TECHNOLOGY-ENABLED TRADING AND BEHAVIORAL BIASES OF RETAIL INVESTORS IN FUTURES AND OPTIONS MARKETS

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Abstract. *The rapid diffusion of digital trading platforms, mobile applications and real-time market information has transformed retail participation in futures and options (F&O) markets. While technology has lowered entry barriers and enhanced market access, it has also amplified behavioral biases that influence investor decision-making. This study examines the interaction between technology-enabled trading and behavioral biases among retail investors participating in F&O markets in North India. Using a structured survey of retail derivative traders and applying descriptive statistics, reliability analysis and regression techniques, the research identifies the prevalence of key behavioral biases such as overconfidence, herding behavior, loss aversion and disposition effect. The findings indicate that ease of access, frequent notifications and gamified trading interfaces intensify trading frequency and risk-taking behavior, often leading to suboptimal investment outcomes. The study contributes to behavioral finance literature by highlighting how technological advancements interact with psychological factors in derivative markets and offers implications for investors, regulators and platform designers.*

Keywords: *Behavioral finance, Futures and options, Retail investors, Technology-enabled trading, Behavioral biases, India*

The participation of retail investors in futures and options (F&O) markets has increased substantially in recent years, particularly in emerging economies such as India. This growth has been supported by rapid advancements in financial technology, including app-based trading platforms, algorithm-driven analytics and low-cost brokerage models. Digitalization has reduced entry barriers, enhanced market accessibility and enabled real-time execution of trades, thereby reshaping the structure of derivative markets.

Despite these advantages, traditional financial theory, which assumes rational decision-making and efficient markets has been increasingly questioned. Behavioral finance literature demonstrates that investors often rely on heuristics and are influenced by cognitive and emotional biases while making investment decisions (Kahneman & Tversky, 1979; Barber & Odean, 2001). In derivative markets, where leverage and volatility are inherently high, such biases can significantly affect trading outcomes and risk exposure.

Technology-enabled trading environments may further intensify these behavioral tendencies. Features such as instant order execution, continuous price alerts, social trading forums and visually engaging interfaces can encourage excessive trading, overconfidence and herding behavior (Shiller, 2000; Statman, 2014). Retail investors, who often possess limited experience and financial literacy are particularly vulnerable to these influences.

North India represents a relevant setting for examining these dynamics due to its growing investor base, increasing digital penetration and rising interest in derivative trading. Understanding how technology interacts with behavioral biases in this context is essential for promoting informed participation, investor protection and sustainable market development. Accordingly, this study investigates the role of technology-enabled trading platforms in shaping behavioral biases among retail investors in F&O markets in North India.

Behavioral finance literature has extensively documented the presence of cognitive and emotional biases in financial decision-making. Behavioral finance research has consistently demonstrated that retail investors do not always act rationally and are often influenced by psychological and cognitive biases while making investment decisions. Seminal work by Kahneman and Tversky (1979) introduced prospect theory, highlighting how individuals evaluate gains and losses asymmetrically, leading to loss aversion and risk-seeking behavior under losses. Barber and Odean (2001) further established that overconfidence significantly increases trading frequency among retail investors, often resulting in lower net returns.

Recent Scopus-indexed studies have extended these insights to derivative markets. Mageswari and Sasirekha (2024) found that overconfidence, herding behavior, and mental accounting strongly influence retail investors' participation in futures and options trading. Their empirical evidence suggests that limited financial literacy and excessive reliance on market sentiment exacerbate biased decision-making in derivatives trading.

With the expansion of financial technology, scholars have increasingly examined the behavioral consequences of digital trading environments. Shiller (2015) and Statman (2014) argue that real-time information access and digital interfaces can amplify emotional reactions and heuristic-driven decisions. Empirical evidence from emerging markets indicates that mobile trading applications and online platforms encourage frequent trading and speculative

behavior, reinforcing biases such as herding and overconfidence among retail investors.

Studies focusing on technology-enabled trading further suggest that social trading features, instant notifications, and low transaction costs reduce deliberation time and promote impulsive trading behavior **(**Baker & Ricciardi, 2014). In derivative markets, where leverage magnifies outcomes, such technology-induced biases can significantly increase financial risk exposure for retail investors.

Despite growing scholarly attention, limited empirical research has jointly examined behavioral biases and technology-enabled trading in the context of Indian futures and options markets.

Despite growing interest in fintech and behavioral finance, empirical studies focusing on the combined impact of technology and behavioral biases in F&O markets remain limited, particularly in the Indian context. This study seeks to bridge this gap by examining retail investors operating in a technology-driven trading environment.

The primary objectives of the study are:

1. To identify dominant behavioral biases among retail investors participating in F&O markets.

2. To examine the influence of technology-enabled trading platforms on retail investors' trading behavior.

3. To analyze the relationship between technological features of trading platforms and behavioral biases in derivative trading.

4. To suggest policy and practical implications for investors, regulators, and trading platform providers.

The study follows a descriptive and analytical research design to examine the relationship between technology-enabled trading and behavioral biases among retail investors in F&O markets. Primary data were collected through a structured questionnaire administered to retail investors actively engaged in futures and options trading across selected states of North India.

4.1 Sample Design

A convenience sampling technique was adopted due to accessibility constraints. A total of 220 questionnaires were distributed, out of which 186 valid responses were used for final analysis.

