_{15}$: The heuristics variables have a significant impact on the trading satisfaction of equity derivative traders	Heuristics bias → Satisfaction	-0.151	.013**	Supported
$H1_{16}$: The prospect variables have a significant impact on the subjective return of equity derivative traders	Prospect bias → Subjective return	-0.175	<.01***	Supported
$H1_{17}$: The prospect variables have a significant impact on the actual return of equity derivative traders	Prospect bias → Actual Return	-0.075	.227	Not Supported
$H1_{18}$: The prospect variables have a significant impact on the trading satisfaction of equity derivative traders	Prospect bias → Satisfaction	-0.165	.004***	Supported
$H1_{19}$: The herd behaviour has a significant impact on the subjective return of equity derivative traders	Herd behaviour →Subjective return	-0.120	.027**	Supported

Hypotheses#	**Path**	***β***	***p-value***	**Result**
H1$_{20}$: The herd behaviour has a significant impact on the actual return of equity derivative traders	Herd behaviour→ Actual Return	0.043	.492	Not Supported
H1$_{21}$: The herd behaviour has a significant impact on the trading satisfaction of equity derivative traders	Herd behaviour → Satisfaction	-0.014	.803	Not Supported
H1$_{22}$: The emotional bias has a significant impact on the subjective return of equity derivative traders	Emotional bias →Subjective return	-0.072	.201	Not Supported
H1$_{23}$: The emotional bias has a significant impact on the actual return of equity derivative traders	Emotional bias → Actual Return	-0.112	.086	Not Supported
H1$_{24}$: The emotional bias has a significant impact on the trading satisfaction of equity derivative traders	Emotional bias → Satisfaction	-0.045	.454	Not Supported
H1$_{25}$: The market impacts have a significant impact on the subjective return of equity derivative traders	Market impact → Subjective return	-0.284	<.01***	Supported
H1$_{26}$: The market impacts have a significant impact on the actual return of equity derivative traders	Market impact → Actual Return	-0.100	.124	Not Supported
H1$_{27}$: The market impacts have a significant impact on the trading satisfaction of equity derivative traders	Market Impact → Satisfaction	-0.221	<.01***	Supported

Source: Primary Data ***,** *The relationship is significant at 1% and 5% level respectively*
#*All hypotheses are alternative hypotheses*

Table 7.40 illustrated the path-wise standardized regression coefficients and their respective *p*-values of Structural Equation Model concerning the dimension-wise impact behavioural bias on the trading performance. The aim of the above analysis is to understand the causal relationship between the various dimensions of behavioural bias and three different factors of trading performance. Based on the Standardized coefficient, influence of Market impact variables on Subjective return (-0.284) is the most influencing path in this SEM model. The alternative hypotheses are accepted in paths where the *p*-values are <.05, and the independent variables in such paths are significantly contributing to the dependent variable.

The Beta coefficient of standardized direct effect of 'Heuristics' on 'Subjective return is -0.129 ($p<.05$) explains the significant negative influence of the independent variable on dependent variable. It means that a 1-point increase in the 'Heuristic biases', explains 0.129-point decrease in Subjective return. The standardized path coefficient of 'Heuristics' on 'Actual return' is 0.035 ($p=.597$) which means there is no significant influence of Heuristics bias on Actual return. Since the beta coefficient is positive and not significant at 1% level, the causal relationship is not established between heuristics bias and actual return. The standardized regression coefficient of 'Heuristics' on 'Trading Satisfaction' is -0.151 ($p<.05$) indicating a significant path of influence between Heuristics bias and Trading satisfaction. It means, when Heuristic bias goes up by 1; Trading satisfaction goes down by 0.151.

The relationship between prospect variable and different aspects of trading performance is examined and the result shows that, the path coefficient of standardized direct effect of 'Prospect variables' on 'Subjective return is -0.175 ($p<.01$), which indicates a significant negative influence of prospect variable on Subjective return. It means that a 1-point increase in the 'Prospect variable', leads to a 0.175-point decrease in the Subjective return. The Beta coefficient of 'Prospect variable' on 'Actual return' is -0.075 ($p=.227$) which means the influence of Prospect variables on Actual return is not significant. Here the negative beta coefficient is not significant at 1% level, therefore causal relationship is not established between Prospect variable and Actual return. The standardized regression coefficient of 'Prospect variable' on 'Trading Satisfaction' is -0.165 ($p<.01$), indicating a significant influence of Prospect variables on Trading satisfaction, and it explains that when Prospect variables goes up by 1; Trading satisfaction goes down by 0.165.

Similarly, the analysis illustrates the causal relationship between the Herd behaviour and Trading performance. The regression coefficient of standardized direct effect of

'Herd behaviour' on 'Subjective return is -0.120 with *p*-value of <.05. It means a significant negative influence of the Herd behaviour is exist on the Subjective return and when the herd behaviour goes up by 1; the Subjective return goes down by 0.12. The standardized regression coefficient of 'Herd behaviour' on 'Actual return' is 0.043 (*p*=.492) which means there is no significant influence of Herd behaviour on Actual return. Since the positive beta coefficient with insignificant *p*-value at 5% level, it can be inferred that the cause-and effect relationship is not exist between the Herd behaviour and Actual return. The regression coefficient of 'Herd behaviour' on 'Trading Satisfaction' is -0.014 with *p*=.803, which indicate that the impact of Herd behaviour on Satisfaction is not significant.

Regarding the effect of Emotional bias on the trading performance, the Beta coefficients of all the three paths are -0.072, -0.112 and -0.045 respectively with *p>.05*. Hence, the cause-and-effect relationship between Emotional bias and trading performance is not established.

Finally, the Beta coefficient of standardized direct effect of 'Market Impact' on 'Subjective return is -0.284 (*p*<.01) explains the significant negative influence of the Market impact bias on the Subjective return. More clearly, a 1-point increase in the 'Market impact bias', leads to a 0.284-point decrease in Subjective return. The standardized regression coefficient of 'Market impact' on 'Actual return' is -0.10 (*p*=.124) which means there is no significant influence of Market impact bias on Actual return. Since the beta coefficient is negative and not significant at 1% level, the causal relationship is not established between Market impact bias and Actual return. The standardized regression coefficient of 'Market impact' on 'Trading Satisfaction' is -0.221 (*p*<.01) indicating a significant negative influence Market impact bias on Trading satisfaction. It means, when Market impact bias goes up by 1; Trading satisfaction goes down by 0.221.

From the above table, it is clear that the heuristic bias, prospect bias and herd behaviour have significant negative impact on subjective return and trading satisfaction. At the same time, these biases have no significant impact on the actual return of equity derivative traders. The emotional biases have no significant impact on any of the dimensions of trading performance. The market impact bias has significant negative influence on the subjective return and trading satisfaction, and it will not influence the actual return.

7.15 Conclusion

This chapter examined the trading performance and satisfaction of equity derivative traders in Kerala. The aim of this chapter is to shed light on the impact of trading knowledge, trading strategies and behavioural biases on the trading performance of equity derivative traders in Kerala. This study examined trading performance in terms of trading return and trading satisfaction. The return from derivative trading is examined using three statements and found that the majority of equity derivative traders realized a consistent return as per their expectations and which is also higher than the return realized from the equity market. The trading satisfaction of equity derivative traders was also examined in this chapter. It is found that the majority of equity derivative traders are satisfied with the return, hedge efficiency and broker competency of trading derivatives.

In the second part of this chapter, the trading performance of equity derivative traders is compared concerning seven demographic variables using ANOVA and independent sample t-test. It is found that there is no significant difference in the trading performance of traders belonging to different areas, gender, age, occupation and trading experience. Whereas, the education level and amount of trading capital significantly influence the trading performance of equity derivative traders in Kerala. A correlation analysis is also conducted between the trading performance of equity derivative traders and the amount of their trading capital to know their direction and degree of relationship and found that there is a positive correlation between trading performance and the amount of trading capital used by equity derivative traders. It means that when the amount of trading capital increases, trading performance will also grow. Therefore, it is evident that the level of knowledge of traders has a positive impact on their trading performance.

Finally, this chapter examined the impact of Trading Knowledge, Trading Strategies and Behavioural Biases on Trading Performance using Structural Equation Model, to understand the cause-and-effect relationship between the independent and dependent variables. It is found that all three independent variables are significantly contributing to the trading performance of equity derivative traders. The summary, findings and conclusion of this study is presented in the next chapter.

REFERENCES

Barber, B. M., & Odean, T. (2000). Trading Is Hazardous to Your Wealth : The Common Stock Investment Performance of Individual Investors. *The Journal of Finance*, *55*(2), 773–806. https://doi.org/10.2139/ssrn.219228

Byrne, B. M. (2010). Structural Equation Modeling with Amos: Basic Concepts, Applications, and Programming. In *Structural Equation Modeling with Amos: Basic Concepts, Applications, and Programming, Third edition* (Second Edi). Routledge - Taylor& Francis Group. https://doi.org/10.4324/9780805863727

Fan, Y., Chen, J., Shirkey, G., John, R., Wu, S. R., Park, H., & Shao, C. (2016). Applications of structural equation modeling (SEM) in ecological studies: an updated review. *Ecological Processes*, *5*(1), 1–12. https://doi.org/10.1186/s13717-016-0063-3

Hill, A. I. (2015). *How to Measure Your Trading Performance*. Trading Sim.Com. https://www.tradingsim.com/day-trading/how-to-measure-your-trading-performance

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Joseph F. Hair, William C. Black, Barry J. Babin, R. E. A. (2010). *Multivariate Data Analysis* (7th Editio). Prentice Hall.

Kim, K., & Nofsinger, J. (2003). The Behavior and Performance of Individual Investors in Japan. *Pacific Basin Finance Journal*, *11*.

Lin, A. Y., & Swanson, P. E. (2003). The Behavior and Performance of Foreign Investors in Emerging Equity Markets : Evidence from Taiwan. *International Review of Finance*, *4*(3–4), 189–210. https://doi.org/10.1111/j.1468-2443.2005.00046.x

Luong, L. P., & Ha, D. T. T. (2011). *Behavioral Factors Influencing Individual Investors' Decision-Making and Performance* [Umea University, Sweden]. www.usbe.umu.se

Oberlechner, T., & Osler, C. (2008). Overconfidence in Currency Markets. *SSRN Electronic Journal*, 1–39. https://doi.org/10.2139/ssrn.1108787

8.1 Introduction

The study's overview, results, and conclusions are presented in this chapter. A brief discussion of the Research problem, objectives, hypotheses and summary of chapters are included in the initial part of this chapter. The key findings, in relation to the research goals and conclusions drawn from the investigations are given in the last part of this chapter. A summary of the study's key findings concludes this chapter.

8.2 The Research Problem in Brief

The increased volatility in the financial market also increased the popularity of the derivatives market in India. The National Stock Exchange of India Ltd. (NSE) emerged as the World's largest derivative exchange in 2019 by the number of contracts traded also evidenced this popularity. People mostly participate in the derivatives market for hedging and speculation. Most traders are unaware of the ways of using derivatives to protect their investment portfolio and they are trading without adequate knowledge. Speculators on the other hand enter the market for earning speculative profit through various trading strategies. A thorough knowledge of market and trading strategies are essential for earning consistent speculative profit. In addition to the above the rational and irrational behaviour of individuals may also influence their trading decision and thereby trading performance. It is known that behavioural biases exist among investors in the Indian stock market. But so far, no studies have examined the influence of behavioural factors on the trading decisions of equity derivative traders in India. In this background, it is very relevant to study the level of knowledge, trading strategies and behavioural biases of equity derivative traders in Kerala.

8.3 Objectives of the Study

Based on the research questions, the following objectives are set forth:

1. To examine the level of knowledge of equity derivative traders about the derivatives market and trading strategies.
2. To identify the trading preferences and strategies of equity derivative traders in Kerala.
3. To explore the influence of behavioural biases on the trading decisions of equity derivative traders in Kerala.
4. To assess the trading performance in terms of return and satisfaction of equity derivative traders.
5. To compare trading performance with respect to different levels of knowledge, strategies and behavioural biases of equity derivative traders.
6. To measure the impact of knowledge level, trading strategies and behavioural biases on the trading performance of equity derivative traders.

8.4 Hypotheses

Based on the above objectives the following hypotheses have been formulated and tested:

8.4.1 Null Hypotheses based on the First objective of the study are:

$H0_1$: There is no significant difference in the level of knowledge among equity derivative traders of different demographic groups

$H0_2$: There is no significant difference in the level of knowledge among equity derivative traders according to trading variables.

8.4.2 Null Hypotheses based on the second objective of the study are:

$H0_3$: There is no significant difference in the use of trading techniques and strategies among equity derivative traders of different demographic groups

$H0_4$: There is no significant difference in the use of trading techniques and strategies among equity derivative traders according to trading variables.

$H0_5$: There is no significant difference in the use of trading strategies among equity derivative traders with different knowledge levels.

8.4.3 Null Hypotheses based on the third objective of the study are:

$H0_6$: There is no significant difference in the influence of behavioural bias among equity derivative traders of different demographic groups

$H0_7$: There is no significant difference in the influence of behavioural bias among equity derivative traders according to trading variables.

$H0_8$: There is no significant difference in the influence of heuristic variables among equity derivative traders of different demographic groups

$H0_9$: There is no significant difference in the influence of heuristic variables among equity derivative traders according to trading variables.

$H0_{10}$: There is no significant difference in the influence of prospect variables among equity derivative traders of different demographic groups

$H0_{11}$: There is no significant difference in the influence of prospect variables among equity derivative traders according to trading variables.

$H0_{12}$: There is no significant difference in the influence of the herding effect among equity derivative traders of different demographic groups

$H0_{13}$: There is no significant difference in the influence of the herding effect among equity derivative traders according to trading variables.

$H0_{14}$: There is no significant difference in the influence of the emotional bias among equity derivative traders of different demographic groups

$H0_{15}$: There is no significant difference in the influence of the emotional bias among equity derivative traders according to trading variables.

$H0_{16}$: There is no significant difference in the influence of the market impact bias among equity derivative traders of different demographic groups

$H0_{17}$: There is no significant difference in the influence of the market impact bias among equity derivative traders according to trading variables.

$H0_{18}$: There is no significant difference in the influence of behavioural factors among equity derivative traders with different knowledge levels.

8.4.4 Null Hypotheses based on the fourth objective of the study are:

$H0_{19}$: There is no significant difference in the trading performance among equity derivative traders of different demographic groups

$H0_{20}$: There is no significant difference in the trading performance among equity derivative traders according to trading variables.

$H0_{21}$: There is no significant difference in the trading performance of equity derivative traders with different knowledge levels.

$H0_{22}$: There is no significant difference in the trading performance of equity derivative traders with different trading strategies.

$H0_{23}$: There is no significant difference in the trading performance of equity derivative traders with different levels of behavioural bias.

$H0_{24}$: There is no relationship between trading performance and the amount of trading capital.

8.4.5 Null Hypotheses based on the fifth objective of the study are:

$H0_{25}$: The level of knowledge of equity derivative traders does not have a significant contribution to the trading performance.

$H0_{26}$: The trading strategy of equity derivative traders does not have a significant contribution to the trading performance.

$H0_{27}$: The behavioural biases of equity derivative traders do not have a significant impact on trading performance.

8.5 Brief Methodological Design

This study is designed as a cross-sectional descriptive and analytical research. The data required for the study were collected from both secondary and primary sources. The Secondary data required for the study were compiled from the websites of NSE, BSE, FIA, WFE, journals, books, magazines and other websites. Primary data were collected from a sample of derivative traders in Kerala by using a self-completion questionnaire sent through Google Forms.

The population for the study is quite large and spread throughout the State of Kerala. The required data were collected through a sample survey since the sampling frame is not available purposively. In order to collect primary data structured questionnaire was used, which contain closed-ended questions including both multiple choice questions and Likert scale questions. A 5-point Likert scale was used to gather data regarding the main variables of the study.

The statistical software SPSS Version 22 and AMOS Version 23 were used for the analysis of primary data. Since the data proves the normality, reliability and validity requirements parametric tests have been used to compare the statistical difference between the variables. Therefore, descriptive statistics, correlation, one-sample t-test, independent sample t-test, one-way ANOVA, Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA) and Structural Equation Modelling (SEM) were used as the statistical tools and techniques.

