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Asymmetric association of investor sentiments with stock returns in companies listed on the Tehran Stock Exchange

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ABSTRACT:
This research examines the asymmetric relationship between investor sentiments and stock returns in companies listed on the Tehran Stock Exchange. It is an applied research with correlational nature and content. Its statistical population is all the companies admitted to the Tehran Stock Exchange. The number of samples is 119 companies during the years 2014 to 2020 and its sampling method is systematic elimination. The data for the research were collected through Rahavard Novin software and were analyzed using the data pooled regression model and Granger causality test through E'views10 software. The results showed that investor sentiments have an asymmetric and significant effect on stock returns in companies listed on the Tehran Stock Exchange. This means that investor sentiments have an asymmetric effect on stock returns, and the behavioral finance hypothesis is confirmed.

Keywords: Investor Sentiments, Stock Returns, Fundamental Value Of Stocks, Tehran Stock Exchange

INTRODUCTION:

One challenging issue in the theoretical foundations is understanding the decision-making process of participants in the capital market. One of the most important hypotheses, the efficient market hypothesis, refers to the speed and completeness of the reaction of securities prices to the announcement of new information. The stock price in an efficient market is a correct and unbiased estimate of the future stock values. Investors have reasonable and informed expectations of future stock prices. One of the fundamental flaws of the efficient market hypothesis is providing a model to determine the real yield of securities, which has been discussed theoretically and practically in numerous studies (Chakraborty and Subramaniam, 2019). This defect is known in financial literature as a market anomaly. This defect in financial markets in behavioral economics has been attributed to perceptual distortions, human errors, human reactions, and symmetrical behavior (Yao et al., 2014). As the traditional financial theory states, the stock price shows the fundamental value of the stock and reflects the value of future cash flows. Investors, based on the efficient market hypothesis, behave rationally, which means that they process all the available information and seek to maximize the expected utility. Thus, changes in stock prices are associated with systematic changes in the company's fundamental values, and the unwise behavior of investors does not affect returns (Kim and Ha, 2019).

As the evidence shows, investors do not use quantitative methods to determine the value of shares. Their judgments are based on mental perceptions, non-scientific information, and psychological and emotional conditions in the stock market. Emotional variables, formed based on cognitive limitations, examine the psychological conditions of stock market participants (Kumari, 2019). Behavioral finance is one of the studies that examine the decision-making process of investors and their reactions to different conditions of financial markets. Its emphasis is more on the impact of investors' emotions, personality, culture, and judgments on the investment decisions. One of the founders of this field of financial knowledge is the famous psychologist Daniel Kahneman (Aggarwal, 2017). The behavioral finance point of view shows that some changes in the price of securities have no fundamental reason and the asymmetric and emotional behavior of the investor plays an important role in determining the prices. Indeed, the dynamic interaction between disruptive traders and rational arbitrageurs shapes prices, and if a stock has more disruptive traders or fewer rational traders, its price fluctuations become significant (Dash and Maitra, 2018).

One of the proven subjects in psychology besides the behavioral financial perspective is the influence of people's emotions on their decision-making process and judgment regarding future events. When individuals have positive feelings, they make optimistic choices and when they have negative feelings, they make pessimistic choices. Therefore, market sentiment reflects investors' attitudes toward anticipated market prices. Since investors reflect their emotions in the capital market, so expectedly investors' emotions, which are also asymmetric, can affect stock returns and volatility (Chakraborty and Subramaniam, 2019).

As Zhou (2018) argues, investors' sentiments show the distance of asset value from its economic fundamentals. Various sources such as official documents, media reports, and market surveys can measure this. Therefore, this research investigates the asymmetric relationship between investor sentiments and stock returns in companies listed on the Tehran Stock Exchange.

Theoretical foundations of research

Investor sentiment

As the evidence reveals, investors do not use quantitative methods to determine the value of shares. Judgments are based on mental perceptions, non-scientific information, and psychological and emotional conditions in the stock market. Emotional variables that are shaped by cognitive limitations examine the psychological conditions of stock market participants (Lin, 2018).