4.2 Data Collection Instrument

The questionnaire consisted of four sections:

- Demographic profile (age, gender, education, income)
- Trading characteristics (experience, frequency, preferred platform)
- Technology-enabled trading factors (mobile apps, alerts, ease of execution)
- Behavioral biases measured using a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree)

4.3 Tools and Techniques

The following statistical tools were employed using SPSS software:

- Descriptive statistics (mean, standard deviation, frequency)
- Reliability analysis using Cronbach's alpha
- Correlation analysis
- Multiple regression analysis

5. Data Analysis and Findings

Table 1

Demographic Profile of Respondents

Variable	Category	Percentage
Gender	Male	68.3
	Female	31.7
Age	Below 30 years	42.5
	30–45 years	38.2
	Above 45 years	19.3
Education	Graduate	46.8
	Postgraduate & above	53.2

Table 2

Reliability Statistics

Construct	Cronbach's Alpha
Overconfidence	0.81
Herding Behavior	0.78
Loss Aversion	0.75
Disposition Effect	0.77

The reliability results indicate acceptable internal consistency for all behavioral bias constructs.

Table 3

Regression Analysis – Impact of Technology-Enabled Trading on Behavioral Biases

Independent Variable	Beta	t-value	Significance
Platform Ease of Use	0.42	4.86	0.000
Real-time Alerts	0.36	3.92	0.001
Trading Frequency	0.29	3.11	0.003

The regression results reveal that technology-enabled trading features significantly influence behavioral biases, particularly overconfidence and herding behavior among retail investors.

The findings suggest that technology-enabled trading amplifies behavioral biases by encouraging rapid decision-making and continuous market engagement. While digital platforms enhance accessibility and convenience, they may also foster impulsive trading behavior among retail investors. In F&O

markets, where leverage magnifies gains and losses, such biases can have serious financial consequences.

The study underscores the need for balanced platform design that promotes informed decision-making rather than excessive trading. Investor education initiatives should emphasize behavioral awareness alongside technical market knowledge.

For investors, recognizing behavioral biases can improve risk management and trading discipline. Regulators may consider introducing guidelines for responsible digital trading practices and enhanced disclosure mechanisms. Trading platform developers can incorporate features such as risk warnings, cooling-off periods, and educational prompts to mitigate bias-driven trading behavior.

This study highlights the critical role of technology in shaping behavioral biases among retail investors in futures and options markets. The interaction between digital trading environments and investor psychology has significant implications for market stability and individual financial outcomes. By focusing on retail investors in North India, the research contributes region-specific insights to the broader behavioral finance literature. Future studies may extend this analysis by incorporating longitudinal data or comparing different regions and investor segments.

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KICHIK BIZNES SUBYEKTLARINING TADBIRKORLIK FAOLLIGINI OSHIRISHNING ISTIQBOLLI YO'NALISHLARI

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Kichik biznes va xususiy tadbirkorlik iqtisodiy o'sish, bandlik va ijtimoiy barqarorlikning asosiy drayverlaridan biri sifatida global miqyosda e'tirof etiladi. Biroq tadbirkorlik faolligi – ya'ni yangi biznes tashabbuslari, innovatsion g'oyalar va bozorga kirish intensivligi – ham institutsional muhit, ham resurslarga kirish, ham bozor rag'batlari bilan belgilanadi. Shuning uchun ham istiqbolli yo'nalishlarni aniqlashda nazariy konsepsiyalar va empirik dalillarni uyg'un qo'llash zarur.

Nazariy-metodologik asos. Y. Shumper tadbirkorni "ijodiy buzuvchi" sifatida talqin etib, aynan innovatsiyalar – yangi kombinatsiyalar, yangi bozorlar va yangi texnologiyalar – iqtisodiy dinamikaning yuragi ekanini ko'rsatadi [1]. Bizning fikrimizcha, ushbu yondashuv kichik biznes uchun ayniqsa dolzarb: ular moslashuvchanligi tufayli mikroinnovatsiyalar orqali tarmoq samaradorligini oshiradi. Piter Durker innovatsiyani tizimli amaliyot, maqsadli izlanish va boshqariladigan jarayon sifatida ko'rish lozimligini ta'kidlab, "tasodifiy ilhom" o'rniga manbalarini aniqlash, sinovdan o'tkazish va bozorga tez yetkazishni tavsiya etadi [2]. Bizning yondashuvimiz shuki, kichik biznesda innovatsiya boshqaruvi yengil vaznli, iterativ va mijozga yo'naltirilgan (lean) usullar orqali tashkil etilganda faollik ko'rsatkichlari barqaror oshadi. Z. Acs va D. Audretsch tajribasi esa kichik firmalar texnologik noaniqlik yuqori bo'lgan segmentlarda ixtisoslashib, yangiliklarni bozorga olib kirishda muhim nisbatli ustunlikka ega ekanini ko'rsatadi [3]. Bizning fikrimizcha, bu ustunlikni kuchaytirish uchun ma'lumotga asoslangan qarorlar va tarmoqlararo kooperatsiya mexanizmlarini kengaytirish talab etiladi.

G.B. Kleynerpning tizimli iqtisodiyot konsepsiyasi iqtisodiy subyektlar o'rtasidagi barqaror aloqalar, rollar va resurslar muvozanatini ta'minlashni markazga qo'yadi [4]. Bizning yondashuvimizda kichik biznes faolligini oshirish "yakkama-yakka subyekt"ni emas, balki ekotizimni (ta'lim, moliya, infratuzilma, tartibga solish, bozorlar) uyg'un rivojlantirish orqali erishiladi. Xalqaro rivojlanish institutlari, jumladan, Jahon banki, O'zbekistonda xususiy sektor transformatsiyasi doirasida kreditga kirish, raqamli xizmatlar, eksport logistikasi va tartibga solish sifatini yaxshilash zaruratini ta'kidlaydi [5]. Bizning fikrimizcha, bu yo'nalishlar bo'yicha "tez yutuqlar" (quick wins) bilan birga chuqur