8.6 Summary of the Chapters

The purpose of this study is to investigate the trading knowledge, trading tactics, behavioural bias, and trading performance of equity derivative traders in Kerala. The report of this study is presented in nine chapters as described below:

Chapter One gives an introduction to this research. The research problem, objectives, scope and significance, study variables, hypotheses and conceptual model are discussed in this chapter. The research questions and operational definitions of concepts are also included in the introduction chapter. This chapter gives a bird’s eye view of the structure of the entire study.

Chapter two provides a literature review of documents relating to the derivatives market. The data set for the literature review have been extracted from Scopus, Shodhganga, SSRN, JSTOR, Google Scholar and Research Gate. The selected literature was reviewed and presented in two sections. In one section, reviews of studies relating to the derivatives market are presented and, in another section, studies relating to behavioural finance are reviewed. Finally, based on the extensive literature survey a research gap is identified and presented in the last section of the chapter.

The third chapter presents the theoretical background of this study. A brief description of the derivative market, derivative trading mechanism, futures and options trading strategies and current statistics relating to futures and options trading are described in this chapter. Theories relating to behavioural finance and behavioural biases are also discussed in the second part of this chapter.

The design and methodology of this research is explained in chapter four. The source of data, sampling design, determination of sample size, etc. are discussed in the first part of this chapter. The questionnaire design, data analysis tools and the determination of the validity of measurement scales used in this study are described in the second part of this chapter.

The trading knowledge, preferences and trading strategies are examined in chapter five of this research report. The demographic and trading profile of respondents were described in the first part of this chapter by using descriptive statistics. The level of knowledge about various aspects of the derivatives market has been examined with the help of variables identified in literature review. The knowledge level of derivative traders has been compared with different demographic variables and found that age, education, trading experience and trading capital significantly influence the knowledge level. Trading objectives and preferences are also examined in this chapter and found that the majority of equity derivative traders are speculating with index options for getting more return. A comparison of trading strategies with demographic variables is also made and it is found that age, education, occupation and trading capital significantly influence the use of trading strategies.

The sixth chapter examines the influence of behavioural bias on the trading decisions of equity derivative traders in Kerala. The influence of behavioural bias on trading decisions has been studied using fifteen variables which were identified through a literature review. In this chapter, five dimensions of behavioural biases have been studied separately and compared with demographic variables to identify whether any differences exist among different demographic groups. The overall analysis of the influence of behavioural bias shows that equity derivative traders in Kerala are highly influenced by behavioural biases in their trading decision.

The trading performance of equity derivative traders were examined in chapter seven. Two types of variables were used to measure trading performance; trading return and trading satisfaction. In another section of this chapter trading performance of equity derivative traders is compared with respect to seven demographic variables using independent sample t-test and One-way ANOVA. Finally, this chapter examines the impact of trading knowledge, trading strategies and behavioural bias on trading performance using Structural Equation Model. The result shows that there is a significant cause-and-effect relationship existing between the independent and dependent variables.

In Chapter Eight, a brief overview of the research is presented, which includes the research problem, objectives, hypotheses and methodological design. A summary of the previous chapters, findings of this study and conclusions are also included in this chapter.

Chapter Nine is the final chapter of this research report. In this chapter recommendations, implications to the stakeholders and scope for future research are given.

8.7 Findings of the Study

Here the findings of the study have been reported in eight sections. Section 1 deals with the profile of respondents. Section 2 includes the findings relating to the trading knowledge of equity derivative traders in Kerala. The findings of the study relating to the objectives and preferences of traders are described in section 3. The trading techniques and strategies of equity derivative traders are reported in section 4. Section 5 includes the findings relating to the behavioural biases of equity derivative traders in Kerala. The study findings relating to the trading performance are exhibited in section 6, and the comparison of trading performance concerning various levels of trading knowledge, strategies and behavioural biases is presented in section 7. Finally, the results of the SEM analysis are presented in Section 8.

Section 1 – Profile of the Respondents

The demographic profile of the respondents is discussed here. Only descriptive statical analysis has been performed in this section. The findings are described below:

1. Out of 300 respondents, 52% of the sample derivative traders reside in urban areas and 48% reside in rural areas.

2. Majority (88%) of the sample derivative traders are male and the remaining (12%) are female.

3. Out of 300 sample derivative traders 13 (4.3%) have passed SSLC, 10 (3.3%) have higher secondary qualification, 130 (43.3%) are graduates, 92 (30.7%) are post-graduates and 55 (18.3%) have professional qualifications.

4. Among 300 respondents 38 (12.7%) are employed in the government sector, 97 (32.3%) are employed in the private sector, 46 (15.3%) are professionals, 37 (12.3%) are self-employed, 52 (17.3%) are doing business and the remaining 30 (10%) are full-time derivative traders.

5. From the set of 300 sample derivative traders 85 (28.3%) are in the age group of 30 years and below, 135 (45%) are in the age group of 31-40, 55 (18.3%) are the age group of 41-50 and the remaining 27 (8.3%) are above 51 years.

6. Among total respondents, 7.3% have an average annual income of Rs.2 Lakhs and below, 32.7% belong to the annual income category of Rs. 2-5 lakhs, 26.3% belong to Rs.5-10 lakhs, and 33.7% belong to more than Rs.10 lakhs annual income category.

7. Among all respondents, more than half (53.7%) of the sample derivative traders have an experience of 2 years and below, 27% (81) have an experience of 3-5 years, 10.7% have an experience of 5-10 years and only 8.7% is have more than 10 years' experience.

8. Amongst 300 sample derivative traders 74 (24.7%) use a monthly trading capital of below Rs. 1 lakh, 136 (45.3%) use a monthly trading capital of Rs. 1-5 lakhs, 29 (9.7%) of respondents use a monthly trading capital between Rs. 10 and 20 lakhs and remaining 37 (12.3%) use more than Rs. 20 lakhs for trading equity derivatives in a span of 30 days.

9. Majority (35%) of the respondents are maintaining derivatives trading accounts with Zerodha, 13.7% of respondents are trading with Geojit, 11.7% are trading with Acumen Capital, followed by Motilal Oswal with 10.7% of traders, 28 respondents (9.3%) are maintaining a trading account in Upstox, 13 (4.3%) each with Angel One and Composite Edge.

Section 2 – Trading Knowledge of Equity derivative traders

The knowledge of derivatives traders is assessed in two groups – knowledge about the basics of the derivatives market and knowledge about trading strategies. Descriptive statistical analysis, one-sample t-test, independent sample t-test and one-way ANOVA were applied to arrive at the following findings.

1. The sample derivative traders have a high level of knowledge of all seven aspects of the basics of the derivatives market. Knowledge of brokerage and other charges has the highest mean score and knowledge of SEBI regulations and guidelines has the lowest mean score. Mean scores of all variables are significantly above the mean score of the response scale i.e., 3 with 't' values showing significance at 5 per cent level of significance.

2. Among 300 sample derivative traders 28 (9.3%) have a low level of knowledge on the basics of the derivative market, 822 (27.3%) traders have medium knowledge and 190 (63.4%) have a high level of knowledge on the basis of derivative market. The mean score obtained for measuring the level of knowledge on the basis of the derivative market is 2.54, which is above the mean score of the response scale i.e., 2.

3. The sample derivative traders have a high level of knowledge of only three F&O trading strategies namely basic futures and options strategies, chart-based trading strategies and strategies like straddle, strangle, etc. At the same time, they have reported a low level of knowledge of Delta Neutral Trading Strategy, options strategy builder, algo trading and pair trading strategy.

4. Amongst 300 sample derivative traders 99 (33%) have low knowledge about trading strategies, 103 (34.3%) traders have medium knowledge and 98 (32.7%) have a high knowledge level on F&O trading strategies. The one-sample t-test shows that the difference between means is statistically not significant because of the *p*-value of 0.943 (p>.05). It means that derivative traders in Kerala have a medium level of knowledge on futures and options trading strategies.

5. The mean score of the knowledge level of urban and rural traders are 50.04 and 49.46 respectively and indicates very little difference between the mean values. Hence, there is no significant difference in the level of knowledge between traders from urban and rural areas.

6. The mean score of the knowledge level of male and female traders are 49.68 and 50.39 respectively and indicates very little difference between the mean values. Since the *p*-value (0.744) is more than 0.05, there is no significant difference in the level of knowledge between male and female equity derivative traders.

7. The age group *41-50 (group 3)* has the highest mean score of knowledge level and the age group *51& above (group 4)* has the lowest mean score of knowledge level about the derivatives market. The one-way ANOVA reveals that there is a

statistically significant difference in the mean score of knowledge level among traders of different age groups.

8. The traders with post-graduation have the highest mean score (51.85) of knowledge level and traders with SSLC have the lowest mean score (36.15) of knowledge level about the derivative market. Further, there is no statistically significant difference in mean knowledge scores between traders of higher secondary and above qualifications.

9. There exists a significant difference in the mean score of knowledge level among traders with different years of trading experience. Traders with 5-10 years of trading experience have highest knowledge level with a mean score of 55.50, and traders with below 2 years' experience have the lowest knowledge level about the derivatives market with a mean score of 47.25.

10. There exists a significant difference in the mean score of knowledge level among traders with different amounts of trading capital. Traders with a trading capital of *10-20 lakhs* have the highest knowledge level with a mean score of 55.92 and traders with a trading capital of *below 1 lakh* have the lowest knowledge level about the derivatives market with a mean score of 47.01. It is found that the knowledge level about the derivatives market is increasing with a corresponding increase in the trading capital of derivative traders.

11. Out of 300 sample derivative traders 52 (17.3%) have a low level of knowledge about the derivative market, 101 (33.7%) traders have a medium level of knowledge about the derivative market and 147 (49%) have a high level of knowledge about the derivative market.

Section 3 – Objectives and Preferences of Equity Derivative Traders

The objectives and preferences of equity derivative traders in Kerala are presented in this section. Multiple-choice questions were asked of respondents about their trading preferences and objectives, and only descriptive analysis is performed in this section. The results are discussed below:

1. Earning speculative profit (44.3%) is the most preferred trading objective of traders in the derivatives market. Among 300 respondents, 5.3% aim at trading derivative for hedging, 44.3% for speculation, 25% for both hedging and speculation, 3.7% for earning arbitrage gain and the remaining 21.7% for getting an additional return on an existing equity portfolio.
2. The result shows that the options market is the most preferred market for derivative traders as more than 50 % of the traders prefer the options market for trade.
3. It is found that the index option is the most preferred contract for derivative traders as more than 50 % of the traders prefer index options for trade.
4. It is clear that intra-day trade is the most popular type of trade among derivative traders as 40 % of the traders prefer intra-day trade.
5. The analysis shows that a weekly expiring contract is the most popular type of contract among derivative traders.
6. It is identified that ATM options (At-the-Money) are the most demanding strike price for options traders.
7. The result explains that the majority of options traders are using different types of options strategies based on market trends.
8. It is found that Opstra is the most popular options strategy builder software among derivative traders in Kerala.
9. Amongst 300 respondents 104 (34.7%) traders square off their position when the market moves adversely, 99 (33%) traders wait for stop-loss and 73 (24.3%) traders modify their strategy in the event of adverse movement in the market.

Section 4 – Trading Strategies of Equity Derivative Traders in Kerala

The trading strategies of equity derivative traders are examined using 11 statements/variables on a five-point scale. The data were analysed using descriptive statistics, one-sample t-test, independent sample t-test and one-way ANOVA. The findings are described below:

1. It is found that most of the equity derivative traders use stop-loss for all their trade. Further, the majority of them frequently use the movement of foreign stock market indices for designing their trading strategies.

2. The result shows that the majority of the traders are not using options strategy builder software for their trade. Likewise, most equity derivative traders do not use Algorithm trading techniques.

3. It is found that the majority of the traders are highly using index options and futures for the trade than stock options and futures. Similarly, most of the equity derivative traders are highly using risk-reward ratio while designing their trading strategies in the derivatives market.

4. The analysis shows that the majority of the traders are highly prefer option selling to buying options while designing their trading strategies. At the same time, most of the traders are moderately using option Greeks for designing their trading strategies.

5. It is elucidated that the majority of the traders are moderately using the put-call ratio for designing their trading strategies. Likewise, most traders are highly using IV and VIX for designing their trading strategies. Further, the majority of traders are highly considering the cost of strategy while designing their trading strategies.

6. Among 300 sample derivative traders 62 (20.67%) have low use of trading techniques, 123 (41%) traders have medium use of trading techniques and 115 (38.3%) have high use of trading techniques and strategies specified in this study. The mean value of 2.17 explains that the use of trading techniques and strategies is moderately high among equity derivative traders in Kerala.

7. There is no significant difference between urban and rural traders as well as male and female traders with regard to trading techniques and strategies.

8. There exists a significant difference in the mean score of trading techniques and practices among traders of different age groups. It is found that out of six group comparisons with regard to trading techniques and practices, the age group 51 & above is significantly different from all other age groups.

9. It is found that there is a difference in the mean score in the use of trading techniques between traders with different educational qualifications. The traders with post-graduation have the highest mean score (36) and traders with SSLC is have the lowest mean score (28.08) for the use of trading techniques and strategies. Hence, they have a statistical mean difference with the significant test statistic.

10. The mean score of full-time traders is the highest (40.00) and govt. employees are lowest (33.03), which shows that the full-time traders are highly using these trading techniques and strategies. Furthermore, there is no significant difference in trading strategies among traders of Govt. employees, Private Employees, Professionals, self-employed and business.

11. It is found that there is a very small difference in the mean score of trading techniques and strategies between traders with different years of trading experience. The traders with 5-10 years of trading experience have the highest mean score (36.94) and traders with below 2 years of experience have the lowest mean score (35.61).

12. It is evident that there is a difference in the mean score of trading techniques and strategies among traders with different amounts of trading capital. The traders with trading capital of *Above 20 lakhs have* the highest mean score (40.95) and traders with trading capital of *below 1 lakh have* the lowest mean score (33.57). It is found that traders with higher trading capital are highly using trading techniques and strategies listed in this study.

Section 4.1 – Comparison of Trading Strategies of Traders with different levels of Knowledge

Based on the level of knowledge the equity derivative traders are classified into three categories. Category 1 represents traders with a low level of knowledge, Category 2 represents traders with a moderate level of knowledge, and Category 3 represents traders with a high level of knowledge about the derivatives market. The objective of this analysis is to examine, whether there is any difference in the trading strategies among traders of different categories of trading knowledge. To find out the statistical significance of the difference, descriptive analysis has been done and one-way ANOVA is performed. The findings are summarised below:

1. The result shows that there is a difference in the mean score of trading strategies among traders with different levels of knowledge. Category 1 traders (with low knowledge level) have the lowest mean score (29.88) and Category 3 traders (with high knowledge level) have the highest mean score (39.30). It is evident that traders with a higher level of knowledge about the derivatives market are highly using trading techniques and strategies listed in this study.

Section 5 – Behavioural Biases influencing trading decisions of Equity Derivative Traders

In this study, behavioural factors influencing the trading decisions of equity derivative traders are divided into five groups: Heuristics, Prospect, Herding, Emotions and Market impact bias based on a Literature survey. Qualitative statements with a five-point Likert scale were used to measure the influence of behavioural biases of equity derivative traders. The objective of this analysis is to examine the level of influence of behavioural biases on the trading decisions of equity derivative traders. To find out the level of bias and statistical significance of the difference, descriptive statistical analysis, one-sample t-test, independent sample t-test and one-way ANOVA were applied. The findings according to each behavioural factor are summarised below:

Section 5.1 – Influence of Heuristic Variables on the trading decisions of Equity derivative traders

Heuristics are generally referred to as the rules of thumb or mental shortcuts that narrow down our decision-making process *(Shefrin, 2002)*. These shortcuts appeal to our instincts to avoid complexities as they simplify the situation and provide a quick solution *(Kapoor & Prosad, 2017)*. Individuals use heuristics to simplify information to make a choice between different preferences or alternatives *(Schwartz, 2010).* In this study, four heuristic-driven biases have been selected to examine the influence of heuristics on the trading decisions of equity derivative traders. They are; Representativeness, Anchoring, Overconfidence and Gambler's fallacy. The influence of the above heuristic-driven biases has been measured using statements with a 5-point Likert scale and analyzed using descriptive statistics, one-sample t-test, independent sample t-test and one-way ANOVA. The result of the data analysis is presented below:

1. With respect to the influence of heuristic variables on the trading decisions of equity derivatives traders, it is found that representative bias, anchoring bias and overconfidence bias strongly exist among equity derivative traders. But gamblers fallacy bias does not exist among them.

