Comparing Investor Behavior During and After Pandemic Era: Dominantly Rational or Irrational Driven?

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Abstract. This study is conducted to compare investors' decision-making behavior between two periods, during pandemic and during recovery period in Indonesia. Our focus is on the rationality and irrationality factors that explained their decision-making. We examine the differences of the behavior between during the covid-19 pandemic and during the economic recovery era.This study is comparing the correlation of investors' rationality factors and irrationality factors on stock market return between two periods, during pandemic and during recovery period. Using Spearman Rank Correlation analysis, we examine the correlation of each factors on stock market return. Our empirical results showed that rationality and irrationality factors correlated significantly with the stock return during the pandemic and during the economic recovery era. However, this study couldn't find significant correlation each factor in each of situation separately, during pandemic period and during recovery period. The results contribute to the importance of reasons and emotions for stock-market returns. We believe this study is contributing various insights to many financial market's stakeholders. The results of the study can help investors and traders to identify various factors affecting their trading during pandemic, support managers to make better investment decision making during uncertain situation, and support stock exchanges and regulators to make policy adjustment by considering irrational factors.

Keywords: Investors' behavior, rational factors, irrational factors, covid-19 pandemic, the economic recovery

1 Introduction

This research was inspired by Pornpikul and Nettayanun (2022) and Thampanya et.al. (2020), which showed that both rational factors and irrational factors of investor behavior, have the ability to explain the stock returns. They found that both of these factors have the same ability to explain stock returns, but under different conditions. In general, rational behavior has the ability to explain changes in stock returns in a wider range than the irrational one. Whereas, in high uncertainty conditions, the irrational behavior has a higher ability to explain than rational behavior. We believe that those studies did not only have a technical contribution, i.e. combining 2 big groups of factors

J. Mistar et al. (eds.), *Proceedings of the 2nd International Conference on Multidisciplinary Sciences for Humanity in Society 5.0 Era (ICOMSH 2022)*, Advances in Social Science, Education and Humanities Research 811,
https://doi.org/10.2991/978-2-38476-204-0_15

which have been studied separately, but also as a recognition of human existence assumption in a more complete manner, that humans have both rational and irrational behaviors when they made decisions. Since there were limited researches with such assumptions, we following the research of Pornpikul and Nettayanun (2021).

Basic assumption is crucial aspect in a research. It represent the researcher's belief about the world, so it affects the framework and design of the research built. Basic assumptions of human behavior in financial behavior field had been discussed and studied by numerous scholars. Bloomfield (2010) grouped the discussion based on their human behavior assumption, i.e. traditional finance and behavioral finance. Traditional finance assumes human being are rational as they make a decisions, having unlimited processing power to any available information, and holds risk preferences as described by expected utility theory (Bloomfield, 2010:1). Under this theory, decision maker behavior are captured by the shape of the utility function. They are risk averse if the function is concave (most classical economic theory based on this tenet), and risk seeking when it is convex (Chiu and Wu, 2010:1-2). Numerous research have used this perspective, for exampe Ou & Penman (1989), Hashemijoo et al, (2012), Fama & French, (2015), and Neukirchen et al (2022). All those researches assumed that information is rationally used by the investor to determine stock market.

While behavioral finance signifies the role of psychological biases and their specific behavioral outcome in decision making (Prosad et al, 2015), i.e., irrational (ruled by sentiments) and having limited capabilities in processing information (prone to make biased decisions). There is an interesting and straight forward term by Meir Statman (1999). He stated that "People in standard finance are rational and people in behavioral finance are normal". Behavioral finance relax particular assumptions about individual behavior (Bloomfield, 2010). This assumption brings the study of financial behavior as an interdisciplinary study between the fields of psychology, sociology and finance (Ricciardi and Simon, 2000).

There were growing numbers of researches that applying this perspective. For examples, Nofsinger (2005), studied Social Mood and Financial Economics, Bijl et al (2016), studied Google Search and Stocks Returns, Griffith et al (2020) studied Emotions in the Stock Market, and Chivianti & Sukamulja (2021) studied The Effect of Google Search Volume Index on Underpriced IPOs and Divergence of Opinions.

Recently, there were studies with mix assumptions. They believed that both rational sentiments and irrational sentiments have effect on stock price simultaneously. Neither rational nor behavioral theories alone can fully explain industry returns, that attributing asset-pricing anomalies to a single kind of driving force is too hasty (Chou el (2011). Verma et.al. (2008) have reviewed that literature on investor sentiments and stock prices provide inconclusive results on specific factors affects the prices, whether rational risk factors, or noise or some combination of both. It motivated them to study the impact of rational sentiments and irrational sentiments on stock market returns simultaneously. They found the impact of rational sentiments is greater than that of irrational sentiments for both individual and institutional investors on stock market returns. Moreover, irrational sentiments have a more rapid and pronounced effect than rational sentiments on stock market returns. Chou el (2011) showed in their findings that industries play a dual role with both rational and behavioral components as shown

by its covariance risk and mispricing of the stock return. O'Sullivan et al. (2019) found that both rational and irrational sentiment risk play a strong role in stock returns. While rational has a strong role in the broad class of FTSE All Shares stocks, irrational sentiment risk is detected among subgroups of the FTSE All-Share (FTSE 250 and FTSE 100 stocks).

Rational and irrational behavior is widely studied using research settings in times of crisis or times of high uncertainty. Conditions of high uncertainty are considered as one of the external environments that will trigger the emergence of certain behaviors that are different compared to normal times. Baker and Wurgler (2007) showed the significance of investor sentiment increases in an extraordinary period and when the markets are difficult to predict. Thampanya et al. (2020) study the behavioral (irrational) and fundamental (rational) factors that drive stock returns in the three different crisis periods. The study found that fundamental factors play crucial roles in influencing stock market volatility in Malaysia, Thailand, and Singapore; whereas, behavioral factors affect stock market volatility more significantly than fundamental factors in Indonesia and the Philippines. They concluded that rational and irrational factors explain asset returns, depending on each country's market development.. While Pornpikul and Nettayanun (2021) showed that rational factors usually explain the volatility of the return to a greater extent than irrational factors, but during a financial crisis, the irrational factors increase their importance in explaining returns.

