ORIGINAL PAPER

DOI: 10.26794/2587-5671-2024-28-4-6-17
JEL G4, G41

Does the Disposition Effect Justify the Options Traders' Irrationality?

V. Choubey, P.V. Joshi
Symbiosis Institute of Operations Management, Nashik,
Symbiosis International (Deemed) University, Pune, India

ABSTRACT

The options trader's decisions are expected to be rational decisions but an element of irrationality is observed in decision making. The Disposition effect is the behavioral aspect of an investor which explains his irrational decision-making. The disposition effect is the tendency to keep losing positions too long and selling winning positions too early. The present research work studies the disposition effect in options trading. Options are derivatives of underlying assets which give the holder the right to exercise them at a given date and price. In this research work, elements of disposition effect namely, Herding (HE), Mental accounting (MA), Risk Aversion (RA) are studied along with Trade enablers (TE) and Cost consciousness (CC). The data was collected from 250 respondents' trading options on the National Stock Exchange, India. The collected data was analyzed using Structured Equation Modeling (SEM). The results reflected that the disposition effect existed in decision-making by options traders. Trade Enabler consisting of Time decay and Open Interest, and Herding emerged as significant elements of disposition effect for options trading. Mental accounting, risk aversion, and cost-consciousness emerged as less significant elements affecting the disposition effect in options trading.

Keywords: disposition effect; herding; mental accounting; risk aversion; behavioral finance

For citation: **Choubey V., Joshi P.V. Does the disposition effect justify the options traders' irrationality? *Finance: Theory and Practice*. 2024;28(4):6-17. DOI: 10.26794/2587-5671-2024-28-4-6-17**

INTRODUCTION

Derivatives and Disposition in Derivative Trading

The global equity trading volumes have surged from 20 trillion US dollars in the first quarter of 2017 to 41.78 trillion US dollars by the 3rd quarter of 2021.[1] Apart from equity investment, a surge in trading of derivatives (equity, commodity, currency, and index) is observed. An option or derivative is a contract that gives the owner the right to buy or sell the security but not an obligation to execute the contract at a future date based on the strike price (1). However, the increased awareness amongst retailer traders about derivative instruments results in the trading of derivatives (2).

As per the report published by Statista[2] the number of options contracts traded worldwide in 2021 was 33.31 billion, as compared to 29.28 billion contracts in futures. As per the report of CNBC, in 2020, retail participants contributed to more than 25% of traded option contracts. The report further mentioned that the majority of them were making losses [3]. As per the reports by SEBI,[3] 89% of Future and Option traders made losses. Derivatives contracts are different from equity contracts in that they have special attributes such as expiry, premium, lot size, time-decay, high risk, high reward, etc. These attributes complicate the decision-making of the traders and involve them psychologically.

The study of decision-making by investors in the capital market was guided by classical theories. These theories tried to provide a rationale for the decisions made by the investors [4]. The Efficient Market Hypothesis (EMH) is proposed by [5] based on the Expected Utility

[1] Value of global equity trading worldwide from 1st quarter 2017 to 4th quarter 2021. URL: https://www.statista.com/statistics/242745/volume-of-global-equity-trading/ (accessed on 01.03.2022).

[2] Number of futures and options contracts traded worldwide from 2013 to 2022. URL: https://www.statista.com/statistics/377025/global-futures-and-options-volume/ (accessed on 01.04.2022).

[3] Analysis of Profit and Loss of Individual Traders dealing in Equity F&O Segment. URL: https://www.sebi.gov.in/reports-and-statistics/research/jan-2023/study-analysis-of-profit-and-loss-of-individual-traders-dealing-in-equity-fando-segment_67525.html (accessed on 30.01.2023).

