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TRADING BEHAVIOR AND STOCK MARKET INVESTMENT DECISION: EMPIRICAL EVIDENCE FROM PAKISTAN STOCK MARKET

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ABSTRACT

The aim of present study is to examine the impact of behavioral biases such as overconfidence, optimism, pessimism, and rational expectations of investors on trading volume in the stock market of Pakistan. Daily data was taken from the official website of the Pakistan Stock Market (PSX). The data period comprises of January 2019 to March 2024. Unit root stationary, Regression models, and GARCH (1,1) models tests were used. Results reveals that significant positive impact of confidence and optimism, while pessimism negatively impacts on daily trading volume. Whereas confidence and optimism positively but insignificantly impact Monday's daily exchange volume. Further results demonstrate that optimism has a positive significance, and confidence and rational expectation show a positive but insignificant impact on Tuesday's daily trading volume. Confidence and optimism have positive impacts on Wednesday's daily trading volume and Pessimism has a negative influence on Wednesday's daily trading volume. The study also confirms that a significant positive impact of optimism and rational expectations has a significant negative impact on Thursday's daily trading volume. GARCH (1,1) indicates that the lagged trading volume has significantly negative impacts on today's trade volume and only pessimism has significant positive influence in trade volume. Further GARCH (1,1) extended model demonstrated that confidence has positive impact a trading volume volatility and pessimism has negative impacts on trading volume volatility. This research explores how behavioral biases like confidence, optimism, and pessimism influence investment decisions.

Keywords: *Behavioral biases, Confidence, Optimism, Pessimism, Rational expectation, Daily trading volume, Pakistan Stock Market.*

INTRODUCTION

The Efficient Market Hypothesis (EMH) asserts that securities prices in an efficient market represent all available information, and returns overhead or under average are impossible (Fama, 1970). (Fama, 1970) he is correct when he believes every market participant should have nearly equal returns regardless of strategy. However, there are innumerable real-time instances where market participants have different returns. Consequently, the author assumes that the behavioral biases causing these variations in individual investor returns cause this variation in return variability (Oprean and Tanasescu, 2014). The efficient capital market hypothesis is a

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helpful place to start when studying contemporary finance theory. The word "efficiency" refers to the idea that investors cannot outperform the market and cannot make extraordinary gains compared to other investors from capital market transactions.

Behavioral finance investigates how emotional and psychological states impact financial and economic decision-making (Kengatharan and Kengatharan, 2014). Economic and behavioral finance are related since they both seek to comprehend how a person's psychology affects their tendency to make decisions. The area of behavioral finance is very new, and it applies principles from economics, sociology, and psychology to the field (Oprean and Tanasescu, 2014). Conventional finance maintains that investors make intelligent investment decisions and are logical beings. Even in unstable times, investors want to maximize gain or profit by picking the finest investment opportunity (Kumar and Goyal, 2015).

According to behavioral experts, confidence stems from believing in oneself and one's talents. Moreover, overconfidence results from an exaggerated belief in one's skills. Overconfidence impacts trading activity and the increase in investments. In this sense, an investor's investing decisions may be influenced by behavioral approaches and financial knowledge regarding investments (Sukanya and Thimmarayappa, 2015). Most research on behavioral finance takes place in developed economies. It examines a wide range of behavioral characteristics of Private investors and portfolio managers, including biases related to confidence, overconfidence, optimism, pessimism, and herding. Due to its extreme sensitivity and reaction to unexpected shocks and news, the Pakistani stock market is highly volatile. It quickly takes an impact on market movement. The Pakistani stock market is robust and recovers swiftly from shocks. Over time, individual investors' participation in the financial markets has increased, making them more peopled.

This study examines the impact of these biases on Pakistani investor's decision-making with respect to trading volume. This study examines the impact of these biases on Pakistani investor's choices. It has highlighted the value of the stock exchange, stating that it is the source of both financing and economic development for enterprises (Rasheed et al., 2021).