2. The combined influence of heuristic variables indicates that there exists a high level of influence among equity derivative traders with significant test statistics.

3. It can be observed that the mean score of influence of the heuristic variable of male and female traders are 14.00 and 14.67 respectively and indicates very little difference between the mean values and hence there is no statistically significant difference in the influence of heuristic variables between male and female traders.

4. There exist only minor differences in the mean score of the influence of heuristic variables among traders of different age groups. The age group 4*1-50 (group 3)* have the highest mean score of influence of heuristic variables and the age group *51& above (group 4)* have a lowest mean score of influence of heuristic variables.

5. It is found that there are no significant differences in the mean score of influence of heuristic variables among traders with different educational qualifications. The traders with professional degree have the highest mean score (14.29) of influence of heuristic variables and traders with SSLC have lowest mean score (13.95) of influence of heuristic variables.

6. The comparative analysis between trading experience and influence of heuristic variables on trading decision discloses that the difference in the mean score of

influence of heuristic variables is statistically not significant among traders with different years of trading experience. Similarly, with respect to trading capital, there is no significant difference in the mean score in the influence of heuristic variables.

Section 5.2 – Influence of Prospect Variables on the trading decisions of Equity derivative traders

Kahneman & Tversky, (1979) point out that individuals attach values to the prospect of gains or losses rather than the prospect of actual monetary wealth. These gains or losses are calculated from a reference point. The reference point is generally the status quo of the agents. Moreover, they found that individuals assign more importance to losses than to gains, as losses hurt more. Therefore, individuals will tend to avoid losses at all costs, which suggests that individuals are loss averse rather than risk averse. *Kahneman & Tversky, (1979)* have summarized all these findings in the Prospect Theory. Prospect theory describes some states of mind affecting individual decision making processes including regret aversion, loss aversion and mental accounting *(Waweru et al., 2008).* The influence of the above prospect theory-driven biases has been measured using statements with a 5-point Likert scale and analyzed using descriptive statistics, one-sample t-test, independent sample t-test and one-way ANOVA. The result of the data analysis is presented below:

1. In the case of influence of prospect variables, loss aversion, regret aversion and mental accounting bias are strongly existing among equity derivative traders in Kerala. The combined influence of prospect variables indicates that there exists high level of influence among equity derivative traders with significant test statistic.

2. It is found that the mean score of influence of prospect variable on male and female traders are 11.13 and 11.83 respectively and indicates very little difference between the mean values. Therefore, there is no significant difference in the influence of prospect variables between male and female equity derivative traders in Kerala.

3. The age-wise comparison reveals that the age group 31-40 (group 2) have the highest mean score (11.49) of influence of prospect variables and the age group 51& above (group 4) have the lowest mean score (9.16) of influence of prospect variables. Hence there exists significant difference in the influence of prospect variables among different age groups of equity derivative traders in Kerala.

4. The education-wise comparison discloses that the traders with SSLC have the highest mean score (13) of influence of prospect variables and traders with professional qualification have lowest mean score (9.25) of influence of prospect variables. There exists a statistical-significant difference in the mean score of influence of prospect variables among traders of different educational qualifications.

5. There is no significant difference among the means of influence of prospect variables of the four groups of derivative traders with respect to different trading experiences as well as different trading capital.

Section 5.3 – Influence of Herding Effect on the trading decisions of Equity derivative traders

Herding is the tendency of investors to follow the crowd without considering their own judgement *(Kapoor & Prosad, 2017)*. The preference of herding depends on types of traders. For example, individual traders have a tendency to follow the crowds in making their decisions more than institutional investors *(Goodfellow et al., 2009).* In this study three herding-driven biases are considered to examine the effect of herding on the trading decisions of equity derivative traders; they are, following general market trends, following analyst's recommendations, and following news about companies. The influence of the above herding-driven biases has been measured using statements with a 5-point Likert scale and analyzed using descriptive statistics, one-sample t-test, independent sample t-test and one-way ANOVA. The result of the data analysis is presented below:

1. The influence of herding effect discloses that following general market trend and news about the companies/events before taking trading decisions strongly exists

among equity derivatives. But the bias of following the analyst recommendation moderately affects the trading decisions of derivative traders. The combined mean score explains that influence of herd behavior exists among the equity derivatives traders in Kerala.

2. It is found that there is no significant difference in the influence of herd behaviour among equity derivative traders according to their gender and age groups.
3. There exists significant difference in the influence of herd behavior among equity derivative traders according to their educational qualification. Here, the traders with higher secondary have the lowest mean score (8.30) and traders with post-graduation have the highest mean score (10.80) of influence of the herd behaviour.
4. The study shows that the difference in the mean score of influence of herd behaviour is statistically not significant among traders with different years of trading experience and different amounts of trading capital.

Section 5.4 – Influence of Emotional Bias on the trading decisions of Equity derivative traders

Emotion is the intense feeling that is directed at someone or something *(Sulphey, 2014)*. Emotions such as fear, greed, hope, anger, pride, excitement, mood, etc., influence the investment decision making and these emotions determine the risk tolerance level of an investor *Peters & Slovic, (2000)*. According to *Shefrin, (2002)* the most commonly identified emotions that contributed to the financial fragility and irrational exuberance are greed, hope and fear. Based on these literatures in this research, three emotional factors such as greed, hope and fear are considered to examine the influence of emotions on the trading decisions of equity derivative traders. The influence of emotional biases was quantified using 5-point Likert scale statements and analyzed using descriptive statistics, one-sample t-test, independent sample t-test, and one-way ANOVA. The following is the outcome of the data analysis:

1. Regarding the influence of emotional biases on the trading decisions of equity derivative traders it is found that greed and hope strongly influence the trading

decisions. Further, the emotional bias of fear also exists among them. The combined mean score explains that the influence of emotional biases strongly exists among equity derivative traders with significant test statistic.

2. It is observed that the mean score of influence of emotional bias on male and female traders are 10.69 and 11.58 respectively, and indicates a small difference in the mean score between them. As the mean score is higher in the case of female traders it can be concluded that the influence of emotional bias is high on the trading decisions of female traders than male traders.

3. It is found that there are significant differences in the mean score of influence of emotional bias among traders of different age groups. The age group 3*1-40* have the highest mean score (11.16) and the age group *51& above* have the lowest mean score (9.24) of influence of emotional bias. It is evident that the influence of emotional bias is less among traders in the age group of above 41 years as compared to traders of below 40 years. It can also be inferred that the impact of emotional bias on the trading decision of equity derivative traders are decreasing with increase in age.

4. The traders with SSLC have the lowest mean score (10.08) and traders with Higher secondary have the highest mean score (11.80) with respect to the influence of the emotional bias. But there is no statistical evidence to prove the exact significant difference between them. Therefore, the null hypothesis could not be rejected and hence, there is no significant difference in the influence of emotional biases among traders according to their educational qualifications.

5. It is found that there is significant difference in the mean score of influence of emotional bias among traders with different years of trading experience. So to say the influence of emotional bias is minimum among traders with more trading experience. But there is no significant difference in the mean score of influence of emotional bias among equity derivative traders with different amount of trading capital.

Section 5.5 – Influence of Market impact Bias on the trading decisions of Equity derivative traders

According to *Waweru et al., (2014)* market information has a significant influence on investor's decisions and as a result, investors tend to focus on well-known stocks and other newsworthy events that are based on stock market information. *Barber & Odean, (2000)* emphasize that investors are impacted by events in the stock market which grab their attention, even when they do not know if these events can result good future investment performance. In line with the findings of *Waweru et al., (2008)*, this study treats market factors fairly as behavioural factors influencing trading decisions, and it chose two market factors, namely market sentiments and stock past trends, to investigate the impact of market impact on the trading decisions of equity derivative traders in Kerala. The influence of market factors was assessed using statements on a 5-point Likert scale, and similar analysis was carried out, yielding the following results:

1. Regarding the influence of market impact biases, the equity derivative traders are strongly influenced by the market sentimental biases and biases of past trends of stock. The overall mean score explains that there exists strong influence of market impact biases among traders for taking trading decisions.

2. The result of gender-wise comparison of influence of market bias discloses that there exists significant difference among equity derivative traders. It also indicates that the influence of market impact is higher on female traders than male traders.

3. It is found that there is no significant difference in the mean score of influence of market impact biases among traders according to their different age groups.

4. The test result reveals that there is statistically significant difference in the mean score of influence of market impact biases among traders of different educational qualifications.

5. It is found that there is a very small difference in the mean score of influence of market impact among traders with different years of trading experience and different amount of trading capital.

Section 5.6 – The Overall Influence of Behavioural Biases on the trading decisions of Equity derivative traders

The overall influence of behavioural biases on the trading decisions is assessed by combining all fifteen variables (under five groups). Based on the level of influence of behavioural bias, the equity derivative traders are categorized into three groups such as Low, Medium and High. The overall influence of behavioural biases is compared with respect to demographic variables by using descriptive statistics, independent sample t-test and one-way ANOVA, and the findings are summarised below:

1. The result indicates that the mean score of the influence of behavioural factors is 2.61, which is higher than the mean score of the response scale i.e., 2 and hence there exists strong influence of behavioural biases among equity derivative traders in Kerala.

2. It is found that there is no significant difference in the influence of behavioural factors between male and female equity derivative traders in Kerala.

3. The age group 3*1-40* have the highest mean score of influence of behavioural factors and the age group *51& above* have a lowest mean score of influence of behavioural factors about the derivative market. The test result reveals that there is a statistically significant difference in the mean score influence of behavioural factors among traders of different age groups.

4. It is found that there are differences in the mean score of influence of behavioural factors among traders with different educational qualifications. The traders with post-graduation have the highest mean score (55.39) of influence of behavioural factors and traders with SSLC have lowest mean score (50.23) of influence of behavioural factors.

5. The result explains that there is no significant difference in the influence of behavioural biases on the trading decision of equity derivative traders with different years of trading experience and different amount of trading capital.

6. Differences in the influence level of behavioural bias among traders with different categories of knowledge level is examined and it is found that, there is a difference in the mean score of influence of behavioural factors among traders with different levels of Knowledge. The traders with a high level of Knowledge (Category 3) have the lowest mean score (33.97) of influence of behavioural bias and traders with Low level of knowledge (Category 1) have the highest mean score (41.08) of influence of behavioural biases. The one-way ANOVA reveals that there is a statistically significant difference in the mean score of influence of behavioural biases among traders of different knowledge levels.

Section 6 – Trading Performance of Equity Derivative Traders in Kerala

Trading performance refers to a means of assessing how well a trader executes his trades. In this research the trading performance of equity derivative traders is evaluated by the objective and subjective viewpoints of individual traders.The subjective evaluation of traders is done by asking them to compare their present real return rates to their expected return rates, whereas the objective evaluation is done by comparing the real return rates to the security market's average return rate *(Oberlechner & Osler, 2008)*. According to *Luong & Ha, (2011)*, investment satisfaction has a strong relationship with return rates; thus, the level of satisfaction with investment decisions is proposed as a criterion to quantify investment performance. Respondents were asked for three statements each in order to assess the performance and satisfaction of equity derivative traders and the data were analyzed using appropriate statistical techniques. The outcome of the data analysis is presented below:

1. It is found that the return realized by the majority of the equity derivative traders meets their expectations and 46% of respondents are in the opinion that their rate of return from F&O trade is higher than the average rate of return realized from equity market. With regard to consistency in return, 59% of traders have reported that they are getting a consistent return from F&O trading in the last year. The one-sample t-test indicates that the trading performance of equity derivative traders is more than the average.

2. The result shows that majority of the equity derivative traders are satisfied with the return achieved through trading derivatives. With regard to hedge efficiency, it is found that most of the equity derivative traders are satisfied with the hedging efficiency of equity derivatives. Satisfaction with respect to the broker's competency and service shows that 64.4 per cent of traders are satisfied and 11.3 per cent of traders are not satisfied. The one-sample t-test also indicates that the trading satisfaction of equity derivative traders in Kerala is high.

3. It is found that there is no significant difference in the performance level of equity derivative traders according to gender and area of residence.

4. It is found that there is a statistically significant difference in the performance level of derivative traders with different educational qualifications. There is a significant difference in the trading performance between traders possessing educational qualification of SSLC and Graduation, SSLC and Post graduation, and finally Post graduation and Professional degree.

5. The result shows that the occupation and trading experience of traders have no impact on the trading performance of equity derivative traders in Kerala.

6. From the result of data analysis, it is evident that there is a significant difference in the trading performance among traders with different amount of trading capital. The trading capital is an important variable affecting trading performance. Since there is difference in trading performance between traders of different trading capital, it is relevant to study the correlation between trading performance and trading capital.

7. A correlation analysis is done between trading capital and trading performance. It gives a correlation coefficient of 0.283, which indicates that there is a positive correlation between trading performance and the amount of trading capital used by equity derivative traders. It suggests that greater trading performance will be accompanied by more trading capital. It means that when the amount of trading capital increases, trading performance will also increase simultaneously.

Section 7 – Comparative analysis of Trading Performance with respect to the categories of knowledge level, trading strategies and behavioural biases

The trading performance is compared with respect to different levels of knowledge, strategies and behavioural biases in order to check whether there is any difference in the performance. To find out the statistical significance of the difference in mean score, One-way Analysis of Variance (ANOVA) is applied. The result of the analysis is reported below:

1. The result shows that there is significant difference in the trading performance of traders according their level of trading knowledge. The trading performance is high among those traders who have high level of knowledge about derivative market. Whereas, the trading performance of equity derivative traders is comparatively medium and low with moderate and low level of trading knowledge respectively.

2. The analysis explains that there is a significant difference in the trading performance of equity derivative traders according to the level of trading strategies. The trading performance is high among those traders who apply advanced strategies for trading. Further, the performance level is medium and low among those traders who use moderate and basic trading strategies respectively.

3. The result shows that there is a significant difference in the trading performance of equity derivative traders according to the level of behavioural biases on trading decisions. The trading performance is high among the traders who have low level of behavioral biases of trading decisions. Whereas, the performance level is comparatively low among those traders who have moderate and high level of behavioural biases.

4. Profitability analysis of instruments, type of trade and type of strategy is also examined in this study by using close-ended multiple-choice statements, based on the trading experience of respondents. It is found that the index options are the most profitable trading instrument (57.3 per cent) and the intra-day trade is the

most profitable type of trade. With regard to the type of strategy the majority opined that basic strategy gives more profit while trading in derivatives.

Section 8 – Impact of Knowledge Level, Trading Strategies and Behavioural Biases on Trading Performance

The Structural Equation Modelling is used to investigate the impact of Trading Knowledge, Trading Strategies, and Behavioural Biases on Trading Performance. This model is developed on the basis of conceptual model and literature review, and three independent variables and one dependent variable are included in this model with corresponding sub variables. 'Knowledge Level', 'Trading Strategies' and 'Behavioural biases' are independent variables and Trading performance is dependent variable in this model. Based on Model Fit Indices produced by Amos, the goodness of fit of this model has been confirmed and established that the data fit well to the model created for the purpose of this research. The result of the analysis is described below:

1. The hypothesized measurement model proposed for testing the impact of knowledge, strategy and behavioural biases on trading performance denotes that there is a significant positive cause and effect relationship among the study variables. Here Knowledge and strategy are considered as the important positive predictors of trading performance with significant regression co-efficient. But behavioural biases are found as the negative predictors of trading performance with significant values of path coefficient.

2. It is found that one point increase in the trading knowledge leads to a 0.226-point increase in the trading performance.

3. Similarly, causal relationship is established between Trading Strategy and Trading Performance because its path coefficient is positive and significant at 5% level of significance. Therefore, it is clear that when Trading Strategy goes up by 1-point; there will be a simultaneous increase in the Trading Performance by 0.261-point.

4. In the case of behavioural bias, the beta coefficient of standardized direct effect of '*Behavioural Biases'* on *'Trading Performance'* is -0.385 with $p<.01$. Hence, it is

evident that, there exists a significant negative influence of Behavioural bias on the Trading performance. This means that, when Behavioural bias goes up by 1 standard deviation the Trading performance goes down by 0.385 standard deviation. More clearly, a 1-point increase in the influence of behavioural bias causes 0.385-point decrease in the Trading Performance.

5. The measurement model proposed for testing the impact of trading knowledge on different dimensions of trading performance exhibits that there is significant positive causal relationship between dependent and independent variables. Here Knowledge is considered as the important positive predictor of all the dimensions of trading performance with significant beta co-efficient.