Theory, which is widely accepted. These traditional theories are challenged by many researchers, given events like the dot-com crash, subprime crisis, Brexit, and the recent emergence of the Corona Virus pandemic [6]. Theories of behavioral finance are adopted to explain irrational behavior. These basic theories of behavioral finance are based on the concept of "bounded rationality" [7]. It is related to "limitations" associated with decision-making. There are a lot of studies indicating the causes of the irrational behavior of individuals. The landmark work of [8] and [9] on the disposition effect is referred to in this research work to understand irrationality in behavior of option traders. The preliminary observations by researchers, followed by interviews with option traders, revealed that traders are holding losing positions longer and selling winning positions early. This poses the following questions in the minds of the researchers.

RQ 1: Does the disposition effect justify (explain) the irrational behavior of option traders?

RQ 2: which is a significant factor determining the disposition effect in options trading.

Aim and Objectives

The study aims to justify (Explain) the irrational behavior of option traders through the disposition effect. Though there have been studies on the behavior of capital market investors, this paper aims at understanding whether the disposition effect explains the irrational behavior of options traders. The study initially focuses on investigating existing literature and exploring factors affecting disposition effects, with special reference to options trading. Further, the research intends to identify significant factors of disposition effect in options trading.

Specific Contribution of Research Work

The theory of Disposition effect was put forth by [8, 9]. Its applications were mainly identified by several authors. The study of DE in case of IPOs [10] and taxation [11] is observed. Also, studies of DE in the context of demographics are done [10, 11]. This paper studies the applicability of the disposition effect on options traders' behavior, which is lacking in the existing literature. Also, several studies were conducted with respect to individual factors of disposition effect, namely Mental Accounting [12], Herding [13], Risk Aversion. However, no work was observed in above studies to identify the significant factors affecting the Disposition effect in options trading. Further, it was noticed after the initial interaction with the option traders that cost and time value play a vital role in decision making in options trading and trigger the disposition effect. This led to further exploration of the literature, and two factors specific to option trading were proposed, namely Cost Consciousness and Trade Enablers.

THEORETICAL DEVELOPMENT

The pioneering work in understanding the complexity of options was done by [14] based on five factors, namely the strike price of the underlying asset, the current premium price of the option, the maturity date of the option, the risk-free rate in the country, and the volatility of the mark. Despite having relevant information, the majority of retailers are making losses, and this signifies the behavioral aspect of options trading decisions. The present work focuses on Disposition effect.

Disposition Effect (DE)

The disposition effect is an integral part of behavioral finance. It supports explaining the irrational behavior of decision-makers where classical theories have limitations [8, 15]. Traces of DE were observed in the self-justification theory proposed by [16], which explains investors' behavior when they commit mistakes. As a counteraction, the individual tends to invest more resources to rectify the mistakes, attracting additional financial commitments that may lead to financial distress. The literature related to DE was further advanced by contribution of [9]. They criticized the expected utility theory and the prospect theory suggested by them. Similarly, [17] observed that the risk profile is situational. An investor may take a risk in some situations and avoid others. Further inspection of the prospect theory was done by [8]. They concluded that the DE works in real decision-making and can be attributed to mental accounting, loss aversion, avoiding regret, seeking pride, and self-control. The major factors creating DE are discussed further.

Herding

It is irrationally copying the decisions of other investors. The negative news causes more fluctuations in

comparison to positive news [18]. It may be attributed to blindly following the advice of experts [19] or to fashion and fads [20]. Herding is observed very well in a social media environment called social trading [21]. This environment provides information, transparency, and constant reciprocal scrutiny by participants but at the same time drives them in direction. The study by [22] also explains the fear of missing out on patterns in trading, which causes herding. The researcher proposes the following:

H1 — Herding positively affects the Disposition Effect.