1.1 Significance of the Study

By attempting to challenge the conventional understanding of investors that upholds the efficient market hypothesis, the present study has further to the corpus of information already in existence. Given the outcomes, contesting the market efficiency theory in Pakistan is possible. The psychological elements that influence investors' decision-making processes and cause people to act irrationally are also highlighted in the study. Second this study is very different from earlier research on emerging markets. First, it measures behavioral biases using secondary data. While many studies' primary data technique provides valuable insights into the issues under investigation, it is also prevalent with respondent biases. This study also helps investors, researchers, market participants, stockbrokers, and fund managers understand that data is not the only factor in informational efficiency. Information has an impact on behavior, which in turn affects investment decisions. Lastly, this research provides current Pakistani contextual information on this subject.

2 Literature Review

Conventional finance concepts (Portfolio and EMH) attempt to justify why financial markets are well-organized., whereas behavioral finance theories aim to explain the reasons for market inefficiency and anomalies. Therefore, behavioral finance describes by what method and why markets are inefficient Asad et al. (2018). Ahmad and Wu, (2022) research suggests that irrational human behavior is inherent in all financial asset markets, causing volatility. The Nobel laureate was a pioneer in predicting tech and housing booms, highlighting the irrationality of market players. The remaining section briefly discusses important empirical literature.

Fahim et al. (2019) argued that adoptive rationality in Malaysian stock market influences pricing and stability, resulting in constrained market efficiency. Toma (2015) the study examined the behavioral elements influencing investing in Bucharest's Romanian capital market.

Stockholders in the market demonstrated overconfidence, herding behavior, the disposition effect, and the representativeness bias. The age of investors and their frequency of trading has an important influence on market outcomes and profitability. Sharma and Kumar, (2020) research indicates that investors' attitudes impact market movements and trading activity in the French market.

Baker et al. (2023) explained that the role of financial professionals is growing in the Indian economic system. Their study investigates the relationship among Big Five character traits and the behavioral biases of Indian financial experts when making investment selections. Kwatra (2020) describes in a study, optimism bias and overconfidence are appropriate indicators of rising markets, even in the face of the current economic slump.

In research on two growing economies, namely Romania and Brazil, behavioral mistakes like anxiety, pessimism, optimism, and sadness have a significant impact on investing decisions compared to rational conduct. Oprean and Tanasescu (2014) a study conducted in Brazil and Romania indicated that investors' illogical judgments influence trading behavior. The findings indicated that Polish investors are pessimistic, whereas optimism impacts trade activity.

2.1 Confidence

Behavioral scientists describe confidence as the belief in one's own skills. Overconfidence occurs when someone overestimates their skills Daniel and Titman, (1999). Overconfidence impacts trading operations and investment growth Suresh (2024) . Overconfidence can impact decision-making when managers overstate their capabilities to forecast future advantages. Overconfidence was found to significantly influence investor decision-making.

Previous performance and accomplishment may boost confidence, as shown by Gervais and Odean (2001). The study found that large market returns boost investor confidence, even if they are spread over the whole market. Shah et al. (2018) research suggests a detrimental correlation among overconfidence and financial decisions. Overconfidence contributes to market volatility and disturbances. Boussaidi (2013) the study demonstrated a unidirectional relationship among transaction volume and return instability, which supports the market's overconfidence phenomenon. Furthermore, it was verified that overconfidence improves perceived investment performance.

2.2 Optimism and Pessimism

All behavioral mistakes, including pessimism, optimism, anxiety, and sadness, contradict logical action. Stock markets include anomalies, and few investors profit from their illogical behavior. In stock markets, individuals may exhibit herding behavior to feel protected Oprean and Tanasescu (2014). Investors' behavior might be influenced by positive or negative information, leading to optimism or pessimism. This conduct (optimism or pessimism) might influence Stock market volatility and futures trading.

Optimistic bias overestimates positive results depending on investor prospects Astebro et al. (2007). Ghumro et al. (2022) insufficient evidence suggests that investors overplay to earnings information. In the French capital market, investors tend to be more pessimistic than optimistic. This is because optimism needs time to be reinforced, but pessimism requires only a minor jolt. This shows that investors' attitudes and opinions impact their investing decisions. Bashir et al. (2019) optimism was found to have no meaningful impact on investment decisions.