6. It is found that 1 percent increase in "trading knowledge" leads to 0.43 percent increase in 'subjective return'. Similarly, a 1 percent increases in Trading knowledge' predicts 0.296 percent increase in 'actual returns. Whereas 1 per cent increase in Trading knowledge causes 0.506 per cent increase in 'Trading satisfaction'.

7. The SEM model proposed for testing the impact of trading strategies on different dimensions of trading performance demonstrates that there is a significant positive causal relationship between the trading strategies and different dimensions of trading performance. Here trading strategy is considered as the important positive influencing variable on all the dimensions of trading performance with significant beta co-efficient.

8. It is found that when strategy improves by 1 point, the subjective return goes up by 0.501 per cent. Similarly, 1 percent increase in Trading strategy' predicts 0.247 per cent increase on 'Actual return'. Whereas I percent increase in trading leads to 0.474 percent increase in trading satisfaction.

9. The regression model proposed for testing the impact of behavioural bias on different dimensions of trading performance displays that there is significant negative causal relationship between dependent and independent variables. Here

behavioural biases are considered as the important negative predictors of all the dimensions of trading performance with significant beta co-efficient.

10. It is found that when ‘trading bias’ goes up by 1-point, the ‘subjective return’ goes down by 0.511 percent. Similarly, a 1-point increase in Trading bias leads to 0.133 percent decrease in ‘actual return'. Whereas, when ‘trading bias’ goes up by 1 per cent, the ‘trading satisfaction’ goes down by 0.393 percent.

11. The SEM model proposed for testing the impact of different dimension of behavioural bias on different dimensions of trading performance displays that there is direct and indirect relationship between dependent and independent variables. Here, heuristics, prospect and herd behaviour are considered as the important negative predictors of subjective return and trading satisfaction with significant beta co-efficient. The emotional biases have no significant impact on any of the dimensions of trading performance. Whereas the market impact bias has significant negative influence on the subjective return and trading satisfaction, and it will not influence the actual return.

8.8 Conclusions based on Findings

This study examines the trading knowledge, trading strategies, influence of behavioural bias and trading performance of equity derivative traders in Kerala. A sample of three hundred equity derivative traders was selected purposively for conducting this study. A structured questionnaire was developed and used for data collection. The questionnaire includes questions/statements to capture data on trading knowledge, trading strategies, behavioural biases and trading performance. The researcher took the objectives of the study one by one and analyzed the data relevant with sophisticated statistical tools including SPSSS and AMOS.

The main objectives of the study include examination of the level of knowledge, identification of trading preferences and strategies, exploring the influence of behavioural biases on the trading decisions and finally to assess the trading performance of equity derivative traders in Kerala. A comparison of trading performance with respect to; demographic variables, levels of knowledge, strategies and behavioural biases are also made in this study. In addition to the above, the impact of knowledge level, trading strategies and behavioural biases on the trading performance is analysed on the basis of Structural Equation Model. The major conclusions based on the findings of the study are explained below.

The demographic profile of the respondents shows that the sample derivative traders are distributed equally in urban and rural areas, whereas the majority of the derivative traders are male and only a few are female. Out of 300 traders, 90 per cent are possessing educational qualifications of graduation and above. The majority of respondents are employed in the private sector, a few professionals are also engaged in derivatives trading, and around 10 per cent of respondents are considering derivative trading as a full-time job. The age profile of respondents indicates that the majority are in the age group of 31-40 years. Among the total respondents, 60 per cent of traders belong to the annual income category of rupees 5 lakhs and more. With regards to trading experience, 75 per cent of the sample traders have experience of below 5 years. An examination of the amount of monthly trading capital reveals that most of the traders are using a trading capital of below 5 lakhs, however, 20 per cent are using trading capital above 10 lakhs per month.

Two types of knowledge of derivatives traders are assessed in this study – Knowledge about the basics of the derivatives market and knowledge about trading strategies. The analysis proves that equity derivative traders have a high level of knowledge of all aspects of these two groups of variables and there is no significant difference in the level of knowledge between male and female equity derivative traders. Traders in the age group *41-50* have the highest mean knowledge level and those with post-graduation are at the top with regard to the level of knowledge. There exists a significant difference in the mean score of knowledge level among traders with different years of trading experience, and traders with 5-10 years of trading experience have the highest level of knowledge about the derivatives market.

The examination of objectives and preferences of equity derivative traders shows that earning speculative profit is the most preferred trading objective of derivatives traders; and the options market, index options and intra-day trade are the most preferred market, instrument and trade respectively. Most of the options traders are showing interest in weekly expiring contracts and ATM options along with different market-based strategies while trading in the options market. Among 300 respondents, more than one-third of traders, square off their position when the market moves adversely without waiting for stop-loss, whereas a small majority reported that they modify their strategies in the event of adverse movement in the market.

An analysis of trading strategies of equity derivative traders reveals that the majority of the traders highly prefer option selling, and at the same time, most of them consider option Greeks, PCR ratio and VIX while designing their trading strategies. Among sample derivative traders around 40 per cent are highly using trading techniques and strategies specified in this study. With regard to trading techniques and strategies, it is evident that there is no significant difference between urban and rural traders as well as between male and female traders. It is also found that traders with higher amounts of trading capital are highly using trading techniques and strategies listed in this study.

An enquiry into the level of influence of behavioural biases on trading decisions is one of the main objectives of this research. The overall influence of behavioural biases on trading decisions is assessed by using fifteen variables and the result indicates that the equity derivative traders in Kerala are strongly influenced by the behavioural biases in their trading decisions, and there is no significant difference in the influence of behavioural factors between male and female equity derivative traders in Kerala. The age, education, and knowledge of traders have a significant influence on the level of behavioural biases of equity derivative traders in Kerala.

The trading performance of equity derivative traders is evaluated by the objective and subjective viewpoints of individual traders. It is found that the return realized by the majority of the equity derivative traders meets their expectations and that the majority of the equity derivative traders are satisfied with the return achieved through trading derivatives. The result points out that there is no significant difference in the performance level of equity derivative traders according to gender, area of residence and trading experience, whereas, there is a statistically significant difference in the performance level of derivative traders with respect to educational qualifications and amount of trading capital. Trading capital is found to be an important variable affecting the trading performance of equity derivative traders.

The trading performance of equity derivative traders is compared with respect to different levels of knowledge, strategies and behavioural biases, it is found that there is a significant difference in the trading performance according to their level of trading knowledge, trading strategies and level of behavioural biases. The Trading performance is high among traders those who have high knowledge and low level of behavioural biases. The Structural Equation Model is used to investigate the impact of Trading Knowledge, Trading Strategies, and Behavioural Biases on Trading Performance and the findings denote that there is a significant cause-and-effect relationship between trading knowledge, trading strategies, behavioural bias and trading performance. Trading knowledge and trading strategies are found to be the important positive predictors of trading performance, but behavioural biases are found to be the negative predictors of trading performance with significant values of the path coefficients.

After the entire study and based on the findings, it can be rightly pointed out that adequate trading knowledge is essential for getting a decent return from the derivatives market. A thorough understanding of derivatives trading strategies is another important factor in deciding the success of equity derivative traders. Apart from these, the influence of behavioural biases also determines the performance of equity derivative traders. Hence, it is concluded that traders with adequate knowledge, well-crafted strategies and low influence of trading bias can achieve greater trading performance.

8.9 Chapter Summary

This chapter discusses a brief outline of the entire research. Findings based on the objectives are presented in the first part of this chapter and discussions and conclusions based on the findings are described in the second part. The findings based on descriptive analysis of demographic variables show that traders were equally distributed between urban and rural areas. The number of female traders is comparatively less in the derivative market. It is evident that most traders are maintaining their trading account with Zerodha, the most popular broker among equity derivative traders in Kerala. Regarding the knowledge level of equity derivative traders, it is identified that only 50 per cent of traders are trading with adequate knowledge about market fundamentals and trading strategies. It is found that most equity derivative traders are engaged in trading options rather than futures. Behavioural biases influence the trading decisions of equity derivatives traders and it is found that there exists a negative causal relationship between trading performance and trading capital. The trading knowledge and trading strategies are found as positive predictors of trading performance in this study. As a result, traders with appropriate knowledge, carefully designed strategies, and a low influence of trading bias can achieve superior trading results.

REFERENCES

Barber, B. M., & Odean, T. (2000). Trading Is Hazardous to Your Wealth : The Common Stock Investment Performance of Individual Investors. *The Journal of Finance*, *55*(2), 773–806. https://doi.org/10.2139/ssrn.219228

Goodfellow, C., Bohl, M. T., & Gebka, B. (2009). International Review of Financial Analysis Together we invest ? Individual and institutional investors ' trading behaviour in Poland. *International Review of Financial Analysis*, *18*(4), 212–221. https://doi.org/10.1016/j.irfa.2009.03.002

Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, *47*(2), 263–292. https://doi.org/10.2307/1914185

Kapoor, S., & Prosad, J. M. (2017). Behavioural Finance: A Review. *Procedia Computer Science*, *122*, 50–54. https://doi.org/10.1016/j.procs.2017.11.340

Luong, L. P., & Ha, D. T. T. (2011). *Behavioral Factors Influencing Individual Investors' Decision-Making and Performance* [Umea University, Sweden]. www.usbe.umu.se

Oberlechner, T., & Osler, C. (2008). Overconfidence in Currency Markets. *SSRN Electronic Journal*, 1–39. https://doi.org/10.2139/ssrn.1108787

Peters, E., & Slovic, P. (2000). The Springs of Action: Affective and Analytical Information Processing in Choice. *Personality and Social Psychology Bulletin2*, *26*(12), 1465–1475. https://doi.org/10.1177/01461672002612002

Schwartz, H. (2010). Heuristics Or Rules of Thumb. In H. K. Baker & J. R. Nofsinger (Eds.), *Behavioral Finance: Investors, Corporations, and Markets* (pp. 57–72). John Wiley & Sons, Inc. https://doi.org/10.1002/9781118258415.ch4

Shefrin, H. (2002). *Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing*. Oxford University Press. https://doi.org/10.1093/0195161211.001.0001

Sulphey, M. M. (2014). *Behavioural Finance* (First). PHI Learning Private Limited.

Waweru, N. M., Munyoki, E., & Uliana, E. (2008). The effects of behavioural factors in investment decision-making : a survey of institutional investors operating at the Nairobi Stock Exchange. *International Journal of Business and Emerging Markets*, *1*(1), 24–41. https://doi.org/DOI:10.1504/IJBEM. 2008.019243

Waweru, N. M., Mwangi, G. G., & Parkinson, J. M. (2014). Behavioural factors influencing investment decisions in the Kenyan property market Nelson Maina Waweru * Geoffrey Gitau Mwangi. *Afro-Asian Journal of Finance and Accounting*, *4*(1), 26–49. https://doi.org/10.1504/AAJFA.2014.059500

9.1 Introduction

Successful trading in the financial markets requires a variety of competencies, such as market knowledge, trading tactics, and trading psychology. The trader's mindset, however, is more crucial than the other two abilities. Traders often need to act quickly and think quickly, which will usually have an impact on their trading profitability. To accomplish this they need thorough knowledge, presence of mind, emotional control, and should trying to take advantage of others' emotions. In this background, this study discusses four dimensions of equity derivative trading. Firstly, the study examines the level of knowledge of equity derivative traders regarding conceptual and trading knowledge. The second part describes the trading preferences and strategies of equity derivative traders. The trading psychology or behavioural biases of equity derivative traders are investigated in the third section and trading performance is analyzed in the last part of this study. Based on the findings of the analysis from the above four dimensions, the following recommendations are made to improve the trading performance of equity derivative traders in Kerala.

9.2 Recommendations

The following recommendations are made on the basis of the findings and conclusions stated in chapter VIII.

9.2.1 Recommendations to Traders

1. It is found that around one-third of equity derivative traders are trading in the derivatives market without adequate knowledge about the derivatives market. Trading without knowledge makes it gambling which is full of risk. Hence it is

recommended that before starting trading in derivatives, a trader must attain adequate knowledge about derivative trading.

2. It is noticed that the level of trading knowledge of equity derivative traders has a direct relationship with trading performance. Therefore, it is suggested that before entering into a trade, one should conquer adequate knowledge about basic concepts, SEBI guidelines, margin system, types of strategies, option Greeks, etc. to achieve maximum profit.

3. The result of the analysis shows that the majority of derivative traders do not use advanced trading strategies. A thorough knowledge of advanced trading strategies is necessary to get adequate and stable returns from trading derivatives. Hence, traders must improve their knowledge level of advanced trading strategies.

4. The result shows that the majority of equity derivative traders do not use options strategy builder software, a powerful tool for back-testing of strategy. Hence, it is advocated that traders must use appropriate strategy builder software and back-test various trading strategies in order to get familiar with the implications of strategies on various market movements.

5. It is observed that most derivative traders use a trading capital of 1-2 lakhs. On the other hand, most successful traders use a trading capital of 20 lakhs and more. So, it is advised to increase the trading capital to earn a reasonable return from derivative trading.

6. It is observed that many options traders do not consider PCR, VIX, IV and Option Greeks while designing their trading strategies. Those who use these parameters are able to achieve better trading performance. Hence, it is advised to design trading strategies by considering the parameters like PCR, VIX, IV and Option Greeks.

7. This study finds that the heuristics biases (Representativeness, Anchoring and Overconfidence bias) strongly affect the trading decisions of equity derivative traders and this affects their trading performance negatively. So, it is recommended to avoid the following types of trade:

- Always using similar strategies because of their success in the past.
- Trading based on technical charts
- Trading with overconfidence

8. This study finds that 30 per cent of equity derivative traders are influenced by the heuristic-driven bias of Gambler's Fallacy. After incurring a loss, many traders tend to increase the position size in the belief that their next trade will be a gain. In order to avoid such bias, it is recommended to set limits on the maximum amount he is willing to win or lose in a day. If the profit/loss target is attained, take the money, close out the position and wait for the next day.

9. It is observed that the influence of prospect variables (Loss aversion, Regret aversion and Mental Accounting) strongly exists among equity derivative traders in Kerala. In order to reduce such biases, it is advised to avoid the following behaviour:

   - Regular trading of low-risk low-return strategy
   - Giving more attention to avoid loss than making gain.
   - Giving different weights to different incomes

10. The result shows that the influence of the Herding effect strongly exists among traders of equity derivatives in Kerala. It is the tendency of the traders to follow the crowd without considering their own judgement. This happens because many traders, especially speculators, have limited knowledge about market behaviour. Therefore, they rely on other traders' knowledge and do what others are doing. This practice of mimicking others may not always be profitable. Hence, it is recommended that traders should be familiar with market behaviour and trade accordingly.

11. The study points out that around 20 per cent of traders are trading with greed. Greed is not easy to overcome. It is often based on an instinct to do better, to get just a little more. A trader should learn to recognize this instinct and develop a trading plan based on rational thinking.

12. It is found that the influence of market impact bias affects the trading decisions of equity derivative traders. In order to reduce such biases, it is recommended to avoid the following behaviour:

    - Trading based on past trends of stocks/index
    - Trading based on market sentiments

13. Speculating in the derivatives market involves huge risk. A lot of skills are required to become a successful trader, so it is suggested that traders need to set out guidelines based on risk-reward tolerance for when to enter and when to exit. The first aim should be to protect capital than make a profit.

14. Majority of traders are influenced by psychological biases, and they negatively affect trading performance. So, it is advised that all traders should set a profit target and put a stop-loss in place to take emotions out of the process.

15. Options trading is more science than luck, a thorough understanding of the relationship between options price and price of underlying is essential for an options trader. Therefore, it is recommended that a trader should devote his maximum possible time to market research. This includes studying market fundamentals, discussions with experts, reading trade journals and doing macro-economic analysis.

16. It is suggested that all trader should periodically assess their trading performance. In addition to reviewing their return, a trader should reflect on how they prepared for a trading session, how up-to-date they are on the market and how they are progressing in terms of acquiring knowledge about trading. This periodic assessment can help a trader to correct mistakes, change bad habits and enhance overall return.

9.2.2 Recommendations to the Broker

1. Based on this study, it is evident that one-third of equity derivative traders are trading without adequate knowledge. Therefore, it is recommended that Brokers

should arrange necessary training programmes on various aspects of derivative trading for their clients in order to improve their trading knowledge.

2. Like *'Zerodha Varsity' (Zerodha Varsity is a free online resource geared towards helping traders to learn about trading in the stock and derivative markets)* other brokers and regulators should also take steps to increase the knowledge level of traders.