Mental Accounting

MA explains that an individual or household decision-maker decides by creating separate considerations called accounts. In the case of financial investments, each security is considered a separate account, and the decisions are not taken based on the whole portfolio altogether [12]. Along the same lines [23], discussing the DE, also considered MA when it was mentioned that the decision-makers do not consider the whole portfolio but individual securities. [24] observed that investors are risk-averse to individual stock losses but do not take into consideration portfolio losses, stressing the presence of MA. The above literature indicates the influence of MA on the DE for various instruments. Based on it, the following hypothesis is proposed to study the relation between MA and DE for options trading:

H2 — MA positively affects Disposition Effect.

Trade Enablers

Trade enablers consist of time-decay (expiration) and open-interest. The importance of the first component of trade enabler, i.e. expiration has been observed by many researchers. The American option value decomposes as it approaches its expiration date [25]. Traders choose not to stay invested in a contract that they do not believe has any chance of becoming profitable. Different observations are made by researchers regarding expiry options. The expiry date is related to return, volatility, and volume in derivatives and their underlying assets [26]. The DE (keeping losers and selling winners) is affected by the above three. It was found that the maturity effect influences the traded volumes but doesn't make the prices volatile [27]. Though volatility remains the same on the expiration day, [28] found that on the expiration day, trading volume fluctuates but prices are not affected. In contrast to this study, it is observed that trading activities are normal on expiry [29]. On the basis of the above, we infer that as the expiry date of options approaches, the probability of price fluctuation reduces, hence the option traders with profitable positions exit from the trade and the option traders with loss making positions continue to hold their positions in expectation of reversal. The second component of the trade enabler, i.e., open interest, is related to the number of un-winded contracts. In the work of [30], the importance of open-interest in predicting is highlighted. They found that increase in put-options open-interest is followed by poor return on underlying. Similarly, an increase in call open-interest predicts good performance by underlying. The options markets show unusual activities in form of open-interest before any significant corporate event [31]. Thus, open-interest can be used as an indicator for predicting the behavior of the market as studied by [32] in the Indian and US markets. The importance of non-price variables, namely open-interest and trading volume, can be seen in the research work of [32]. The common observation was that open-interest predicts the movement of underlying. The authors infer that open-interest is an indication of holding positions (i.e., DE) and intend to hypothesize that open interest increases DE. These two factors — expiry of options and changes in open-interest play an important role in holding a contract. These two factors combined are termed "Trade Enablers" by researchers. To capture the trading behavior related to expiry and open-interest and its impact on disposition, the following hypothesis is framed:

H3 — Trade Enablers positively affect the Disposition Effect.

Risk Aversion

Risk Aversion and DE are studied by many researchers. Investors' decisions are based on their economic outlook and expected utility from the investment, and they always look for value in the opportunity [8]. The expected returns vary proportionately with the risk involved in the investment. RA is a major cause of the DE and it is because of this RA that decision-makers tend to sell their winning positions too soon. However, the term asymmetric RA is used to indicate that the decision-maker is risk-averse only in a winning position but becomes a risk-taker when in a loss [33].

The paper researched the impact of only RA on the DE on the investors and concluded that the RA alone is insignificant in explaining the DE in the case of winners but is significant in the case of losing investments [34]. The previous research works reflect a relationship between RA and DE. The following hypothesis is proposed for studying the decision-makers in options trading:

H4 — Risk Aversion positively affects Disposition Effect.

Cost-Consciousness

The term cost-consciousness though is a widely used term in scientific literature, but the concept lacks clarity and is vague [35]. Cost-consciousness is looked at from different points of view, like cost reduction, operations and economic efficiency [36]. This paper intends to use the term from the capital market point of view. In this research work, the term cost consciousness is used to represent two vital and concerning elements of option trading, i.e. the transaction costs and taxes involved. The transaction cost is a major element determining efficiency and ultimately influences the decisions of stock market traders [37]. In an experiment [38], it was found that of the major factors affecting the DE, transaction cost was found to be a significant factor. On similar lines, observations were made by [39]. It is found that the DE is sensitive to taxes and the decisions of traders are affected by the rate of taxes [40]. In this context [41], observed the impact of security transaction taxes and inferred that it has an adverse impact on stock market participants and reduces profitability. Studies by [42] reveal that to reduce tax liabilities, traders wind up their winning positions as the year approaches. This indicates that decisions made are affected by taxes. The research [43] studied the impact of taxation on the trading behavior of private investors. They concluded that taxes have a major impact on the decision-making of traders. Discontinuity of taxes increases the trading volume of buying and selling of positions in case of gains as well as losses. Hence, the researchers are interested in understanding the existence of the following relationship:

H5 — Cost-consciousness positively affects the Disposition Effect.