2.3 Rational Expectation

According to that idea, mediators analyze all relevant information when anticipating without making systematic errors. Combining individual predictions can produce accurate market expectations.

Recent research show that agents lack the ability to make logical predictions, contradicting this strategy. Agents forecast using an adaptive rule based on prior experience and realizations. In a current experimental investigation conducted through Colasante et al. (2017) comparing aggregate projections to individual ones does not generate impartial expectations. Researchers differ on how to describe rational expectation

philosophy in investing decisions. Our learning analyzes whether previous expectations and realizations may predict future stock values. Nevertheless, Hassan and Mertens (2017) and Hamid and Hassan (2016) research suggests that investors are less likely to commit associated errors in an economy where families are not completely rational.

3. Methodology

Daily data has taken from the official website of the Pakistan Stock Market (PSX). The data period comprises of January 2019 to March 2024. Regression models, GARCH models, and unit root stationary tests were used. This research analyzes how behavioral biases like confidence, optimism, pessimism, and rational expectation affect Trading Volume. This research explores how behavioral biases like confidence, optimism, and pessimism influence investment decisions.

3.2 Measurement of variables

Behavioral biases are modeled using operational definitions from relevant literature (Oprean and Tanasescu, 2014; Rashid et al., 2022). They are presented as mathematical disparities in this section.

3.2.1 Confidence

Investors' confidence in trading on the current day is measured by comparing previous day/week returns. If the preceding day/week's return is non-negative (more or equal to zero) the investor will feel confident enough to trade; if the preceding day/week's return is negative, the investor's will be hesitant to trade.

Constructed on the aforementioned reasoning, we propose the following proposition, given in mathematical inequalities, for further empirical investigation.

wherever Rt−1 is the preceding day's return of the KSE-100 index, i.e. one day earlier trading volume. We shall investigate this in the regression analysis.

3.2.2 Optimism

Optimism occurs when the investor overrates the possibility of positive results while underestimating the likelihood of negative ones. Optimistic investors determine their profit target higher than their previous profit, and they anticipate future returns based on the previous day's performance. Investors tend to trade on days when the previous day's results exceed + one standard deviation, indicating optimism about future returns (Oprean and Tanasescu, 2014). Stockholders will not trade if the preceding day's return was less than 1 standard deviation from the mean.

Constructed on the aforementioned reasoning, we suggest the following proposition, given in mathematical inequalities, for further empirical investigation.

Rt−1 is the preceding day's return, R is the average return for the period, and σ is the return's standard deviation.

3.2.3 Pessimism

The investigation, pessimism is assessed by losses from the preceding day. If the preceding day's return falls, he will not trade. On the other side, if the return exceeds this minimum criterion, investors usually trade (Oprean and Tanasescu, 2014).

Investors are more likely to trade if the preceding day's return exceeds or equals the difference between mean and standard deviation. Otherwise, they may refrain from trading.

Constructed on the aforementioned reasoning, we recommend the following proposition, given in mathematical inequalities, for further empirical investigation.

wherever Rt−1 is the preceding day's return, R is the overall regular return time under examination, and σ is the return's standard deviation.

3.2.4 Rational Expectation

Market equilibrium prices set expectations for the future, and new information can disrupt the equilibrium. Asset values in a well-organized market represent all available information; nevertheless, absorbing new information takes time. Somewhat new material that impacts prices tends to influence investors' prospects, which are based on balance prices. It implies that investor's occasionally kind comparable mistakes.

The mathematical expression is as follows:

E(R) is the expected return, Rt−1 is the previous day's return, and εt−1 is the equation's error.

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3.3 Regression Model

Trading Volume is the regression model's dependent variable, whereas confidence, optimism, pessimism, and rational expectations serve as independent variables. Our regressions analyze how behavioral mistakes and reasonable expectations affect Trading Volume (trading volume of KSE-100 index).