3. It is found that behavioural biases are negatively influencing the trading performance of equity derivative traders in Kerala. Therefore, it is suggested to take necessary steps to reduce the influence of behavioural biases on trading decisions by educating them on the risk of trading with bias through seminars and workshops.

4. It is found that the number of female traders is very less in the derivative market. Hence, it is recommended that brokers should initiate special training programmes to attract, educate, develop and retain female traders in the derivatives market.

5. This study reveals that a causal relationship is established between Trading Strategy and Trading Performance, more clearly, if the Trading Strategy goes up by 100 per cent; there will be a simultaneous increase in the Trading Performance by 26.1. Hence, it is recommended that brokers should organize special training programmes to introduce and familiarize advanced and complex trading strategies to equity derivative traders so as to help them to achieve better trading performance.

9.2.3 Recommendations to the Regulators/Government

1. It is proved that adequate trading knowledge is essential to become a successful trader in the derivatives market, therefore it is suggested that the regulator should conduct workshops/training programmes for enhancing the knowledge level of derivative traders.

2. According to a recent SEBI report, the number of individual traders in the equities F&O market has increased by more than five times in Financial Year 2022.

Furthermore, nine out of ten individual traders in the stock F&O segment lost money in both FY19 and FY22. It is due to irrational trading decisions by individual traders. Therefore, SEBI should take steps to find out the reasons for losses and also take appropriate measures to discourage excessive speculation in the derivatives market, especially among retail individual traders.

3. This study finds that 11.3 per cent of equity derivative traders are not satisfied with broker competency and service. Therefore, it is recommended that SEBI should take the necessary steps to enhance the service quality and competency of stockbrokers.

4. Selling options are more profitable than buying options, but Option selling requires a large amount of trading capital. Due to this many small retail traders resort to options buying where the margin money required is very less. Therefore, it is recommended that SEBI should take appropriate steps to reduce the margin required for options selling in accordance with international standards.

5. In order to increase participation in option selling, huge capital is required. Hence, it is recommended to the regulators (SEBI and Stock Exchanges) to reduce the minimum contract value (based on which lot size is calculated) of index options as well as stock futures and options.

9.3 Implications of the Research

The contributions of the present research work on different beneficiaries are briefly explained below:

9.3.1 Contributions to Derivative Traders

Derivatives can be used to either mitigate risk or assume risk with the expectation of proportionate reward. Most traders are unaware of the ways of using derivatives either to protect their investment portfolio or to make a speculative profit. Adequate knowledge about the derivatives market, trading strategies, and psychological biases is essential for making a profit from derivative trading. By examining the level of knowledge, trading strategies, the influence of behavioural biases and trading performance of equity derivative traders, this study aims to identify the trading mistakes and help them to correct mistakes, change bad habits and thereby enhance the overall return from derivative trading.

Trading psychology refers to the trader’s emotional and mental state which dictates their trading action. Understanding trading psychology will help traders to mitigate trading mistakes. This study will be helpful to equity derivative traders in this regard. Therefore, this research gives a substantial contribution to the trading community of the derivative market. The study also aims to popularise the derivative products and their trading strategies to common individual investors. By popularizing derivative products and their trading strategies, many individuals may be attracted to taste the profit of the highly leveraged equity derivative market.

9.3.2 Contributions to Dealers/Brokers

The study's goal is to make derivative products and trading tactics more accessible to ordinary retail investors. Many individuals may be attracted to the highly leveraged equity derivatives market by popularising derivative products and trading tactics. Of course, increasing the number of traders in the derivatives market will benefit the intermediaries and brokers of the derivatives market. This study has identified the behavioural factors influencing the trading decisions of equity derivative traders, which can be useful to dealers in providing better advice and guidance to their clients.

9.3.3 Contributions to Regulatory Authority/Government

The derivatives market is one of the most important parts of the Capital market and it also serves as an important source of information about prices. As research in the derivatives market, this study aims to enhance trading performance by identifying and reducing trading mistakes and behavioural biases of derivatives traders. This research has tested and established a Trading Performance Model which can be useful for enhancing the trading performance of capital market traders in future. An increase in the profitability of traders can contribute to the social and economic well-being of a country. This study has also put forth some recommendations which can also be useful for the regulators in framing rules and guidelines about the derivatives market in future.

9.3.4 Contributions to Academic and Research Community

This study is aimed at understanding the trading psychology of equity derivative traders in Kerala. Based on the literature survey the researcher has identified possible behavioural biases and grouped these biases into five categories, such as Heuristics variables, Prospect variables, Herding effect, Emotional bias and Market variables, in this way this research has made an important contribution to the area of Behavioural Finance.

This study is designed and carried out in a systematic manner and also developed scales for measuring variables for each construct separately. Similarly, this research has tested and established a Research Model (Trading Performance Model) which can be useful for researchers in future. Besides, this study also tries to fill the research gap in the area of derivatives and behavioural finance.

9.4 Scope for Further Research

Further study in the derivatives market and behavioural finance has enormous potential. Some suggestions for future research are included below.

1. The researcher has carried out a study about equity derivative traders in Kerala. Future studies can be done on any other geographical location.

2. There is huge scope for future research in the area of 'Information content in options trading volume and implied volatility'.

3. Future research is also possible to examine 'The leading information role of Options implied volatility (IV) in the Indian derivative market'.

4. There is scope for doing empirical research on the effectiveness of volatility-based option trading strategies.

5. Future studies can also be done to examine the Structural relationship between options trading volume and market volatility in India. A comparative study with other countries is also possible.

6. New study can be conducted to analyse the hedging role of futures in comparison to options, in order to determine which instrument is better for hedging.

7. Empirical research on the effectiveness of various options trading strategies, the area where studies are very rare. Hence there is scope for doing new research.

8. Another area where future research is possible is, to examine the effect of covid19 pandemic on derivative trading activity on exchanges in India.

9.5 Chapter Summary

This chapter discusses the major contributions of this research. Recommendations based on the findings are presented in the first part of this chapter, and the implications and contributions of this research to various stakeholders are described in the second part. The scope for further research is also reported at the end of this chapter. Finally, in a nutshell, it can be concluded that irrational decisions and the influence of behavioural biases are the most important problem faced by individual traders. Therefore, identifying the behavioural factors influencing trading decisions will help to reduce the investment mistakes that they are making in their decision-making and reduce the intensity of anomalies in future.

I. **Journal articles**:

Acharya, V. V., & Johnson, T. C. (2007). Insider trading in credit derivatives. *Journal of Financial Economics,* 84(1), 110–141. https://doi.org/10.1016/j.jfineco. 2006.05.003

Aday, L. A., & Cornelius, L. J. (2006). Designing and conducting health surveys: a comprehensive guide. *In John Wiley & Sons* (Third Edit). Jossey-Bass. https://doi.org/10.5860/ choice.27-5148

Ahn, H., & Ryu, D. (2008). Informed trading in the Index Option Market : The case of KOSPI 200 options. *Journal of Futures Markets*, 28(12), 1118–1146. https://doi.org/10.1002/fut

Alkebach, P., & Hagelin, N. (2004). Expiration day effects of index futures and options: Evidence from a market with a long settlement period. *Applied Financial Economics,* 14(6), 385–396. https://doi.org/10.1080/096031004100 01673612

Allen, F., & Santomero, A. M. (1998). The theory of financial intermediation. *Journal of Banking & Finance,* 21, 1465–1485. https://doi.org/10.1016/S0378-4266(97)00032-0

Anbukarasi, M., & Devaki, M. (2020). Behavioral Myth of Retail Investors in Commodity Derivative Market – With reference to Coimbatore District. *JAC : A Journal Of Composition Theory*, XIII(I), 614–620.

Ansari, S., Ubeja, S., Jain, D., & Pathak, S. (2015). A Study of Investor ' s Perception towards Derivative Market. *Advances in Economics and Business Management* (AEBM), 2(8), 781–785.

Antony, A., & Joseph, A. I. (2017). Influence of Behavioural Factors Affecting Investment Decision—An AHP Analysis. *Metamorphosis: A Journal of Management Research*, 16(2), 107–114. https://doi.org/10.1177/0972622 517738833

Avellaneda, M., & Levy, A. (1995). Pricing and hedging derivative securities in markets with uncertain volatilities. *Applied Mathematical Finance,* 2(2), 73–88. https://doi.org/10.1080/ 13504869500000005

Barber, B. M., & Odean, T. (2000). Trading Is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors. *The Journal of Finance,* 55(2), 773–806. https://doi.org/10.2139/ssrn.219228

Barberis, N., & Huang, M. (2001). Mental Accounting , Loss Aversion , and Individual Stock Returns. *The Journal of Finance,* 56(4), 1247–1292. https://doi.org/10.2307/2697796

Barberis, N., & Thaler, R. (2003). A survey of Behavioral Finance. In M. H. and R. S. G.M. Constantinides (Ed.), *Handbook of the Economics of Finance* (pp. 1052–1114). Elsevier Science B.V. http://houdekpetr.cz/!data/public_html/papers/economics_psychology/Barberis Thaler 2003.pdf

Bartram, S. M. (2006). The use of options in corporate risk management. *Managerial Finance,* 32(2), 160–181.

Battermann, H. L., Braulke, M., Broll, U., & Schimmelpfennig, J. (2000). The preferred hedge instrument. *Economics Letters*, 66(1), 85–91. https://doi.org/10.1016/S0165-1765(99)00180-9

Bauer, R., Cosemans, M., & Eichholtz, P. (2009). Option trading and individual investor performance. *Journal of Banking and Finance*, 33(4), 731–746. https://doi.org/10.1016/ j.j bankfin.2008.11.005

Bentler, P. M., & Bonett, D. G. (1980). Significance Tests and Goodness-of-Fit in Analysis of Covariance Structures. *Psychological Bulletin,* 88(3), 588–606. https://doi.org/10.1037/0033-2909.88.3.588

Bhaumik, S. K., & Bose, S. (2009). Impact of derivatives trading on emerging stock markets: Some evidence from India. *Comparative Economic Studies*, 51(1), 118–137. https://doi.org/ 10.1057/ces.2008.18

Black, F., & Scholes, M. (1973). The Pricing of Options and Corporate Liabilities. *The Journal of Political Economy*, 81(3), 637–654. http://www.jstor.org/ stable/1831029

Blau, B. M., Bowles, T. B., & Whitby, R. J. (2016). Gambling Preferences, Options Markets, and Volatility. *Journal of Financial and Quantitative Analysis,* 51(2), 515–540. https://doi.org/10.1017/S002210901600020X

Blau, B. M., Nguyen, N., & Whitby, R. J. (2014). The information content of option ratios. *Journal of Banking and Finance,* 43(1), 179–187. https://doi.org/10. 1016/j.jbankfin. 2014.03.023

Boateng, G. O., Neilands, T. B., Frongillo, E. A., Melgar-Quinonez, H. R., & Young, S. L. (2018). Best Practices for Developing and Validating Scales for Health, Social , and Behavioral Research : A Primer. *Frontiers in Public Health,* 6(June), 1–18. https://doi.org/10.3389/ fpubh.2018.00149

Booth, G. G., So, R. W., & Tse, Y. (1999). Price Discovery in the German Equity Index Derivatives Markets. *The Journal of Futures Markets,* 19(6), 619–643. https://doi.org/10.1002/ (SICI) 1096-9934(199909) 19:6<619: AID-FUT1>3.0.CO;2-M

Bowden, M. P. (2015). A model of information flows and confirmatory bias in financial markets. *Decisions in Economics and Finance.* https://doi.org/ 10.1007/s10203-015-0164-y

Breeden, D. T. (1984). Futures markets and commodity options: Hedging and optimality in incomplete markets. *Journal of Economic Theory,* 32(2), 275–300. https://doi.org/10.1016/ 0022-0531(84)90055-3

Broll, U., Chow, K. W., & Wong, K. (2001). Hedging and nonlinear risk exposure. *Oxford Economic Papers,* 53(2), 281–296. https://doi.org/10.1093/oep/53.2.281

Caparrelli, F., Arcangelis, A. M. D., Cassuto, A., Caparrelli, F., Arcangelis, A. M. D., & Cassuto, A. (2010). Herding in the Italian Stock Market : A Case of Behavioural Finance. *Journal of Behavioural Finance,* 5(4), 222–230. https://doi.org/10.1207/s15427579jpfm0504

Carlson, M. D. A., & Morrison, R. S. (2009). Study design, precision, and validity in observational studies. *Journal of Palliative Medicine,* 12(1), 77–82. https://doi.org/10.1089/ jpm.2008.9690

Carmona, R., & Durrleman, V. (2003). Pricing and hedging spread options. *SIAM Review*, 45(4), 627–685. https://doi.org/10.1137/S0036144503424798

Carr, P. P. (2000). Deriving Derivatives of Derivative Securities. *Journal of Computational Finance*, 4(2), 4–30. https://doi.org/10.1109/CIFER.2000.844609

Carr, P., & Wu, L. (2006). A Tale of Two Indices. *The Journal of Derivatives,* 13.3(Vix), 13–29. https://doi.org/10.3905/jod.2006.616865

Chakravarty, S., Gulen, H., & Mayhew, S. (2004). Informed trading in stock and option markets. *Journal of Finance,* 59(3), 1235–1258. https://doi.org/10.1111/j.1540-6261.2004. 00661.x

Chang, C. C., Hsieh, P. F., & Wang, Y. H. (2010). Information content of options trading volume for future volatility: Evidence from the Taiwan options market. *Journal of Banking and Finance,* 34(1), 174–183. https://doi.org/10.1016/ j.jbankfin.2009.07.015

Chen, A. S., & Leung, M. T. (2003). Option straddle trading: Financial performance and economic significance of direct profit forecast and conventional strategies. *Applied Economics Letters*, 10(8), 493–498. https://doi.org/10.1080/1350 485032000095375

Chen, H.-S., & Sabherwal, S. (2018). Overconfidence among options traders. *Review Of Financial Economics,* 37, 61–91. https://doi.org/10.1002/rfe.1048

Chiang, R., & Fong, W. M. (2001). Relative informational efficiency of cash, futures, and options markets: The case of an emerging market. *Journal of Banking and Finance*, 25(2), 355–375. https://doi.org/10.1016/S0378-4266(99)00127-2

Chiras, D. P., & Manaster, S. (1978). The information content of option prices and a test of market efficiency. *Journal of Financial Economics*, 6(2–3), 213–234. https://doi.org/10.1016/ 0304-405X (78)90030-2

Corredor, P., Ferrer, E., & Santamaria, R. (2015). Sentiment-prone investors and volatility dynamics between spot and futures markets. *International Review of Economics and Finance,* 35, 180–196. https://doi.org/10.1016/j.iref. 2014.09.013

Daniel, K., Hirshleifer, D., & Teoh, S. H. (2002). Supporting social deliberative skills online: The effects of reflective scaffolding tools. *Journal of Monetary Economics*, 49, 139–209. https://doi.org/10.1007/978-3-642-39371-6_36

Dash, M., Kavitha, V., Deepa, K. M., & Sindhu, S. (2007). A study of optimal stock & options strategies. *SSRN Electronic Journal*. http://ssrn.com/ abstract=1293203

Daskalakis, G., Psychoyios, D., & Markellos, R. N. (2009). Modelling CO 2 emission allowance prices and derivatives: Evidence from the European trading scheme. *Journal of Banking and Finance,* 33(7), 1230–1241. https://doi.org/ 10.1016/j.jbankfin.2009.01.001

DeBondt, W. F. M., & Thaler, R. (1985). Does the Stock Market Overreact? *The Journal of Finance*, 40(3), 793–805. https://doi.org/10.2307/2327804

DeBondt, W., Palm, F., & Wolff, C. (2004). Introduction to the special issue on behavioural finance. *Journal of Empirical Finance,* 11(4), 423–427. https://doi.org/10.1016/j.jempfin. 2004.05.001

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Marc, W. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133(March), 285–296. https://doi.org/10.1016/j.jbusres. 2021.04.070

Emm, E. E., Gay, G. D., Ma, H., & Ren, H. (2021). Effects of the Covid-19 pandemic on derivatives markets_ Evidence from global futures and options exchanges _ Enhanced Reader.pdf. *Journal of Futures Markets*, John Wiley & Sons, Ltd, 42(5) (May), 823–851.