Looking at the literature and research work available, applications of DE have been studied by many authors, like in taxation [10], IPO [41], or demographics [11]. Also, several studies were conducted with respect to individual factors of disposition effect namely Mental Accounting [12]; Herding [18]. Risk Aversion [33]. However, no work was observed in the above studies to identify the significant factors affecting the Disposition effect in options trading. Further, it was noticed after the initial interaction with the option traders that cost and time

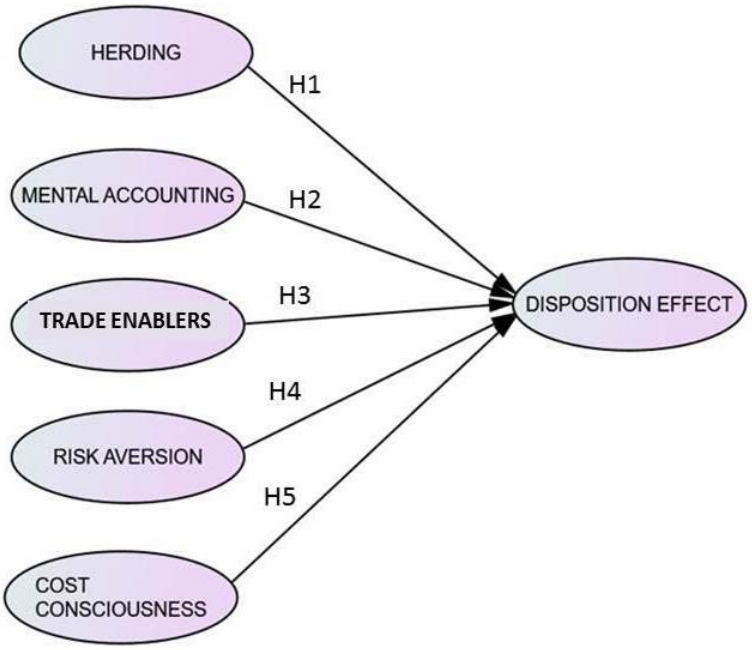

Fig. 1. **Proposed Model for DE in Options Trading**

Source: Compiled by authors.

value play a vital role in decision making in options trading and trigger disposition effect. This led to further exploration of literature and two factors specific to option trading were proposed, namely Cost Consciousness and Trade Enablers. Based on the detailed literature review, the model is proposed as in *Fig. 1*.

RESEARCH METHODOLOGY

Instrument Development

The disposition effect is studied based on five factors: Herding, MA, Trade Enablers, Risk Aversion, and Cost-Consciousness. *Table 1* depicts the sources of items for various constructs (factors).

These items from various sources were adapted for the current study. The items, related to Trade Enablers and Cost-Consciousness, were developed by researchers on suggestions of experts. The validity of an instrument is the appropriateness by which it measures what is required to measure [47]. The Content Validity of these items was judged by the expert panel of 10 judges from Industry and Academia. Items having 75% consensuses were used for data collection. Out of 22 items, seventeen were validated by a panel of judges. Items **DE4 and DE 5, TE2 & TE3, CC2** were dropped based on the judges' opinion. The final instrument was presented to respondents and responses were collected on a five-point Likert scale with Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), and Strongly Disagree (1).