Emotional tendencies are "investors' tendencies to speculate". So they lead to the creation of relative demand for speculative investments, and this will have temporary effects on stock prices. Another definition for the emotional tendencies of investors: "the margin of optimism and pessimism of shareholders towards a stock (Kim and Ha, 2019).

Behavioral finance expresses two basic assumptions: the first one is that investors make decisions under the influence of their emotional tendencies. Here, the emotional tendency is a belief in future cash flows and investment risks, which is not established by available facts. The second assumption is that arbitrage is risky and expensive for emotional investors. Therefore, rational investors or arbitrageurs are not active in returning the prices to the fundamental price. Modern behavioral finance believes that there are limits to arbitrage (Heyderpour et al., 2018).

Emotional and internal factors play a major role in individual decisions and can have an impact on the financial market (Romer and Leonstein, 2018). For example, the role of the weather and the bad pattern of market traders affect the stock price, which comes back to the emotional situation and internal effects (Kumar, 2017). Research has shown that cloudy, rainy, and snowy days have a negative effect on stock prices, but being sunny has no effect on stock prices. The emotional situation and internal influences also have an important effect on the interpretation and perception of the risk situation and ambiguous conditions; it causes the intensification or weakening of other cognitive distortions (Lebang, 2020).

Stock returns

The profit or loss of an investment during a certain period expressed as a percentage of the initial cost of the investment is called the rate of return. Investment return is any income earned on securities plus realized capital gains. The rate of return measure can calculate almost any investment instrument, from real estate to bonds and stocks to artworks, provided that the asset is purchased at one point in time and then generates cash flows at another point in the future. Financial securities are generally judged based on their past rate of return, which can be compared with assets of a specific type to determine which investments are the most attractive (Nikbakht, 2016).

The realized annual return percentage of an investment that is adjusted for price changes because of inflation or other external effects is the real rate of return. This method shows the nominal rate of return, which maintains the purchasing power of a certain level of capital over time (Nikbakht, 2016). Adjusting the nominal rate of return to compensate for factors like inflation allows investors to determine how much of their nominal return is about a real return.

RESEARCH METHOD

This study is an applied research that is correlational in nature and content. Its statistical population is all the companies admitted to the Tehran Stock Exchange. Its sampling is purposeful, which means that the population has been screened by considering the conditions and the companies matching the desired conditions have been analyzed based on the elimination method as the statistical sample companies of the research. The number of 119 companies remained as the screened population, all of which were selected as research samples.

Table 1: Final sampling

Final sample selection steps	Number of companies
All the companies in the stock market (based on Novin Rahavard) from 2014 to 2019	752
Number of Iranian OTC companies	(297)
Companies including banks, insurance, financial intermediaries, investment companies, leasing, and holdings	(60)
Companies whose fiscal year end is other than March 29	(191)
Companies with incomplete data	(85)
Final sample	119

The research has followed the deductive-inductive arguments. Thus, the theoretical foundations and background of the research have been gained deductively through library studies of articles and sites, and information to confirm and reject the hypothesis has been collected inductively. The reason for using the correlation method is to discover correlation relationships between variables.
The first stage used the library method to formulate the theoretical foundations of the research. The second stage collected the data of this research through computer information companies, referring to the library of the Stock Exchange Organization, and using the new Rahvard software, because the only reliable sources for collecting financial data are computer information companies, the library of the Stock Exchange Organization, and the new Rahvard software.

Research model

This research has used the model of Chang et al. (2000) to test the research hypothesis based on the research of Chakraborty and Subramaniam (2019). As this model shows, when the deviation of the company's share returns from the market returns decreases, the signs of asymmetric behavior are revealed. The presented model used the coefficient of the second power of the market return to show the existence of asymmetric behavior in the capital market. If this coefficient is negative, it indicates an asymmetric behavior in the capital market. Likewise, the linear relationship between the absolute value of the market return and the cross-sectional deviation of the return shows a balanced relationship between risk and return in the capital asset pricing model (CAPM). The model of Chang et al. (2000) is as follows:

$$CASD_t = \beta_0 + \beta_1|R_{mt}| + \beta_2 R_{mt}^2 + \varepsilon_t$$

Here, CASD represents the share return and its changes, (△CASD) represents the share return fluctuations, RM represents the absolute value of the market return, and Rm^2 represents the second power of the market return. This research used the following relationship to calculate the yield deviation:

$$CASD_t = \frac{1}{N}\sum_{1}^{N}|R_{it-}R_{mt}|$$

Share return (market return) is also calculated through the difference between today's closing price (total market index) and yesterday's closing price (total market index) divided by yesterday's closing price (total market index).