Evans, D. A. (2006). Subject Perceptions of Confidence and Predictive Validity in Financial Information Cues. *Journal of Behavioural Finance,* 7(1), 12–28. https://doi.org/10.1207/ s15427579jpfm0701

Fan, Y., Chen, J., Shirkey, G., John, R., Wu, S. R., Park, H., & Shao, C. (2016). Applications of structural equation modeling (SEM) in ecological studies: an updated review. *Ecological Processes*, 5(1), 1–12. https://doi.org/10.1186/s13717-016-0063-3

Fedenia, M., & Grammatikos, T. (1992). Options Trading and the Bid-Ask Spread of the Underlying Stocks. *The Journal of Business*, 65(3), 335–351. http://www.jstor.com/stable/ 2353269

Figlewski, S. (1989). Options Arbitrage in Imperfect Markets. *The Journal of Finance*, 44(5), 1289–1311. https://doi.org/10.1111/j.1540-6261.1989. tb02654.x

Filbeck, G., Hatfield, P., & Horvath, P. (2005). Risk Aversion and Personality Type. *The Journal of Behavioural Finance,* 6(4), 170–180. https://doi.org/10.1207/ s15427579jpfm0604

Fleming, J., Ostdiek, B., & Whaley, R. E. (1996). Trading costs and the relative rates of price discovery in stock, futures, and options markets. *Journal of Futures Markets,* 16(4), 353–387. https://doi.org/10.1002/(SICI)1096-9934(199606) 16:4<353: AID-FUT1>3.0.CO;2-H

Fogel, S. O. C., & Berry, T. (2006). The Disposition Effect and Individual Investor Decisions: The Roles of Regret and Counterfactual Alternatives. *Journal of Behavioural Finance,* 7(2), 107–116. https://doi.org/10.1207/s15427579 jpfm0702

Fong, K., Gallagher, D. R., & Ng, A. (2005). The Use of Derivatives by Investment Managers and Implications for Portfolio Performance and Risk. *International Review of Finance*, 5(1–2), 1–29.

Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research,* 18(1), 39–50. https://doi.org/10.2307/3151312

Fridson M. S. (1997) Against the Gods: The Remarkable Story of Risk (a review), Financial Analysts Journal, 53:2, 74, DOI: 10.2469/faj.v53.n2.2075

Frijns, B., Lehnert, T., & Zwinkels, R. C. J. (2010). Behavioural heterogeneity in the options market. *Journal of Economic Dynamics and Control*, 34(11), 2273– 2287. https://doi.org/ 10.1016 /j.jedc. 2010.05.009

Gang, J., Huang, N., Song, K., & Zhang, R. (2020). Index volatility and the put-call ratio: a tale of three markets. *Quantitative Finance*, 20(12), 1983–1996. https://doi.org/10.1080/ 14697688 .2020.1814009

Gao, B., Xie, J., & Jia, Y. (2019). A futures pricing model with long-term and short- term traders. *International Review of Economics and Finance*, 64, 9–28. https://doi.org/10.1016/ j. iref.2019.05.010

Gautam, I., & Kavidayal, P. (2016). Perception of Market Participants towards Derivative Trading: A study of Uttarakhand. *International Journal of Management, IT and Engineering,* 6(May), 191–207.

Goodfellow, C., Bohl, M. T., & Gebka, B. (2009). International Review of Financial Analysis Together we invest? Individual and institutional investors trading behaviour in Poland. *International Review of Financial Analysis,* 18(4), 212–221. https://doi.org/10.1016/ j.irfa.2009.03.002

Grunbichler, A., & Longstaff, F. A. (1996). Valuing futures and options on volatility. *Journal of Banking and Finance*, 20(6), 985–1001. https://doi.org/10.1016/0378-4266(95)00034-8

Guo, D. (2000). Dynamic volatility trading strategies in the currency options market. *Review of Derivatives Research,* 4(2), 133–154. https://doi.org/10.1023/ A:1009638225908

Hayunga, D. K., & Lung, P. P. (2014). Trading in the Options Market around Financial Analysts' Consensus Revisions. *The Journal of Financial and Quantitative Analysis*, 49(3), 725–747. https://www.jstor.org/stable/43303965

Hirshleifer, D. (2001). Investor Psychology and Asset Pricing. *Journal of Finance,* 56(4), 1533–1598. http://dx.doi.org/10.2139/ssrn.265132

Hoffmann, A. O. I., & Shefrin, H. (2014). Technical analysis and individual investors. *Journal of Economic Behaviour and Organization*, 1–25. https://doi.org/10. 1016/j.jebo.2014.04.002

Hoffmann, A. O. I., Fischer, E. T. S., Hoffmann, A. O. I., & Fischer, E. T. S. (2012). Behavioural Aspects of Covered Call Writing: An Empirical Investigation. *Journal of Behavioural Finance,* 13(1), 66–79. https://doi.org/10.1080/15427 560.2012.657314

Hoffmann, A. O. I., Post, T., & Pennings, J. M. E. (2015). How Investor Perceptions Drive Actual Trading and Risk-Taking Behaviour. *Journal of Behavioural Finance,* 16(1), 94–103. https://doi.org/10.1080/15427560.2015.1000332

Houlihan, P., & Creamer, G. G. (2017). Can Sentiment Analysis and Options Volume Anticipate Future Returns? *Computational Economics*. https://doi.org/10.1007/s10614-017-9694-4

Houlihan, P., & Creamer, G. G. (2018). Leveraging a call-put ratio as a trading signal. *Quantitative Finance*, 7688. https://doi.org/10.1080/14697688.2018.1538563

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modelling: A Multidisciplinary Journal*, 6(1), 1–55. https://doi.org/10.1080/10705519909540118

Huang, J. Y., CP, J., & Kao, S. Y.-C. (2016). Starting points for a new researcher in behavioural finance. *International Journal of Managerial Finance Starting,* 12(1). http://dx.doi.org/10. 1108 / IJMF-05-2015-0111

Hvide, H. K. (2002). Pragmatic beliefs and overconfidence. *Journal of Economic Behaviour and Organization,* 48(1), 15–28. https://doi.org/10.1016/S0167-2681(01)00221-9

Jeanneau, S., & Micu, M. (2003). Volatility and derivatives turnover: a tenuous. *BIS Quarterly Review,* March, 57–65.

Judge, A., & Reancharoen, T. (2014). An empirical examination of the lead-lag relationship between spot and futures markets: Evidence from Thailand. *Pacific Basin Finance Journal,* 29, 335–358. https://doi.org/10.1016 /j.pacfin.2014.05.003

Kahneman, D., & Riepe, M. W. (1998). Aspects of Investor Psychology. *The Journal of Portfolio Management*, 24(4), 52–65. https://doi.org/10.3905/jpm. 1998.409643

Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, 47(2), 263–292. https://doi.org/10.2307/1914185

Kaminski, K. M., & Lo, A. W. (2013). When Do Stop-Loss Rules Stop Losses ? *Journal of Financial Markets*, 1–43. https://doi.org/10.1016/j.finmar.2013.07.001

Kapoor, S., & Prosad, J. M. (2017). Behavioural Finance: A Review. *Procedia Computer Science,* 122, 50–54. https://doi.org/10.1016/j.procs.2017.11.340

Karmakar, M. (2005). Modelling Conditional Volatility of the Indian Stock Markets. *Vikalpa*, 30(3), 21–37.

Karthika, P., & Karthikeyan, P. (2013). Options Investment Strategy and Their Benefits_ An Analysis. *International Journal of Management Focus,* 2, 1–10. https://ssrn.com/abstract= 2886743

Kempf, A., & Ruenzi, S. (2006). Status Quo Bias and the Number of Alternatives: An Empirical Illustration from the Mutual Fund Industry. *Journal of Behavioural Finance,* 7(4), 204–213. https://doi.org/10.1207/s15427579 jpfm0704

Khan, S., Upadhyaya, C., Gautam, S., & Natu, P. (2020). A Study on the impact of Covid-19 on the investment pattern of investors with specific reference to traditional investment (Real Estate and Gold) and Market-based financial products (Equities) in Mumbai. *European Journal of Molecular & Clinical Medicine,* 7(11), 5644–5660.

Kim, K., & Nofsinger, J. (2003). The Behaviour and Performance of Individual Investors in Japan. *Pacific Basin Finance Journal,* 11.

Kim, M. J., Lee, J. E., Kim, S. Y., & Kim, K. (2010). The two-phase phenomenon in linear and non-linear financial instruments. *Physica A: Statistical Mechanics and Its Applications*, 389(13), 2580–2585. https://doi.org/10.1016/j.physa. 2010.02.031

Kim, S. (2009). The Performance of Traders Rules in Options Market. *Journal of Futures Markets*, 29(11), 999–1020. https://doi.org/10.1002/fut

Kliger, D., & Kudryavtsev, A. (2013). Volatility expectations and the reaction to analyst recommendations. *Journal of Economic Psychology,* 37, 1–6. https://doi.org/10.1016/j.joep. 2013.04.003

Koh, C. E., & Nam, K. T. (2005). Business use of the internet A longitudinal study from a value chain. *Industrial Management and Data System*, 105(1), 82–95. https://doi.org/10.1108/ 02635570510575207.

Kumiega, A., & Vliet, B. E. Van. (2012). Automated Finance: The Assumptions and Behavioural Aspects of Algorithmic Trading. *Journal of Behavioural Finance*, 13(1), 51–55. https://doi.org/10.1080/15427560.2012.654924

Kyriacou, K., & Sarno, L. (1999). The Temporal Relationship between Derivatives Trading and Spot Market Volatility in the U. K: Empirical Analysis and Monte Carlo Evidence. *The Journal of Futures Markets,* 19(3), 245–270.

Lai, M., Low, K. L. T., & Lai, M. (2001). Are Malaysian Investors Rational? *The Journal of Psychology and Financial Markets*, 2(4), 210–215. https://doi.org/10.1207/S153277 60JPFM0204_5

Lehenkari, M., & Perttunen, J. (2004). Holding on to the Losers: Finnish Evidence. *Journal of Behavioural Finance,* 5(2), 116–126. https://doi.org/10.1207/s15427579jpfm0502

Li, X., Subrahmanyam, A., & Yang, X. (2018). Can financial innovation succeed by catering to behavioural preferences? Evidence from a callable options market. *Journal of Financial Economics*, 1–28. https://doi.org/10.1016/j.jfineco. 2018.01.010

Lien, D., & Wang, Y. (2006). Cross-hedging with futures and options: The effects of disappointment aversion. *Journal of Multinational Financial Management*, 16(1), 16–26. https://doi.org/10.1016/j.mulfin.2005.02.001

Lin, A. Y., & Swanson, P. E. (2003). The Behavior and Performance of Foreign Investors in Emerging Equity Markets: Evidence from Taiwan. *International Review of Finance,* 4(3–4), 189–210. https://doi.org/10.1111/j.1468-2443.2005.00046.x

Lin, C.-H., Hsu, H., & Chiang, C.-Y. (2005). Trading Patterns and Performance of Trader Types in Taiwan Futures Market. *Review of Pacific Basin Financial Markets and Policies*, 8(2), 217–234.

Lin, W. T., Tsai, S. C., Zheng, Z., & Qiao, S. (2017). Does options trading convey information on futures prices? *North American Journal of Economics and Finance*, 39, 182–196. https://doi.org/10.1016/j.najef.2016.10.005

Lowies, G. A., Hal, J. H., & Cloete, C. E. (2016). Heuristic-driven bias in property investment decision-making in South Africa. *Journal of Property Investment & Finance,* 34(1), 51–67. https://doi.org/10.1108/JPIF-08-2014-0055

Lutz, C. (2016). The Asymmetric Effects of Investor Sentiment. *Macroeconomic Dynamics,* 20, 1477–1503. https://doi.org/10.1017/S1365100514000996

Lynham, S. A. (2002). Theory Building: Dubin's Method. *Advances in Developing Human Resources,* 4(3), 242–276. https://doi.org/10.1177/ 15222302004003003

Malik, N. S., Bhardwaj, K., & Singla, R. (2019). Price Discovery and Arbitrage Efficiency Test: A Study of the Indian Options Market. *Finance India*, XXXIII (3), 623–638.

Manasa, N., & Narayanarao, S. (2018). A Study on the impact of BANKNIFTY derivatives trading on spot market volatility in India. *Academy of Accounting and Financial Studies Journal,* 22(1).

Manrai, R. (2015). Investor Behavior Towards Derivative Markets in Indian Context. *IOSR Journal of Business and Management* (IOSR-JBM), 10–14.

Mazouz, K., Wu, Y., & Yin, S. (2015). Trading Activity in Options and Stock Around Price-Sensitive News Announcements. *Journal of Futures Markets*, 35(12), 1173–1194. https:// doi.org / 10.1002/ fut.21691

Mohamed, R., & Hidhayathulla. (2020). Month Wise Behavioural Pattern of Commodity Derivative Trading Volume In. *European Journal of Molecular & Clinical Medicine,* 07(03), 4859–4864.

Morgado, F. F. R., Meireles, J. F. F., Neves, C. M., Amaral, A. C. S., & Ferreira, M. E. C. (2017). Scale development: ten main limitations and recommendations to improve future research practices. *Psicologia: Reflexão e Crítica*, 30(3), 1–20. https://doi.org/10.1186/s41155-016-0057-1

Mutum, K. (2017). Volatility Forecast Incorporating Investors' Sentiment and its Application in Options Trading Strategies: A Behavioural Finance Approach at Nifty 50 Index. *Vision*, 24(2), 217–227. https://doi.org/10.1177/0972262920914117

Narang, S., & Vij, M. (2013). Long-Term Effects of Expiration of Derivatives on Indian Spot Volatility. *ISRN Economics*. http://dx.doi.org/10.1155/2013/718538

Narasimha, V., & Mushinada, C. (2018). Self-attribution, Overconfidence and Dynamic Market Volatility in Indian Stock Market. *Global Business Review,* 21(2), 1+ – 20. https://doi.org/ 10.1177/0972150918779288

Nofsinger, J. R. (2005). Social Mood and Financial Economics. *Journal of Behavioural Finance,* 6(3), 144–160. https://doi.org/10.1207/s15427579jpfm0603_4

Nolte, I., & Nolte, S. (2012). How do individual investors trade? *The European Journal of Finance,* 18(10), 921–947. https://doi.org/10.1080/1351847X. 2011.601647

Novemsky, N., & Kahneman, D. (2005). How do intentions affect loss aversion? *Journal of Marketing Research,* 42(2), 139–140. https://doi.org/10.1509/jmkr.42.2.139.62295

Oberlechner, T., & Osler, C. (2008). Overconfidence in Currency Markets. *SSRN Electronic Journal,* 1–39. https://doi.org/10.2139/ssrn.1108787

Odean, T. (1998). Are Investors Reluctant to Realize Their Losses? *The Journal of Finance,* 53(5), 1775–1798. https://doi.org/10.1111/0022-1082.00072

Odean, T. (1999). Do Investors Trade Too Much? *The American Economic Review,* 89(5), 1279–1298.

Palathara, D. J. S., & Yadukrishnan, V. (2020). A Study on Recent Trends in Derivative Markets in India. *International Journal of Advance Research and Innovative Ideas in Education,* 6(3), 1743–1751. https://doi.org/10.31142/ijtsrd23902

Pan, J., & Poteshman, A. M. (2006). The information in option volume for future stock prices. *Review of Financial Studies,* 19(3), 871–908. https://doi.org/10.1093/rfs/hhj024

Panton, D. (1976). Chicago board call options as predictors of common stock price changes. *Journal of Econometrics*, 4(2), 101–113. https://doi.org/10.1016/0304-4076(76)90008-7

Pathak, R., Bhattacharjee, K., & Reddy V., N. (2015). Information Content of Derivatives under Varying Market Conditions and Moneyness: The Case of S&P CNX Nifty Index Options. *Global Business Review,* 16(2), 281–302. https://doi.org/10.1177/0972150914564420

Patil, S., & Bagodi, V. (2021). “A study of factors affecting investment decisions in India: The KANO way.” *Asia Pacific Management Review,* 26(4), 197–214. https://doi.org/10.1016/j. apmrv.2021.02.004

Pennings, J. M. E. (2002). Pulling the trigger or not: Factors affecting the behaviour of initiating a position in derivatives markets. *Journal of Economic Psychology,* 23(2), 263–278. https://doi.org/10.1016/S0167-4870(02)00067-3

Peters, E., & Slovic, P. (2000). The Springs of Action: Affective and Analytical Information Processing in Choice. *Personality and Social Psychology Bulletin2*, 26(12), 1465–1475. https://doi.org/10.1177/01461672002612002

Raizada, G., & Sahi, G. S. (2006). Commodity Futures Market Efficiency in India and Effect on Inflation. *SSRN Electronic Journal*. https://doi.org/DOI: 10.2139/ssrn.949161

Renuka, N. (2019). Investors' Perception towards Investments in Derivatives. International *Journal of Innovative Technology and Exploring Engineering,* 8(12), 5421–5428. https://doi.org/10.35940/ijitee.