Sample and Data Collection

The data was collected from individual options traders on the National Stock Exchange, India. Responses were collected from 315 option traders using the judgment sampling method. A self-administered questionnaire was used for this purpose. The response rate was 79% (approx.), and 250 valid and complete responses were used for further analysis. The respondents' profile is given in the *Table 2*.

RESULTS

Common Method Bias and Normality

Common method bias was observed using Harman's single-factor test. The maximum variance for a single factor was 43.5%. These rules out biasedness in the given data. The data was found in the normal range of +/−2 for skewness and kurtosis. This ensures the normality of the data [48].

Validity

Convergent validity: Composite Reliability (CR), factor loadings, and Average Variance Extracted (AVE) were used for establishing convergent validity. An acceptable range for CR above 0.7 and AVE above 0.5 for convergent validity [49]. Factor loading above 0.5 is acceptable. Cronbach Alpha is above 0.60 for all the constructs and is within an acceptable range [49]. The findings are presented in *Table 3*.

Discriminant validity: the discrimination in latent value is understood by discriminant validity. The square root value of AVE for each construct should be greater than the correlation coefficient it has with other constructs. *Table 4* indicates the presence of discriminant validity as the AVE square root was greater than the correlation coefficient.

Structural Model

SPSS Amos version 25 was used to conduct SEM. The values indicate the adequate fit of the proposed

Table 1

Instrument Development Sources

Construct (factors)	Source
Disposition Effect (DE1, DE2, DE3, DE4, DE5)	[44]
Herding (HE1, HE2, HE3)	[45]
MA (MA1, MA2, MA3)	[45, 46]
Risk Aversion (RA1, RA2, RA3, RA4)	[46]
Trade Enablers (TE1, TE2, TE3, TE4)	Suggested by experts
Cost-Consciousness (CC1, CC2, CC3)	Suggested by experts

Source: Compiled by authors.

Table 2

Respondents' Profile

Description	Category	Number
Gender	Male	174
	Female	76
Age Group	21 to 35	122
	36–50	81
	Above 50	47
Educational Qualification	Undergraduate	71
	Graduate	133
	Post Graduate	36
Annual Income	Up to 0.25 mln	46
	0.25 mln – 0.5 mln	113
	Above 0.5 mln	91

Source: Compiled by authors based on data collection.

model. The values were within the acceptable range, as suggested by [49]. Normed $\chi 2 = 1.821$, CFI = 0.974, IFI = 0.974, TLI = 0.966 and RMSEA = 0.057).

Path Analysis

The following *Table 5* presents the results of hypotheses H1 to H5 at a 0.05 level, showing a significant positive relation between DE and Herding (H1), DE, and Trade-Enablers (H3). However, no significant positive relationship was observed between, the DE and Mental-Accounting (H2); DE and Risk-Aversion (H4); DE and Cost-Consciousness (H5). The predictive validity can be assessed through estimates. The Herding and Trade Enablers were significant predictors at p-value of 0.05 level (*Table 5*). The model is presented in *Fig. 2*.

DISCUSSION

The research aimed at studying the Disposition effect in option trading. Disposition is selling winning positions too early and keeping losing positions for too long [8]. Options trading was studied in light of five dimensions related to disposition. Herding, MA and RA constructs were obtained from the literature review, whereas TE and CC were added as per the expert's opinion. Responses obtained from the options traders in the NSE were run through the SEM to identify the relationship between the constructs and disposition effect. The results are discussed further.