$$CASD_t = \beta_0 + \beta_1|R_{mt}| + \beta_2 R_{mt}^2 + \beta_3 Sen_t * R_{mt}^2 +$$

Here, sen represents the sentiments of investors. If the coefficient of investors' sentiments is negative and significant, it shows its asymmetric effect on stock returns.
The Arms index is used in this research to measure investors' sentiments (Sen). The Arms index is construed based on market data (Blasko et al., 2012). The Arms index is calculated as follows:

$$ARMZ_t = \frac{Adv_t/_{Dec_t}}{Advvol_t/_{Decvol_t}}$$

The Arms index is gained by dividing two ratios. The number of companies in the first ratio whose prices increased in one working day is divided by the number of companies whose prices decreased in the same working day. The volume of traded shares in the second ratio (denominator) whose price has increased is divided by the volume of traded shares whose price has decreased. Finally, the two are divided into each other. The Arms index can be greater or less than the number one.
Moreover, the present research used the Granger causality test to investigate the causal relationship between the asymmetry of investors' sentiments and stock returns. In other words, the Granger causality test determines the impact of investors' sentiments on the asymmetry in the capital market. It used the market value of the traded shares and the number of shares of the company to measure the daily size of the company, and its relationship is as follows:

$$Size\ Firm_t = \ln(\frac{1}{n}\sum_{1}^{n} Pri_t * NS_t)$$

Here, Pri represents the closing price of the share, NS represents the number of issued shares of the company, and n represents the number of companies traded in a working day.
Table (2) gives the hypothesis and the regression model of each hypothesis.

Table 2: Research regression models

Model	Regression model	
First	First main hypothesis: investor sentiments have an asymmetric and significant effect on stock returns in companies listed on the Tehran Stock Exchange.	
	The First main hypothesis model	$CASD_t = \beta_0 + \beta_1\|R_{mt}\| + \beta_2 R^2_{mt} + \beta_3 Sent * R^2_{mt} + \varepsilon_t$

Research variables

A: independent variable
Investor sentiments: This research used the Arms index to measure the asymmetric sentiments of investors based on the research of Chakraborty and Subramaniam (2019). The Arms index is construed based on market data (Blasko et al., 2012). It is calculated as follows:

$$ARMZ_t = \frac{Adv_t/Dec_t}{Advvol_t/Decvol_t}$$

The Arms index is gained by dividing two ratios. The number of companies in the first ratio whose prices increased in one working day is divided by the number of companies whose prices decreased in the same working day. The volume of traded shares in the second ratio (denominator) whose price has increased is divided by the volume of traded shares whose price has decreased. Finally, the two are divided into each other. The Arms index can be greater or less than the number one.

B: Dependent variables

Share return: Share return (market return) is also calculated through the difference between today's closing price (total market index) and yesterday's closing price (total market index) divided by yesterday's closing price (total market index).

Volatility of stock returns: This research measures the volatility of stock returns by the standard deviation of daily returns (Chakraborty and Subramaniam, 2019).

FINDINGS

Table (3) shows the descriptive statistics of research variables.

Table 3: Descriptive statistics for research variables

Variables	Asymmetric Investor Sentiments	Stock Returns	Volatility of Stock Returns	Firm Size
	SEN	CASD	△CASD	SIZE
Average	0.449130	0.000853	0.000479	18.16084
Median	0.394401	0.000000	0.000010	18.22000
Maximum	6.991085	0.280000	0.080660	24.87000
At least	-6.037656	-0.270000	0.000000	11.60000
Standard deviation	2.035418	0.021792	0.004315	2.118424
Skewness	-0.042970	1.151393	15.79091	0.081745
Kurtosis	3.476998	81.98137	268.1922	3.311118
Number of observations	833	833	833	833

Table (3) summarizes the descriptive statistics of research variables. This table, which includes central and dispersion indices for different variables, is slightly different from all research variables in the mean and median distance.