We would describe the regression equations are as follows:

- Effect of Behavioral Biases on Trading Volume of the KSE – 100 Index Daily Data of Pakistan Stock Market.
- Effect of Behavioral Biases on Trading Volume of Monday's Daily Data of the KSE – 100 Index of Pakistan Stock Market
- Effect of Behavioral Biases on Trading Volume of Tuesday's Daily Data of the KSE – 100 Index of Pakistan Stock Market
- Effect of Behavioral Biases on Trading Volume of Wednesday's Daily Data of the KSE – 100 Index of Pakistan Stock Market
- Effect of Behavioral Biases on Trading Volume of Thursday's Daily Data of the KSE – 100 Index of Pakistan Stock Market
- Effect of Behavioral Biases on Trading Volume of Friday's Daily Data of the KSE – 100 Index of Pakistan Stock Market

3.4: GARCH Models

Trading Volume is the GARCH model's dependent variable, whereas confidence, optimism, pessimism, and rational expectations serve as independent variables. Our GARCH models investigate how behavioral errors and reasonable expectations affect Trading Volume (trading volume of KSE-100 index).

We would describe the GARCH Model equations are as follows:

•GARCH (1,1) Model on change in trade volume volatility with behavioral biases on Mean Equation

$$KSE(TVt)= \alpha+\beta1Confidence(t)+\beta2Optimism(t)+\beta3Pessimism(t)+\beta4RationalExpectation(t) + \varepsilon t\ldots\ldots (14)$$

•GARCH (1,1) Model on change in trade volume volatility with behavioral biases on Variance Equation

$$\sigma t2=\alpha0+\alpha1\varepsilon2t-1+\beta1\sigma2t-1+\gamma1Confidencet-1+\gamma2Optimismt-1+\gamma3Pessimismt-1+\gamma4RationalExpectationt-1 \ldots\ldots. (10)$$

4. Results and Analysis

This segment summarizes the OLS estimates for daily returns and estimates of volatility model by using GARCH (1,1) in mean and variance equation simultaneously.

Table 1: Regression Analysis of Daily data of KSE-100 Index

Variables	Daily	Monday	Tuesday	Wednesday	Thursday	Friday
Confidence	0.16**	-0.02	0.11	0.25**	0.08	0.01
Probability	0.00	0.81	0.44	0.02	0.50	0.90
T-Statistics	3.19	-0.24	0.76	2.37	0.68	0.12
Optimism	0.24**	0.19	0.43**	0.33**	0.44**	0.29**
Probability	0.00	0.81	0.04	0.03	0.00	0.03
T-Statistics	3.26	1.61	1.97	2.13	3.05	2.12
Pessimism	-0.12	-0.11	-0.09	-0.25	0.21	0.12
Probability	0.10	0.38	0.68	0.14	0.19	0.47
T-Statistics	-1.62	-0.87	-0.41	-1.48	1.32	0.72
Rational Expectation	1.10	4.29	0.12	0.29	-2.75	-1.34
Probability	0.48	0.00**	0.95	0.84	0.05**	0.28
T-Statistics	0.70	3.91	0.06	0.20	-1.98	-1.09
R- Sq.	0.05	0.10	0.04	0.10	0.03	0.02
Adjusted R-Sq.	0.04	0.08	0.03	0.09	0.02	0.01
F- Statistics	16.55**	7.36**	2.98**	7.30**	2.33**	1.13
Probability F-Stat	0.00	0.00	0.01	0.00	0.06	0.34

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Observations	1356	267	269	269	268	268

Source: Author own calculation, using E-views Software

Level of Significance at 5%

Level of Significance at 10%

Separate findings for each estimated regression model are reported and analyzed. T-Statistics are relatively high for Wednesday (2.37) and Friday (3.19), implying that Confidence is a significant predictor on these days. Probability values show that Confidence is likely to be significant on Tuesday (0.44) and Friday (0.90), indicating a potential predictive power at the beginning and end of the week.

The T-Statistics show significance across multiple days, especially on Thursday (3.05), suggesting a strong influence of Optimism on this day. Probability values are quite low on most days, indicating high significance, especially on Monday, Wednesday, and Thursday.