Herding is the mentality of following others [50]. Irrespective of the individuals' ability to trade, the traders get influenced by others' opinions and ultimately end up trading irrationally [19]. In this study, it was observed that the traders normally follow the trends while dealing with options. The high volatility in the prices of options also causes traders to depend on others. It was also revealed that opinions expressed on social media play a major role in determining option traders' decisions. Based on the outcome of SEM, it was found that herding supports the disposition effect in options traders. MA is an individual's or household's decision to create separate considerations for different investments [12]. MA was not observed as a significant factor in determining DE. Option traders apply multiple trading strategies that involve creating simultaneous positions in multiple contracts. Here, the net returns are considered as the outcome of the strategy, wherein these multiple trades are interrelated and not separated by mental accounts. Thus, MA doesn't contribute significantly to the DE. Cost-consciousness is the impact of transaction costs and taxes paid by the trader on trading behavior [37]. Though the transaction costs and taxes are high, the options traders compare them with the expected returns from the trade and are thus willing to take up the costs. The options traders are aware of the transaction charges and taxes they incur, and they devise their risk-reward ratios accordingly, thus, cost-consciousness is found to be a non-significant element. It

Table 3

Construct — Standardized Factor Loading, AVE, SCR, and Cronbach's Alpha

Construct	Item Code	Indicator	Standardized Factor Loading	Scale composite reliability	Average Variance Extracted	Cronbach Alpha
Mental Accounting	MA1	"You tend to treat each element / account in your trading portfolio separately"	0.864	0.900534	0.751	0.901
	MA2	"You take separate actions for losing and winning positions"	0.869			
	MA3	"You ignore the connection between different trading possibilities"	0.867			
Herding	HE1	"Other investors' decisions of buying and selling stocks impact my investment decisions"	0.926	0.877221	0.710	0.843
	HE2	"I usually react quickly to the changes in other investors' decisions and follow their reactions to the stock market"	0.930			
	HE3	"I follow social blogs / forums / news / YouTube before making the stock a purchase/sale"	0.638			
Disposition Effect	DE1	"I will keep holding stocks even though they are losing and will never think about selling the stocks until they balance the losses"	0.674	0.774849	0.535	0.751
	DE2	"I usually sell profitable stocks to realize gains first when I am in want of money. I buy other stocks and keep holding them to wait for the price of unprofitable stocks to go up"	0.768			
	DE3	"There is profit from several share transactions for me at times, which could not compensate for one loss"	0.749			
Cost-Consciousness	CC1	"I quickly sell profitable positions after covering up the transaction charges"	0.877	0.873423	0.775	0.873
	CC3	"I quickly sell profitable positions after covering up the taxes"	0.884			
Risk Aversion	RA1	"You sell a position that has increased in value faster"	0.877	0.910954	0.719	0.91
	RA2	"You avoid selling positions that have decreased in value"	0.847			
	RA3	"You feel more sorrow about holding losing positions too long"	0.832			
	RA4	"You feel more sorrow about selling winning positions too soon"	0.835			
Trade Enablers	TE1	"I quickly sell winning positions nearing expiry (time-decay)"	0.581	0.729907	0.586	0.694
	TE4	"I sell losing positions with decreasing Open interest"	0.914			

Source: Authors' calculations.

Table 4

Discriminant Validity

Correlations						
	HE	MA	DE	CC	RA	TE
HE	.842					
MA	.841**	.866				
DE	.309**	.428**	.731			
CC	.833**	.864**	.441**	.881		
RA	.771**	.834**	.409**	.830**	.848	
TE	.239**	.152*	–.157*	.194**	.097	.766

Source: Authors' calculations.

Table 5

Path Analysis

Hypothesis	Path	Estimate	Standardized path coefficient	t-value	p-value	Supported/Not Supported
H1	DEЯ	0.474	0.854	2.264	.024	Supported
H2	DEЯ	.037	0.054	0.043	.966	Not supported
H3	DEЯ	1.263	0.341	2.746	.006	Supported
H4	DEЯ	.300	0.410	0.904	.366	Not supported
H5	DEЯ	.376	1.853	1.112	.266	Not supported

Source: Authors' calculations.