Table 4: Results of Levine, Lin, and Chu's durability testing of research variables

Variables	Symbol	Value of Sig. statistic	Sig. level	Result
Stock returns	CASD	-11.92	0.000	Durable
Volatility of stock returns	△CASD	-53.03	0.000	Durable
Asymmetric sentiments of investors	SEN	-75.94	0.000	Durable
Firm size	SIZE	-91.26	0.000	Durable

As "Levine, Lin, and Chu" tests show, because the probability value of all variables was less than 0.05, all independent, dependent and control variables are durable during the research period. Therefore, there will be no false regression problem.

Hypothesis: Investor sentiments have an asymmetric and significant effect on stock returns in companies listed on the Tehran Stock Exchange.

The following model tested the first main hypothesis:

$CASD_t = \beta_0 + \beta_1|R_{mt}| + \beta_2 R^2_{mt} + \beta_3 Sent * R^2_{mt} + \varepsilon_t$

One of the ways to identify the presence or absence of a collinear relationship is to use the variance inflation factor (VIF). This factor shows how much the variance of the estimated coefficients is inflated compared to the case where the estimated variables do not have a linear correlation.

Table 5: Results for collinearity of model variables

Model	VIF values of the variables			Result
	Rm	R2m	SEN*R2M	
First	3.89	4.148	1.35	Non-collinear

As Table (5) shows, the variance inflation factor for all variables of the first research model is less than 10; in conclusion, the hypothesis of non-collinearity between independent variables is confirmable. So all these variables can be estimated together in one model.

This research has investigated the normality of the distribution of the residuals of the research model using the zero mean test, and the results are as follows.

Table 6: Results of the test of the zero mean residual of the model

Model	Value	Sig.	Result
First	3.73E-17	1	Normal

Since the significance level for the research model is above 5%, hypothesis H_0 is confirmable and the residuals of the model follow the normal distribution.

Table 7: Results of homogeneity of variance test

Model	**Breusch-Pagan LM**	Probability	Result
First	8630	0.000	Non-homogeneity of variance

As the significance of the F statistic for the research model shows, the null hypothesis of the test (based on the equality of variances) is rejected. Hence the necessary correction (in the covariance matrix) in the estimation of the model. Therefore, we choose the method of calculating the covariance matrix of the coefficients, and cross-section weights. In other words, we should use the EGLS model instead of the OLS model. This changes the method of calculating the

standard error of the coefficients, and consequently, the t-student statistic and the corresponding significance levels are corrected because of the homogeneity of the existing variance.

Table 8: Chow test for selecting the first research model

	Chow or Limmer test				Result
Model name	Effects test	Value	Degree of freedom	Probability value	
First	Cross-section	1.1949	(118،711)	0.0957	Pooled data

The probability value of the Chow test in the model of Table (8) is higher than 0.05. Therefore, the model is one with combined data or the so-called pooled data. There are no individual effects and the y-intercept of all groups is the same. Therefore, cross-sections and time in this research do not cause a special event in the regression model and they are ignorable.

Table 9: Estimation of the research model

$CASD_t = \beta_0 + \beta_1|R_{mt}| + \beta_2 R^2_{mt} + \beta_3 Sent * R^2_{mt} + \varepsilon_t$

Variables	Symbols	Coefficients	Standard deviation	t-value	Probability value	Result
y-intercept	C	0.000856	6.95E-06	123.1677	0.0000	-
Market return	RM	-0.006521	0.005115	-1.274783	0.2028	Without significance
The square root of the market return	R2M	0.640712	0.546707	1.171948	0.2416	Without significance
Investor sentiment	SEN* R2M	-0.160752	0.080462	-1.997865	0.0426	Significant and negative
F value				548	F probability value	0.000
coefficient of determination				0.7894	Durbin-Watson	1.886
Adjusted coefficient of determination				0.7875		

The value of the significance probability of F in Table (9) is equal to 0.000. This value is less than 0.05, so the null hypothesis is rejected at the 95% confidence level; that is, there is a significant model at the 95% confidence level. The coefficient of determination is equal to 0.7894; that is, about 79% of the changes in the dependent variable are expressed by the independent and control variables. The coefficient is strong, and this shows a strong relationship between the independent variables and the dependent variable. Since the probability of the variable investor sentiments is below 5%, and this value is also negative, the "investor sentiments have an asymmetric and significant effect on stock returns in companies listed on the Tehran Stock Exchange." The research hypothesis is confirmable.