Ritter, J. R. (2003). Behavioural finance. *Pacific Basin Finance Journal*, 11, 429–437. https://doi.org/10.1016/S0927-538X(03)00048-9

Ross, S. A., Rubinstein, M., & Cox, J. C. (1979). Option pricing: A simplified approach. *Journal of Financial Economics,* 7(3), 229–263.

Rostan, P., Rostan, A., & Nurunnabi, M. (2020). Options trading strategy based on ARIMA forecasting. *PSU Research Review*, 4(2), 111–127. https://doi.org/10.1108/prr-07-2019-0023

Roy, A. (2009). Market Integration and Impact of Futures Derivative Trading – Case of Indian Wheat Market. *SSRN Electronic Journal,* 1–19. https://doi.org/10.2139/ssrn.1494879

Ryu, D. (2011). Intraday price formation and Bid-Ask spread components: A New Approach Using a Cross Market Model. *The Journal of Futures Markets*, 31(12), 1142–1169. https://doi.org/10.1002/fut 20533

Sah, A. N., & Omkarnath, G. (2006). Derivatives Trading and Volatility - A Study of the Indian Stock Markets. *SSRN Electronic Journal,* 1–15. https://doi.org/ 10.2139/ssrn.873968

Sahi, S. K. (2017). Psychological biases of individual investors and financial satisfaction. *Journal of Consumer Behaviour,* 1–25. https://doi.org/10.1002/cb.1644

Sarwar, G. (2005). The informational role of option trading volume in equity index options markets. *Review of Quantitative Finance and Accounting,* 24(2), 159–176. https://doi.org/ 10.1007/s11156-005-6335-0

Scheinkman, J. A., & Xiong, W. (2003). Overconfidence and speculative bubbles. *Journal of Political Economy*, 111(6), 1183–1219. https://doi.org/10.1086/378531

Schwartz, H. (2010). Heuristics Or Rules of Thumb. In H. K. Baker & J. R. Nofsinger (Eds.), *Behavioral Finance: Investors, Corporations, and Markets* (pp. 57– 72). John Wiley & Sons, Inc. https://doi.org/10.1002/9781118258415.ch4

Shalini, H., & Raveendra, P. (2014). A Study of Derivatives Market in India and its Current Position in Global Financial Derivatives Markets. *IOSR Journal of Economics and Finance,* 3(3), 25–42. https://doi.org/10.9790/5933-0332542

Shefrin, H., & Statman, M. (1985). The Disposition to Sell Winners Too Early and Ride Losers Too Long: Theory and Evidence. *The Journal of Finance,* 40(3), 777–790. https://doi.org/ 10.1111/ j.1540-6261.1985. tb05002.x

Sheu, H. J., & Wei, Y. C. (2011). Effective options trading strategies based on volatility forecasting recruiting investor sentiment. *Expert Systems with Applications*, 38(1), 585–596. https://doi.org/10.1016/j.eswa.2010.07.007

Sing, M. (2022). Evolution of Derivatives Market in India. *International Journal for Research in Applied Science & Engineering Technology* (IJRASET), 10(1), 1–10. https://doi.org/ 10.22214/ ijraset.2022.39657

Srinivasan, P. (2010). Do futures and options trading increase spot market volatility in India? the case of S&P CNX Nifty. *International Journal of Business Performance and Supply Chain Modelling,* 2(2), 134–145. https://doi.org/10.1504/IJBPSCM.2010.036166

Statman, M. (1999). Behavioural Finance: Past Battles and Future Engagements. *Financial Analysts Journal,* 55(6), 18–27. https://doi.org/10.2469/faj.v55.n6.2311

Straub, D., Boudreau, M.-C., & Gefen, D. (2004). Validation Guidelines for IS Positivist Research. *Communications of the Association for Information Systems,* 13, 380–427. https://doi.org/10.17705/1CAIS.01324

Szakmary, A., Ors, E., Kyoung Kim, J., & Davidson, W. N. (2003). The predictive power of implied volatility: Evidence from 35 futures markets. *Journal of Banking and Finance*, 27(11), 2151–2175. https://doi.org/10.1016/S0378-4266(02)00323-0

Taherdoost, H. (2016). Validity and Reliability of the Research Instrument; How to Test the Validation of a Questionnaire/Survey in a Research. *International Journal of Academic Research in Management* (IJARM), 5(3), 28–36. https://doi.org/10.2139/ssrn.3205040

Tan, L., Chiang, T. C., Mason, J. R., & Nelling, E. (2008). Herding behaviour in Chinese stock markets: An examination of A and B shares. *Pacific Basin Finance Journal,* 16, 61–77. https://doi.org/10.1016/j.pacfin.2007.04.004

Tebogo, B. (2012). Derivatives: Markets, Risk Management Strategies, and Valuation. *SSRN Electronic Journal*, April 2012, 1–11. https://doi.org/10.2139/ssrn.2043390

Thamotharan, A., & Prabakaran, G. (2013). Investors' Perception on Derivatives Market, Indications from Derivatives Market in India with Special References to Dharmapuri District. *International Journal of Scientific Research*, 2(12), 338–343.

Tripathi, G. (2014). An Empirical Investigation of Investors Perception towards. *Global Journal of Finance and Management.*, 6(2), 99–104. http://www.ripublication.com

Tse, Y. (1999). Market Microstructure of FT-SE 100 Index Futures: An Intraday Empirical Analysis. *The Journal of Futures Markets,* 19(1), 31–58.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science,* 185(4157), 1124–1131. https://doi.org/10.4324/9781912282562

Varghese, J. (2011). Regulation of Financial Derivatives: Some Policy Considerations. *The IUP Law Review,* 1(3), 27–42. https://ssrn.com/abstract=2063695

Vashishtha, A., & Kumar, S. (2010). Development of financial derivatives market in India - A case study. *International Research Journal of Finance and Economics,* 37(37), 15–29.

Voukelatos, N., & Verousis, T. (2019). Option-implied information and stock herding. *International Journal of Finance and Economics*, 24(4), 1429–1442. https://doi.org/10.1002/ ijfe.1741

Wagner, C., Garner, M., & Kawulich, B. (2011). The state of the art of teaching research methods in the social sciences: Towards a pedagogical culture. *Studies in Higher Education*, 36(1), 75–88. https://doi.org/10.1080/03075070903452594

Wang, Y., Hua, R., & Zang, Z. (2011). The investor behaviour and futures market volatility. *China Finance Review International*, 1(4), 388–407. https://doi.org/10.1108/204413 911111 67496.

Waweru, N. M., Munyoki, E., & Uliana, E. (2008). The effects of behavioural factors in investment decision-making: a survey of institutional investors operating at the Nairobi Stock Exchange. *International Journal of Business and Emerging Markets,* 1(1), 24–41. https://doi.org/DOI:10.1504/IJBEM. 2008.019243

Waweru, N. M., Mwangi, G. G., & Parkinson, J. M. (2014). Behavioural factors influencing investment decisions in the Kenyan property market. *Afro-Asian Journal of Finance and Accounting,* 4(1), 26–49. https://doi.org/10.1504/AAJFA.2014.059500.

Wolf, A. (1987). Optimal hedging with futures options. *Journal of Economics and Business*, 39(2), 141–158. https://doi.org/10.1016/0148-6195(87)90013-0

Wong, K. P. (2003). Currency hedging with options and futures. *European Economic Review*, 47(5), 833–839. https://doi.org/10.1016/S0014-2921(02)00287-8

Yadav, P. K., & Pope, P. F. (1994). Are stock index futures mispricing: profit opportunities or risk premia? *Journal of Banking and Finance,* 18(5), 921–953. https://doi.org/10.1016/0378-4266(94)00026-3

Yang, H., Kutan, A. M., & Ryu, D. (2018). Option moneyness and price disagreements. *Applied Economics Letters*, 25(3), 192–196. https://doi.org/ 10.1080/13504851.2017.1307931

Yoon, S. J., & Kang, S. H. (2012). ITMs versus OTMs. *Asia-Pacific Journal of Financial Studies*, 41(4), 517–539. https://doi.org/10.1111/j.2041-6156.2012.01081.x

Zangirolami-Raimundo, J., Echeimberg, J. de O., & Leone, C. (2018). Research methodology topics: Cross-sectional studies. *Journal of Human Growth and Development,* 28(3), 356–360. https://doi.org/10.7322/jhgd.152198.

Zhou, L., Zhang, R., & Huang, J. (2018). Investor trading behaviour on agricultural future prices. *North American Journal of Economics and Finance*, March, 1–15. https://doi.org/ 10.1016/ j.najef.2018.05.004

Zhou, Y. (2022). Options trading volume by moneyness, firm fundamentals, and expected stock returns. *Journal of Financial Markets,* 58(October 2019), 100648. https://doi.org/10.1016/j. finmar.2021.100648.

II. Books (including both authored and edited books)

Bajpai, N. (2018). *Business Research Methods* (Second Edition). Pearson India Education Services Pvt Ltd.

Bomfin, A. N. (2005). *Understanding Credit Derivatives and Related Instruments.* Elsevier Academic Press.

Byrne, B. M. (2010). Structural Equation Modeling with Amos: Basic Concepts, Applications, and Programming. (Second Edi). Routledge -Taylor& Francis Group. https://doi.org/10.4324/ 9780805863727

Chawla, D., & Sondhi, N. (2016). *Research Methodology- Concepts and Cases* (Second Edition). Vikas Publishing House Pvt. Ltd.

Cooper, D. R., Schindler, P. S., & Sharma, J. (2021). *Business Research Methods* (12th Edition). Mc Graw Hill Education (India) Pvt. Ltd.

Damasio, A. R. (1994). *Descartes' Error: Emotion, Reason and the Human Brain.* Avon Books, New York.

Dubofksy, D. A. (2003). *Derivatives- Valuation and Risk Management.* OxfordUniversity Press.

Edwards, F. R., & Maa, C. W. (1992). *Futures & Options.* Mcgraw-Hill Inc.

Field, A. (2005). *Discovering statistics using SPSS: and sex and drugs and rock "n" roll* (2nd Edition), SAGE Publications Ltd.

Fisher, C. (2010). *Researching and Writing a Dissertation- An Essential Guide for Business Students* (Third Edition). Pearson Education Ltd. http://www.mim.ac.mw/books/Researching and Writing a Dissertation.pdf

George, Darren & Mallery, Paul. (2003*). SPSS for Windows Step-by-Step: A Simple Guide and Reference, 14.0 update* (7th Edition). Allyn & Bacon, http://lst-iiep.iiep-unesco.org/cgi-bin/wwwi32.exe/[in=epidoc1.in]/?t2000=026564/(100).

Flick, U. (2010). *An Introduction to Qualitative Research* (Fourth Edition). SAGE Publications India Pvt. Ltd.

Ghauri, P., & Gronhaug, K. (2010). *Research Methods in Business Studies- A Practical Guide* (Third Edition). Pearson Education Ltd.

Gupta, S. L. (2017). *Financial Derivatives - Theory Concepts and Problems* (Second Edition). PHI Learning Private Limited.

Hull, J. C, & Basu, S. (2017). *Options, Futures, and Other Derivatives* (9th Edition). Pearson India Education Services Pvt. Ltd.

Joseph F. Hair, William C. Black, Barry J. Babin, R. E. A. (2010). *Multivariate Data Analysis* (7th Editio). Prentice Hall.

Kolb, R. W., & Overdahl, J. A. (2007). *Futures, Options and Swaps* (Fifth Edition). Blackwell Publishing, U.K.

Krishnaswami, O., & Ranganathan, M. (2016). *Methodology of Research in Social Social Sciences* (Second Edi). Himalaya Publishing House Pvt. Ltd.

Kumar, S. S. S. (2015). *Financial Derivatives.* PHI Learning Private Limited.

McDonald, R. L. (2014). *Derivative Markets. In Paper Knowledge. Toward a Media History of Documents* (Third Edition), Vol. 7, Issue 2. Pearson India Education Inc.

Neuman, W. L. (2000). Social Science Research Methods: *Qualitative and Quantitative Approaches* (Fourth Edi). Allyn and Bacon, A Pearson Education Company.

Panneerselvam, R. (2016). *Research Methodology* (Second Edi). PHI Learning Private Limited.

Phanse, S. (2016). *Research Methodology: Logic, Methods and Cases.* Oxford University Press.

Plous, S. (1993). *The Psychology of Judgment and Decision Making.* Mcgraw-Hill Book Company.

Richard H. Thaler. (1993). *Advances in Behavioural Finance* (Volume 1). Russell Sage Foundation.

Robert F. Devellis. (2017). *Scale Development: Theory and Applications* (Fourth Edi). Sage Publications, Inc.

Shefrin, H. (2002). *Beyond Greed and Fear: Understanding Behavioural Finance and the Psychology of Investing*. Oxford University Press. https://doi.org/10.1093/0195161211. 001.0001

Shefrin, H. (2005*). A Behavioural Approach to Asset Pricing.* Elsevier Academic Press.

Shiller, R. J. (2000). *Irrational Exuberance.* Princeton University Press.

Shleifer, A. (2000). *Inefficient Markets: An Introduction to Behavioural Finance.* Oxford University Press.

Srivastava, R. (2014). *Derivatives and Risk Management.* Oxford University Press.

Sulphey, M. M. (2014). *Behavioural Finance* (First Edition). PHI Learning Private Limited.

Varma, J. R. (2008). *Derivatives and Risk Management.* Tata McGraw Hill Education Private Limited.

III. Book chapters or sections

DeBondt, W. F. M., & Richard H. Thaler. (1995). Chapter 13 Financial Decision-Making in Markets and Firms: A Behavioral Perspective. In *Handbooks in Operations Research and Management Science* (Vol. 9, pp. 385–410). Elsevier Science B.V. https://doi.org///doi.org/ 10.1016/ S0927-0507(05)80057-X.

Shiller, R. J. (1999). Chapter 20 Human Behaviour and the Efficiency of the Financial System. *Handbook of Macroeconomics,* 1(1), Elsevier, Volume 1, Part C,1999, Pages 1305-1340, https://doi.org/10.1016/S1574-0048(99)10033-8

IV. Reports or working papers or circulars

137/2022, C. R. N. (2022). NSE Circular, *Revision in NIFTY Weekly Expiry Options Contract Cycle: Vol. 137/2022* (pp. 1–2). National Stock Exchange of India Limited. https://archives. nseindia.com/ content/circulars/FAOP54334.pdf

Circular NSE. (2023). *Revision in NIFTY BANK (BANKNIFTY) Expiry Futures and Options Contract Cycle In* (pp. 1–2). National Stock Exchange of India Limited. https://archives.nseindia.com/content/circulars/FAOP56967.pdf

IMF. (1998). IMF Report on Financial Derivatives. https://www.imf.org/external/bopage/ pdf/98-1-20.pdf

Market Pulse: A monthly review of Indian Economy and Markets. (2023). *Economic Policy and Research, National Stock Exchange of India Ltd. (NSE),* 5(3), 1–192. https:// www.nseindia.com/ resources/publications-reports-nse-market-pulse#href-1

NSE Press Release, Mumbai, January 19, 2022. (2022). https://www.nseindia.com

Raju, M. T., & Karande, K. (2003). Price Discovery and Volatility on NSE Futures Market. *In Securities and Exchange Board of India Working Paper* (Issue 7).

V. Conference papers or proceedings

Agarwal, R., Kumar, S., Mukhtar, W., & Abar, H. (2009). Impact of Derivatives on the Indian Stock Market. *Indian Finance Summit.*

Dhar, S. K. (2013). Derivative Trading in India: A New Perspective of Risk Management. *Financial and Commodity Derivatives, Rohtak Matcom Education Society, 2013*, 1–20.

Elangovan, N., & Rajendran, R. (2015). Conceptual Model: *A Framework for Institutionalizing the Vigor in Business. Third National Conference on Indian Business Management*, April, 1–32. https://doi.org/10.13140/RG.2.1. 2164.8484

Yang, S. Y., Qiao, Q., Beling, P. A., & Scherer, W. T. (2014). Algorithmic Trading Behaviour Identification using Reward Learning Method. *International Joint Conference on Neural Networks (IJCNN)*, 3807–3814.