is also observed by [40] that the effect of taxes and other costs is significant when the financial year ends, but short term option trading doesn't get affected by these costs. Risk-aversion was found to be an insignificant contributor to the DE in the decision-making of options traders. Risk-aversion is the tendency to prefer guaranteed outcomes over probabilistic ones [33]. The investors in capital markets judge their win or loss with a reference point like their purchase price and the current price of the stocks or any other financial asset [9]. However, when it comes to options trading, the reference point phenomenon becomes insignificant because the instrument traded is not an asset but underlying security and thus has no purchase price of its own. The premium involved in options is volatile and simply moves based on multiple external factors apart from the market price of the underlying asset. Due to the phenomenon of time decay, even without any change in the price of the underlying asset, the premium involved is bound to be zero. Thus, riskiness is an underlying attribute of option trading. Thus, the options trader accepts the risk involved while entering into any position, and so risk aversion is a less significant factor for disposition effect in the case of options traders. Trade-enablers influence options trading by holding losing positions longer and selling winning positions early. It was found from the results that TE significantly influences DE in options trading. It comprises two factors, time-decay, and open interest. Options are instruments that give traders the right to trade at a paid premium, which is usually less than the actual value of the asset. However, latent costs are involved as a time factor. Due to time decay, the premium approaches zero at expiry and it creates a sense of urgency in traders to wind up positions before expiry. This results in a DE. On the other hand, if the trade has moved in the loss-making territory, traders avoid winding up positions for two reasons. Firstly, there is the there is the expectation that trade will take a favorable turn and they will end up making profits. Secondly, nearing expiration, the premium has already decayed substantially, resulting in the recovery of minimal investment. Thus, the traders remain invested

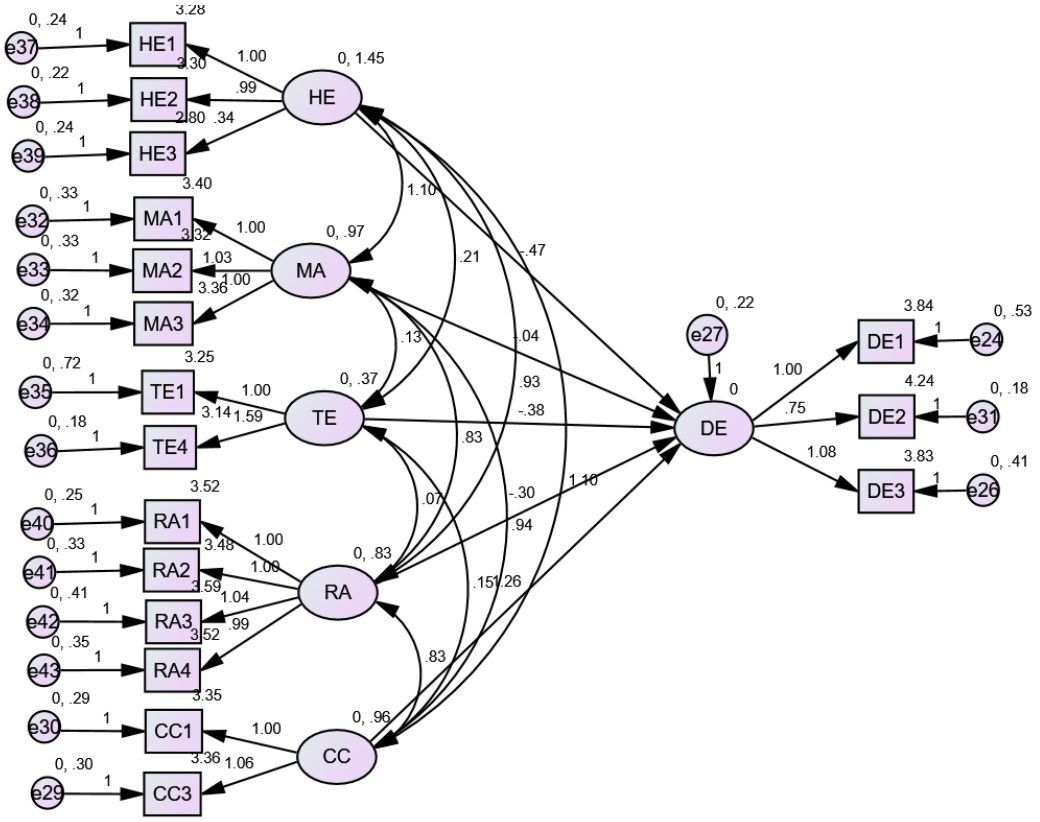

Fig. 2. **Structural Model**

Source: Model based on authors' calculation.