The above results show that the asymmetric sentiments of investors affect stock returns. In contrast, some believe that stock returns can also be the cause of investors' asymmetric sentiments. The Granger causality test was used to answer this question.

Table 10: Results for determining the optimal number of breaks

Number of breaks	Natural logarithm criterion of Probability function	Akaike criterion	Schwartz criterion	Hannan-Quinn criterion
0	7471.562	-41.83508	-41.79164	-41.81780
1	7580.425	-42.35532	-42.13808*	-42.26892*
2	7598.698	-42.36806*	-41.97703	-42.21253
3	7604.739	-42.31227	-41.74744	-42.08761
4	7614.453	-42.27705	-41.53843	-41.98327

Table (10) shows the results of Akaike, Schwartz, Hannan-Quinn, and the natural logarithm of the probability function. Since the number of research data is high (833 data), the Akaike criterion (AIC) is used; this criterion shows two breaks as the optimal breaks. The optimal break is created when the Akaike, Schwartz, and Hannan-Quinn criteria have the lowest value and the natural logarithm criterion of the probability function has the highest value. The Granger causality test was performed after determining the optimal break, and Table (11) describes its results.

Table 11: Granger causality test results

Hypothesis H_0	F statistic	Sig. level	Test result
Asymmetric sentiments of investors are not the Ganger cause of stock returns.	6.3173	0.0019	Hypothesis H_0 is rejected.
Stock returns are not the Granger cause of asymmetric investor	0.23466	0.7909	Hypothesis H_0 is not rejected.

sentiment.			

As the results of the Granger Causality test reveal, the asymmetric sentiments of investors among the companies listed in the Tehran Stock Exchange are the cause of stock returns, but the stock returns neither are the cause of the emergence of asymmetric sentiments of investors nor can cause it to become more intense.

CONCLUSION

The results showed that investor sentiments have an asymmetric and significant effect on stock returns in companies listed on the Tehran Stock Exchange. This means that investor sentiments have an asymmetric effect on stock returns, and the behavioral finance hypothesis is confirmable. This result is in agreement with the research of Alavi Kakhak (2020). He stated that "the emotional tendencies of investors have a significant effect on the simultaneous stock price." Honarmand Qalibaf (2014) stated that "there is a significant relationship between the sentiment index and the return and volatility of the return (risk) of the stock market". Chakraborty and Subramaniam (2019) stated that there is a significant relationship between "stock returns and fluctuations in the formation of investor sentiments." The results of the Granger causality test with the number of 2 optimal breaks also showed that the investors' asymmetric sentiments are the Granger causality of stock returns. This result is in line with the results of Hartaha and Rishad (2020), which stated that "irrational emotions significantly cause excess market volatility. The study showed that the asymmetric aspects of an inefficient market lead to excess volatility and returns."

This study is important for academics, policymakers, and businessmen. Emerging economies such as Iran's capital market are inefficient in information and arbitrage opportunities are limited. Therefore, these markets may be prone to sentiment.

This research provides evidence that investor sentiment, stock market returns, and volatility have significant effects. Therefore, trading strategies should be designed according to this asymmetric relationship. It helps policymakers develop appropriate policies to prevent bubbles or crashes in the phases of greed and fear. Since investor sentiments have an impact on stock returns, investors should pay attention to the role of emotions when making investment decisions and avoid optimistic and pessimistic emotional decisions to make better investments. They should gain information and the required knowledge about the company's business to prevent the aggravation of asymmetric effects on stock returns.