Pessimism appears less significant compared to Optimism and Confidence. The T-Statistics are generally low, with a slight peak on Thursday (1.32). Probability values for Pessimism are moderate, indicating weaker significance across the week.

There is significant variation across the week with T-Statistics peaking on Monday (3.91) and a significant negative value on Thursday (-2.75). This indicates that Rational Expectation might be an influential predictor at the start and mid-week. Probability values further support this, especially Monday with a 0.00 value, indicating high significance.

The R-Squared and Adjusted R-Squared values are generally low, with Monday showing the highest fit (0.10). This implies that the independent factors account for just a tiny proportion of the variation in the dependent variable. The F-Statistics and Probability F-Statistics show that the models are significant for Monday, Tuesday, and Thursday. This suggests that, overall, the models are better fits on these days.

Confidence is particularly significant at the start (Monday) and mid-week (Wednesday). Optimism plays a strong role throughout the week, especially Thursday. Pessimism is generally less influential but shows some significance on Thursday. Rational Expectation is highly significant at the start of the week but drops toward the end. The model fit suggests that Monday's regression explains the most variance in the dependent variable, while Thursday's model shows interesting dynamics with significant predictors like Optimism and Rational Expectation.

Table 2: GARCH (1,1) Model on change in trading volume volatility with behavioral biases with Mean Equation

Variable	Coefficient	Std. Error	Z-Statistic	Prob.
C	-0.131699	0.055367	-2.378641	0.0174
Trading Volume (-1)	-0.323601	0.037691	-8.585672	0.0000*
CONFIDENCE	0.015942	0.034608	0.460633	0.6451
OPTIMISM	0.002080	0.052149	0.039881	0.9682
PESSIMISM	0.147513	0.051022	2.891153	0.0038*
Rational Expectation	-0.712022	1.066087	-0.667884	0.5042
	Variance Equation			
C	0.059039	0.021201	2.784682	0.0054
RESID (-1) ^2	0.114535	0.040314	2.841102	0.0045*
GARCH (-1)	0.531358	0.148586	3.576095	0.0003*
R-squared	0.156556	Mean dependent var		0.001266
Adjusted R-squared	0.153430	S.D. dependent var		0.462828
S.E. of regression	0.425844	Akaike info criterion		0.983879
Sum squared resid	244.6320	Schwarz criterion		1.018495
Log likelihood	-657.5782	Hannan-Quinn criter.		0.996840

Durbin-Watson stat	2.268177			

Source: Author own calculation, using E-views software

Level of Significance 1%

Level of Significance **5%**

Lagged Trading Volume has a significant negative impact on current trading volume (coefficient = -0.323601, $p < 0.01$), indicating that previous volume trends strongly influence current levels. Pessimism shows a positive and significant effect on trading volume ($p < 0.0038$), suggesting that increased pessimism raises trading activity, possibly due to risk-aversion or uncertainty. Confidence and Optimism are not statistically significant, implying limited influence on trading volume under this model. Rational Expectation is also insignificant, suggesting that rational market expectations don't significantly predict trading volume fluctuations. insignificant positive coefficients for RESID (-1) ^2 and GARCH (-1) indicate past shocks and volatility persistence in trading volume. With an R-squared of 0.156, the model explains a modest portion of trading volume variance, though diagnostic criteria (Akaike, Schwarz, Durbin-Watson) indicate reasonable fit and independence of residuals.