and DE comes into play. Open interest is the number of positions that are not un-winded by traders. This sets the trend for traders. Most of the researchers found open interest to be an important factor in influencing trading behavior [31]. Based on a number of calls or put positions held in the market, traders make decisions about the prevalent trend in the market. Thus, winding up positions on the basis of open interest causes traders to sell winning positions early with the changes in open interest. On the other hand, for losing positions, traders are found waiting for an open interest rate change in their favor. Further, the model studied the covariance among the multiple factors. All the factors showed positive covariance with each other. Thus, the factors have a positive impact on the trading behavior of option traders. However, no covariance was observed between HE and CC. This implies that covariance amongst factors augments to disposition effect.

CONCLUSION

The study was conducted with the objectives of investigating irrationality in option trading and identifying elements of Disposition Effect. The study initiated with review of extant literature related to disposition effect and found, Herding Mental Accounting, Risk Aversion, Trade Enablers and Cost-Consciousness as important elements of DE. To further achieve the objectives of identifying important elements producing a disposition effect, a model was developed to test hypotheses. Responses were collected from 250 stock market participants trading in derivatives. Structural Equation Modelling was used to validate the model. It can be concluded that DE does exist in option trading and leads to irrationality. Trade Enabler consisting of Time-decay and Open-Interest, and Herding emerged as significant factors affecting DE for options traders. The factors not significantly affecting DE in options trading were MA, risk-aversion, and cost-consciousness. The research paper is intended to understand the DE in options trading. The research work contributed by explaining the existence of the DE in options trading. The study is the first of its kind to study option derivatives as trading instruments by retail traders. The research can be of use to the individual traders in devising trading strategies. The

traders would better understand the causes of their irrational behavior and may try to avoid or alter their behavior. The research is also of value to regulators and policymakers, as it will help them devise proper policies that may discourage irrational behavior.

Limitations and Scope

The research was conducted on the behavioral responses of 250 option traders on the National Stock Exchange India. The biases in responses may affect the study. The study opens vistas of research wherein the behavioral responses can be validated by actual trades. The analysis can also be based on demographic attributes. Investment size is another important factor that can be considered for future research. Covariance among factors can be taken into account in future studies to elaborate on the on the disposition effect.

Implications

The research can be of use to individual traders in devising trading strategies. The traders would better understand the causes of their irrational behavior and may try to avoid or alter their behavior. The traders are required to overcome the hype or hoax created and should be able to judge the real and panicky movement. The open interest and time decay observed with trade enablers calls for emotional control while trading in options.

The research is also of value to the regulators and policy makers as it will help them to devise proper policies that may discourage the irrational behavior.

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ABOUT THE AUTHORS

Vardhan Choubey — PhD, Assist. Prof., Symbiosis Institute of Operations Management, Nashik, Symbiosis International (Deemed) University, Pune, India
https://orcid.org/0000-0002-2124-9759
Vardhan.choubey@siom.in

Prasad Vasant Joshi — PhD, Assist. Prof., Symbiosis Institute of Operations Management, Nashik, Symbiosis International (Deemed) University, Pune, India
https://orcid.org/0000-0002-7198-4786
Corresponding author:
joshi.prasad@siom.in

Conflicts of Interest Statement: The authors have no conflicts of interest to declare.

The article was submitted on 05.07.2023; revised on 15.08.2023 and accepted for publication on 26.08.2023. The authors read and approved the final version of the manuscript.