VI. Theses or dissertations

Afsal, E. M. (2007). *An Analysis of the Impact of Derivatives on the Stock Market in India*. Mangalore University.

Anu, K. (2018). *Investors Trading Behaviour and Performance of Equity Derivatives Market in India with special reference to Tamil Nadu* [Bharathiar University]. http://hdl.handle.net/ 10603/235892

Aravind, M. (2013). *Customer Preference towards Financial Derivatives with reference to South Kerala Market*. Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya.

Atif, M. (2018). *Returns and Volatility Relationship between futures and spot market in India.* Jamia Milia Islamia.

Bhat, R. B. (2017). *Impact of derivatives on price volatility in Indian stock market* (Issue March). Mahatma Gandhi University, Kottayam.

Binoosa, T. (2018). *Role of Futures in Risk Reduction : A Study with Reference to Select Banks' Futures* (Issue August). University of Calicut.

Das, A. (2011). *Nature And Functioning of Derivatives Trading in Indian Stock Market: An Empirical Investigation*. University of Burdwan, West Bengal.

Dhanya, K. A. (2013*). Hedge effectiveness and attitude of individual derivative traders towards hedging a study with special reference to selected financial derivatives.* University of Calicut.

Ganesh Sankar. (2018). *Determinants of Derivative Pricing – a study on Indian Derivative Markets*. Institute for Financial Management and Research (IFMR).

Gourav Goutam. (2017). *Impact of Financial Derivatives on Stock Market Volatility in India Market with reference to RBI.* Kurukshetra University.

Goyal, N. (2012). *Impact of financial derivatives on stock market volatility in India.* Kurukshetra University.

Gupta, R. (2004). *Financial Derivatives Trading in India*. Mahatma Gandhi Kashi Vidyapith.

Gupta, Y. (2016). *Behavioural Finance a Study on Investors' Behaviour towards Equity Market Investment concerning Investors of Delhi*. Jamia Milia Islamia.

Jacob, A. N. (2016). *A Study on Experiences and Perceptions of Capital Market Investors on Financial Derivatives* (Issue May). UGC Minor Research Project. Baselius College, Kottayam.

Jose, B. (2011). *Informational Efficiency of Futures Market in India*. Pondicherry University.

Luong, L. P., & Ha, D. T. T. (2011). *Behavioural Factors Influencing Individual Investors' Decision-Making and Performance* [Umea University, Sweden]. www.usbe.umu.se

Mall, M. (2011). *A study on a stock index and stock index futures with special reference to S&P CNX Nifty and Nifty Futures.* Siksha O Anusandhan University, Bhubaneswar.

Mistri, A. (2016). *A Study of Derivative Trading Strategies in Indian Stock Market*. Sardar Patel University.

Nuruzzaman, M. A. (2011). *Retail Investor's Participation in India's Stock-Based Index Futures Market: Opportunities and Challenges*. Aligarh Muslim University.

Parsa, M. (2014). *An Analysis of the Impact of Derivatives on Spot Market, Risk and Portfolio Management* (Issue July). Mangalore University.

Raghavendra. (2013*). An Economic Analysis of Trading in Derivatives and Behavioural Pattern of Investors in Financial Instruments- A Case Study of Dakshina Kannada District in Karnataka.* University of Mysore.

Santhini, M. (2013). *Investors' Perception Towards Derivatives with reference to Futures and Options in Tanjore District*, Tamilnadu. Bharatidasan University, Tiruchirappally-Tamilnadu.

Sanyal, P. K. (2013). *Impact of Financial Derivatives on Stock Market Volatility- A case study of Options and Futures on BSE Sensex and NSE Nifty* (Vol. 003, Issue July). Sambalpur University.

Trivedi, K. N. (2010). *A Study on Derivatives*. Gujrat University, Ahmedabad.

Vattoli, A. (2018). *Index Derivatives and ETFs: Hedge Effectiveness and the behaviour of Individual Investors in Kerala* (Issue July). Mahatma Gandhi University, Kottayam.

Yadav, S. (2015). *Impact of financial derivatives on the growth of the Indian stock market.* University of Rajasthan.

VII. Online sources or web pages

Annual Review of 2022 ETD Trading Trends- Futures Industry Association. (2023). https://www.fia.org/fia/etd-tracker

FY 2022 Market Highlights - World Federation of Exchanges. (2022). https://www.world-exchanges.org/our-work/statistics

Hill, A. I. (2015). *How to Measure Your Trading Performance.* Trading Sim.Com. https://www.tradingsim.com/day-trading/how-to-measure-your-trading-performance

ICICI. (2022). *Retail Investors Ruling the Indian Stock Market.* ICICI Securities Ltd. https://www.icicidirect.com/ilearn/stocks/articles/retail-investors-ruling-the- indian-stock

Juneja, P. (2020). *The Need for Derivatives.* Management Study Guide. https://www. managementstudyguide.com/ types-of-derivatives.htm

Mallory, M. L. (2023). Introduction to Option Contracts. *In Price Analysis: A Fundamental Approach to the Study of Commodity Prices.* Bookdown. http://mindymallory.com/ PriceAnalysis/ introduction-to-option-contracts.html

National Stock Exchange of India Ltd. (2009*). Options trading strategies: Module workbook.* https://www1.nseindia.com/content/ncfm/sm_otsm.pdf

NSE (2023). National Stock Exchange of India Limited. https://www.nseindia.com/products-services/equity-derivatives-products

The Options Guide. (n.d.). The Options Guide.Com. Retrieved April 10, 2023, from https://www.theoptionsguide.com/strip.aspx

Vijayakumar, V. (2022). *Newbie retail investors flocking to the stock market: Who will gain & who will lose?* The Economic Times. https://economictimes. indiatimes.com/ markets/stocks/ news/

QUESTIONNAIRE

Dear Sir/Madam,

I am Subeesh VK, research scholar at Dept. of Commerce and Management Studies, University of Calicut, doing PhD under the guidance of Prof. M.A. Joseph on the topic **"The Effect of Knowledge, Strategies and Behavioural Biases on the Trading Performance of Equity Derivative Traders in Kerala".** This survey is done as part of my PhD research. Kindly share your views on following questions and spend 10-15 minutes to complete this questionnaire. All questions require an answer in order to progress through the survey. Please choose the most appropriate answer honestly after carefully reading the instructions. All collected data will be kept confidential and will use for academic purpose only. If you need any clarifications on any of the questions please contact me at subeeshvk@gmail.com or call 9446781113.

Subeesh V. K.
Part-time Research Scholar,
DCMS, University of Calicut.

I. LEVEL OF KNOWLEDGE ABOUT BASICS OF DERIVATIVE MARKET

Please express your knowledge level about following aspects of derivative market. Put a tick mark (✓) on the appropriate field corresponding to each variable.

Q. No.	Knowledge variables	Knowledge Level				
		Very Poor	Poor	Average	High	Very High
1	Knowledge about the basic concepts of Derivatives	1	2	3	4	5
2	Derivative products trading in India	1	2	3	4	5
3	Regulations/SEBI guidelines relating to derivative trading	1	2	3	4	5
4	Leverage Risks in F&O trading	1	2	3	4	5
5	NSE's new Margin requirements for F&O trading	1	2	3	4	5
6	Brokerage and other charges relating to F&O trade	1	2	3	4	5
7	Tax treatment of F&O trading gain/loss	1	2	3	4	5

II. LEVEL OF KNOWLEDGE ABOUT F&O TRADING AND STRATEGIES

Please express your knowledge about following aspects of F&O trading. (The intention of following questions is to measure your understanding on F&O strategies and its uses under various market circumstances) Put a tick mark (✓) on the appropriate field.

Q.No.	Knowledge variables	Knowledge Level				
		Very Poor	**Poor**	**Average**	**High**	**Very High**
8	Basic futures and options trading strategies	1	2	3	4	5
9	Option Greeks and their impact on option position	1	2	3	4	5
10	Technical charts based trading strategies	1	2	3	4	5
11	Delta neutral trading strategies	1	2	3	4	5
12	Option strategy builder software and its uses	1	2	3	4	5
13	Algo trading and its benefits	1	2	3	4	5
14	Pair Trading Strategies	1	2	3	4	5
15	Various types of Option strategies like straddle, strangle etc. and its uses under various market conditions	1	2	3	4	5

III. TRADING PREFERENCES AND STRATEGIES

Following are questions relating to your F&O trading preferences and strategies. Please put a tick mark (✓) on the appropriate boxes.

16. The objective of trading in derivative market

- ☐ For hedging a stock portfolio
- ☐ For earning speculative profit
- ☐ For earning arbitrage profit
- ☐ Both hedging & speculation
- ☐ For getting additional return on existing equity portfolio

17. If you have a directional view on the stock/index price which market you prefer more to trade?
    - ☐ Options Market
    - ☐ Spot Market
    - ☐ Both 1&2
    - ☐ Futures Market
    - ☐ All three
18. Which of the following derivative contract you generally prefer to trade more?
    - ☐ Index Futures
    - ☐ Stock Futures
    - ☐ Index Options
    - ☐ Stock Options
19. Which of the following type of trade you generally prefer more?
    - ☐ Intra-day trade
    - ☐ Overnight trade
    - ☐ Swing trade
    - ☐ Roll-over trade
20. Which of the following maturity of F&O contract you generally prefer more?
    - ☐ Weekly
    - ☐ Monthly
    - ☐ Annual
    - ☐ Both weekly and monthly
    - ☐ All three
21. Which option strike do you prefer to buy more frequently?
    - ☐ DITM
    - ☐ ITM
    - ☐ ATM
    - ☐ OTM
    - ☐ DOTM
    - ☐ NA

22. Which option trading strategy you adopt more frequently?
   - ☐ Basic Strategy
   - ☐ Income Strategy
   - ☐ Vertical Spread Strategy
   - ☐ Volatility Strategy
   - ☐ Sideways Strategy
   - ☐ Leveraged Strategy
   - ☐ Synthetic Strategy

The following table gives statements relating to your trading preferences in Equity Derivative market. Please tick on the appropriate cell based on your agreement or disagreement with each statement.

Q. No.	Statements relating to trading preferences	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
23	I always decide stop-loss position for all trading position	1	2	3	4	5
24	I always trade with the help of option strategy builder software	1	2	3	4	5
25	I always use Algorithmic Trading	1	2	3	4	5
26	I always trade based on the movement of foreign stock indices	1	2	3	4	5
27	I always prefer index future/options for trade than trading stock futures/options	1	2	3	4	5
28	I always decide risk -reward ratio for all my trade in F&O	1	2	3	4	5
29	I always prefer to sell options than buying options	1	2	3	4	5
30	I always consider option Greeks while taking trading decisions.	1	2	3	4	5
31	I always look put-call ratio to identify bullishness or bearishness	1	2	3	4	5
32	I always consider Implied Volatility and movements of India VIX (Volatility Index) while trading	1	2	3	4	5
33	I always consider cost of each strategy while taking trading decisions	1	2	3	4	5

34. Which option strategy builder software /websites/apps you generally used for trading options?
    - ☐ Sensibull
    - ☐ Opstra
    - ☐ Tradestation
    - ☐ Quantsapp
    - ☐ Eqsis
    - ☐ Option Bingo
    - ☐ Tastyworks
    - ☐ Others/No answer.........................
35. What would you do, If the market move against your expectation after initiated an option strategy?
    - ☐ Square off and Exit
    - ☐ Wait for stop/loss
    - ☐ Modify the strategy
    - ☐ Others......................

IV. BEHAVIOURAL FACTORS INFLUENCING TRADING DECISIONS

The following table gives statements relating to behavioural factors influencing your trading decisions in Equity Derivative market. Put a tick mark (✓) on the appropriate boxes.

Q. No.	Statements relating to influence of behavioural factors	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
36	Once I win a strategy, then I try more similar strategy next time	1	2	3	4	5
37	I have a tendency to trade in F&O based on the indications given by technical charts	1	2	3	4	5
38	I always believe that my skills and knowledge of stock market can help me to make profit from F&O market	1	2	3	4	5

Q. No.	Statements relating to influence of behavioural factors	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
39	When a trade results in a loss, I always believe that my next trade will be a gain and I increase the position size	1	2	3	4	5
40	I always prefer trading in low risk strategy even if returns are lower	1	2	3	4	5
41	I am always focusing on avoiding loss more than on making gain	1	2	3	4	5
42	I generally give different weight to different income. (For eg. I spend my regular income very carefully than my investment or additional income.)	1	2	3	4	5
43	I consider open interest, volume, etc, to identify existing market trend and trade accordingly	1	2	3	4	5
44	I consider analyst's recommendations for entering or closing a position in derivative market.	1	2	3	4	5
45	I always consider news about the companies/events before taking trading decision in F&O market	1	2	3	4	5
46	I prefer to trade in F&O as it generate quick profit than trading in stock market	1	2	3	4	5
47	I sometimes tend to hold on a losing position with the hope of recovery in price without considering stop-loss.	1	2	3	4	5
48	Usually I square off a profitable position too early due to fear of loss	1	2	3	4	5
49	I consider market sentiments before making trading decision in F&O market	1	2	3	4	5
50	I consider past trends of stocks under consideration for my trading decision in F&O market	1	2	3	4	5

V. TRADING PERFORMANCE

Please express your opinions about the levels of agreement on the following statements relating to the performance of your equity derivative trading in the last year.

Q. No.	Statements relating to trading performance	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
51	The rate of return of my recent Futures/Option trade meets my expectation	1	2	3	4	5
52	My rate of return from Futures/Options trade is higher than the average rate of return realized from equity market investments.	1	2	3	4	5
53	I am getting a consistent return from F&O trading in the last year	1	2	3	4	5

Please share your opinions about the satisfaction levels of F&O trading in the last year. Put a tick mark (✓) on the appropriate cells.

Q. No.	Statements relating to satisfaction	Level of satisfaction				
		Highly dissatisfied	Dissatisfied	Neutral	Satisfied	Highly satisfied
54	Are you satisfied with return realized from Futures/Options trading	1	2	3	4	5
55	Are you satisfied with the hedge efficiency of Futures/ Options contract	1	2	3	4	5
56	Are you satisfied with your broker’s competency and service	1	2	3	4	5

Please share your experience about the profitability of your recent F&O trades.

57. What is your average number of trade per month?

    ……………………………………………………..

58. What is the average number of winning trade per month? …Winning Ratio….
59. What is your average return from F&O trading per month?…….. (in percentage)

60. In your experience which of the following contract gives more return?

- ☐ Index Futures
- ☐ Stock Futures
- ☐ Index Options
- ☐ Stock Options

61. In your experience which type of trade gives you maximum return?

- ☐ Intra-day trade
- ☐ Overnight trade
- ☐ Swing trade
- ☐ Roll-over trade

62. In your experience which option trading strategy gives you more return?

- ☐ Basic Strategy
- ☐ Income Strategy
- ☐ Vertical Spread Strategy
- ☐ Volatility Strategy
- ☐ Sideways Strategy
- ☐ Leveraged Strategy
- ☐ Synthetic Strategy

VI. GENERAL INFORMATION

Please give answer to the following questions or put a tick mark (✓) on the appropriate boxes.

63. Your District : ....
64. Area : ☐ Urban ☐ Rural
65. Your Gender : ☐ Male ☐ Female ☐ Transgender
66. Your Age : .... years.
67. Education Level : ....
68. Occupation : ....
69. Average monthly income: Rs.....................................
70. How long you have been trading in Stock market? : .... years
71. How long you have been trading in Derivative market? : ....years

72. Which of the following securities included in your investment portfolio?

- ☐ Equity shares
- ☐ PSU Bonds
- ☐ Exchange traded funds
- ☐ Corporate Bonds
- ☐ Mutual funds
- ☐ Others……………………
- ☐ Govt. Bonds

73. What is the size of your investment portfolio: Rs. ....

74. Do you use your investment assets as Collateral margin (by pledging) for F&O trade?

- ☐ Always
- ☐ Rarely
- ☐ Often
- ☐ Never
- ☐ Sometimes

74A. If yes average amount of your investment portfolio using as collateral margin: ....

75. Average amount of cash you are using for F&O trading per month: Rs...............

76. Trading Capital: .... (74 +75)

77. Percentage of Collateral margin to total trading capital…………………

78. Please name the main stock broking company in which you are maintaining trading account for F&O trade? :

....

....

....

Remarks (if any) :

....

....

....

....