REFERENCE:

1. Asadi, Maryam (2019). Investigating the relationship between investors' emotional tendencies and the market's reaction to financial restatements, MSc Thesis, Hafez Institute of Higher Education.
2. Poursoltani, Sattar & Dehghan, Abdul Majid & Mohammadi, Mohsen (2017). Relationship between investors' sentiments and risk-adjusted returns on stocks, Quarterly Journal of Management and Accounting Studies, 3(3), 220-238.
3. Haiderpur, Farzaneh & Tari Verdi, Yadaleh & Mehrabi, Maryam (2017). Effect of investors' emotional tendencies on stock returns, Financial Science Quarterly of Securities Analysis, 6(17), 1-13.
4. Alavi Kakhak, Seyyed Ali Akbar (2020). Investigating the relationship between investors' emotional tendencies and stock price synchronicity, MSc thesis, Senabad Golbahar Institute of Higher Education.
5. Nik Bakht, Mohammad Reza & Hosseinpour, Amir Hossein & Islami Mufidabadi, Hossein (2016). Investigating the effect of investors' emotional behavior and accounting information on stock prices, Journal of Experimental Accounting Research, 6(4), 219-255.
6. Honarmand Qalibaf, Mohammad (2014). Investigating the impact of investors' sentiments on the return and volatility of returns of the Tehran Stock Exchange (with an emphasis on the mystery of investment companies), MSc thesis, Allameh Tabatabai University, Faculty of Management and Accounting.
7. Aggarwal, D. (2017), "Exploring relation between Indian market sentiments and stock market returns", Asian Journal of Empirical Research, Vol. 7, No. 7, pp. 147-159.
8. Baker, M., Wurgler, J., (2016). Investor sentiment and the cross-section of stock returns. J. Financ. 61(4), 1645–1680
9. Brown, G.W., Cliff, M.T., (2020). Investor sentiment and the near-term stock market. J. Empir. Finance11 (1), 1–27.
10. Chakraborty, M. & Subramaniam, S. (2019). Asymmetric relationship of investor sentiment with stock return and volatility: evidence from India, Review of Behavioral Finance, 1940-5979. DOI 10.1108/RBF-07-2019-0094.
11. Dash, S. and Maitra, D. (2018), "Does sentiment matter for stock returns? Evidence from Indian stock market using wavelet approach", Finance Research Letters, Vol. 26, pp. 32-39
12. Haritha, P.H. & Rishad, A. (2020). An empirical examination of investor

sentiment and stock market volatility: evidence from India, Financial Innovation, 6:34, https://doi.org/10.1186/s40854-020-00198-x.
13. Kim, Taehyuk& Ha. Aejin, (2019) "Investor Sentiment and Market Anomalies" 23rd Australasian Finance and Banking Conference Paper, Available at www.ssrn.com.
14. Kumari, J. (2019), "Investor sentiment and stock market liquidity: evidence from an emerging economy", Journal of Behavioural and Experimental Finance, Vol. 23, pp. 166-180.
15. Kumar, A., Lee, C., (2017). Retail investor sentiment and return co-movements. J. Financ. 61 (5), 2451– 2486.
16. Lin, M. (2018)" The Effects of Investor Sentiment on Returns and Idiosyncratic Risk in the Japanese Stock Market": International Research Journal of Finance and Economics,60, 29-43.
17. Ling, D., Naranjo, A. Scheik B., (2020), "Investor Sentiment and Asset Pricing in Public and Private Markets" Available at www.ssrn.com
18. Mushinada VNC, Veluri VSS (2018) Investors' overconfidence behavior at the Bombay Stock Exchange. Int J Manag Financ 14(5):613–632.
19. Schmeling, M., (2019). Investor sentiment and stock returns: some international evidence. J. Empir. Finance 16 (3), 394–408.
20. Westerlund, J., Narayan, P.K., (2020). Testing for predictability in conditionally heteroskedastic stock returns. J. Financ. Econ. 13 (2), 342–375.
21. Yao, J., CH. Ma., and W. Peng He. (2014). "Investor Herding Behavior of Chinese Stock Market". International Review of Economics and Finance, 29, 12-29.
22. Zhong, X., Zhong, D. & Wen, j. (2018), "Investor sentiment and its nonlinear effect on stock returns New evidence from the Chinese stock market based on panel quantile regression model", Economic Modelling, 50, 266–274.
23. Zhou, G. (2018) Measuring investor sentiment. Ann Rev Financ Econ 10:239–259.