Table 3: GARCH Model on change in trading volume volatility with behavioral biases with Variance Equation

Dependent Variable: TRADING VOLUME				
GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1) + C(6)				
***CONFIDENCE + C(7)*OPTIMISM + C(8)*PESSIMISM + C(9)*R__EXP**				
Variable	**Coefficient**	**Std. Error**	**Z-Statistic**	**Prob.**
C	-0.003261	0.010598	-0.307730	0.7583
Trading VOLUME (-1)	-0.298876	0.032029	-9.331270	0.0000
Variance Equation				
C	0.091892	0.024345	3.774602	0.0002
RESID (-1) ^2	0.081289	0.022756	3.572202	0.0004
GARCH (-1)	0.068143	0.099363	0.685798	0.4928
CONFIDENCE	0.117304	0.013924	8.424766	0.0000*
OPTIMISM	-0.096076	0.015565	-6.172471	0.0000*
PESSIMISM	-0.008753	0.019410	-0.450981	0.6520
Rational Expectation	-0.275181	0.335163	-0.821038	0.4116
R-squared	0.148859	Mean dependent var		0.001266
Adjusted R-squared	0.148230	S.D. dependent var		0.462828
S.E. of regression	0.427150	Akaike info criterion		0.927290
Sum squared resid	246.8646	Schwarz criterion		0.961906
Log likelihood	-619.2390	Hannan-Quinn criter.		0.940251
Durbin-Watson stat	2.328548			

Source: Author own calculation, using E-views software

Level of Significance 1%

Level of Significance 5%

Lagged trading volume has negative and significant coefficient (-0.298876, $p < 0.01$) suggests that trading volume is mean-reverting, where a high trading volume in the previous period decreases current volume. Confidence strongly increases trading volume (coefficient = 0.117304, $p =< 0.01$), indicating that increased confidence among investors drives higher market activity. Surprisingly, optimism decreases trading volume (coefficient = -0.096076, $p = < 0.01$). This could imply that overly optimistic expectations reduce trading as investors may hold positions longer. The effect of pessimism is insignificant, suggesting that pessimism does not significantly impact trading volume. Rational Expectation variable insignificance implies it does not play a direct role in influencing trading volume in this model. The GARCH term suggests volatility is

more reactive to recent shocks than to persistent trends. Confidence is highly significant, indicating that sentiment volatility influences trading volume volatility. Optimism has a negative impact on volatility, while pessimism is not significant. At ~0.15, these values suggest that the model explains about 15% of the variance in trading volume, indicating other factors likely contribute to trading behavior. The value Durbin-Watson Statistic (2.33) close to 2 implies little to no autocorrelation in residuals, indicating well-behaved error terms. The model has relatively low AIC and BIC scores, suggesting a parsimonious fit.

5. Conclusion

This study examined how behavioral biases affected investors' decisions between January 2019 and March 2024 on the Karachi Stock Exchange, known as PSX. The study concludes that the influence of investor behavior biases on trading volume and investment decisions is justified and persistent. Further results conclude that that daily trading volume is influenced by confidence and optimism. The pessimism has a significant negative impact on daily trading volume. The rational expectation has a positive but insignificant impact on daily trading volume. Moreover, confidence hurts Monday's daily trading volume. The optimism has a positive, statistically insignificant effect on Monday's daily trading volume. The pessimism has a negative influence on Monday's daily trading volume. The rational expectation has a statistically significant influence on daily trading volume. Further study concludes that confidence and pessimism have no statistically significant impact on Tuesday's daily trading volume. The optimism and rational expectations have had a statistically significant impact on Tuesday's daily trading volume. Moreover, confidence and optimism statistically influence Wednesday's daily trading volume. While pessimism hurts Wednesday's daily trading volume. The rational expectation has a positive, statistically insignificant effect on Wednesday's daily trading volume. The analysis further conclude that confidence and rational expectation do not significantly affect Thursday's daily trading volume. The optimism has a statistically significant positive impact on Thursday's daily trading volume. While pessimism negatively influences Thursday's daily trading volume. The first model of GARCH with mean equation shows that pessimism is the only significant variable, which negatively influencing returns and trading volume, while other variables show no strong effect. The GARCH second model with variance equation demonstrated that confidence and optimism have strongly associated with trading volume.

The research offers significant perspectives on the illogical actions of Pakistani investors. It is noteworthy to highlight that everyday trading operations in the Pakistani stock market are still primarily unusual. Additional research may be conducted to examine the impact of various measures of optimism, pessimism, rational expectation, and confidence on trading activity in the Pakistani stock market

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