This research was conducted to continue previous research that examined the rational and irrational behavior of investors simultaneously in the context of the Indonesian capital market. As in all parts of the world, Indonesia is experiencing a bad economy due to the pandemic. The performance of the stock market fell very sharply throughout 2020. However, along with the better handling of the covid virus in Indonesia, the Indonesian economy began to recover. Likewise, the performance of the Indonesian capital market is in the recovery stage. Graph 1 below shows the changing conditions of the capital market in Indonesia from 2020 to 2022.

Fig. 1. Graph 1. Development of Trading Volume Stock Exchange in Indonesian Stock Exchange.Source: idx.co.id (2022)

This study aims to examine the behavior of investors in the Indonesian capital market during the Covid pandemic period, and compare it to the period of Indonesia's economic recovery. Pandemic is the representation of the condition with high uncertainty period and economic recovery is representation of more stable period. This study is following Pornpikul and Nettayanun (2021) with adjustment with Indonesia's condition. Research with context of the Indonesian capital market is necessary because investor behavior is influenced by capital market developments in each country (Thampanya et al. (2020)) and influenced by the degree of independence in that country (Erdem, 2020). Topcu and Gulal (2020) show that the effect of a pandemic in emerging markets is greater than that in developing capital markets.

The results of this study will contribute to all stock market stakeholder, i.e. investors, traders, Indonesia Stock Exchange (IDX) and the Indonesian government. Investors and traders increasingly understand their own behavior, especially irrational behavior. Managers make better decisions in their investment decisions by considering irrational factors in certain investment conditions. Decision makers in the capital market will be able to make policy adjustments when investors are dominated by irrational attitudes.

1.1 Rational And Irrational Investor Behavior

Traditional (Standard) finance is the body of knowledge built on the pillars of the arbitrage principles of Miller and Modigliani, the portfolio principles of Markowitz, the capital asset pricing theory of Sharpe, Lintner, and Black, and the option-pricing theory of Black, Scholes, and Merton (Statman, 1999). Under those principles and theories, human are rational, i.e. behave in a manner as to maximize their utility with a given level of income or money and choose higher returns to lower returns for a given level of risk. The assumption explain Fama and French (2015)'s five-factor model. A five-factor model directed at capturing the size, value, profitability, and investmentpatterns in average stock returns. They believed that size, value, profitability, and investment patterns affect investor's behavior in setting stocks prices.

Theories that are widely used in Behavioral Finance research include Prospect Theory (Kahneman & Tversky, 1979), Bounded Rationality (Simon, 1955), and Cumulative Prospect Theory (Tversky & Kahneman, 1992). Research conducted by Herbert Simon in the 1950s showed that decision-making by humans was laden with cognitive limitations, even though he was encouraged to make decisions rationally (Cherry, 2021). This cognitive limitation is caused by humans naturally having limited time, limited information and human ability to process information, to be able to analyze the benefits and costs of each option from all available options. Meanwhile, Prospect Theory and Cumulative Prospect Theory basically show that risk is perceptual. Due to its perceptual nature, a person's attitude towards risk is influenced by many factors, such as previous experience and expectation.

2 Methodology

This study is comparing the correlation of investors' rationality factors and irrationality factors on stock market return between two periods, during pandemic and during recovery period. Using Spearman Rank Correlation analysis, we examine the correlation of each factors on stock market return.

We are using rational factors and irrational factors from Pornpikul and Nettayanun (2021) with adjustment to Indonesia condition. Pornpikul and Nettayanun (2021) used 5 rational factors and 5 irrational factors. Due to data availability in Indonesia, specifically irrational factors, we use 2 factors only, Google Search Volume Index (GSVI) and Trading Volume (TV). Following irrational factors, the rational factors also used only 2 factors, Profitability and Size.

For GSVI we didn't use the same method as Pornpikul and Nettayanun (2021), since we want to capture all search result of the company name during research period. GSVI measured by number of search result as we type the official name of the company in a particular time period. Trading Volume measured by the number of shares traded during a particular time period. The rational factor, Profitability, is measured by Earning per Share (EPS) and Size, is measured by market capitalization (price times shares outstanding). While Stock Return, is measured by changes in stock price between 2 periods.

The data we use in this paper are obtained from Indonesian Stock Exchange website (https://www.idx.co.id/id) and Google Trends. The data obtained from idx.co.id include daily closing prices, volumes, earnings and the number of shares outstanding for companies listed in the Food and Beverages sub sectors industry from January 1, 2020 through September 30, 2022. As earnings information available in quarterly base, so as the others follow. Daily data of return, GSVI, trading volume, and market capitalization are adjusted into average of quarterly period.

3 Findings and Discussion

The processed data comes from 56 companies in the food and beverage sub-industry listed on the IDX with a total of 301 quarterly data. However, because the completeness of the data for rational factors and irrational factors is different, the amount of data processed for each factor is also different. The data processed for rational factors is 300, consisting of 132 during the pandemic and 168 during the economic recovery. Meanwhile, the data processed for irrational factors was 301, consisting of 133 before the pandemic and 168 during the economic recovery period.

The first analysis performed was descriptive data analysis related to the 5 factors being tested. Descriptive data analysis aims to get a picture of each variable being tested and shown in Table 1

Table 1. Descriptive Analysis of Data

	EPS	Market Cap	Google Indexs	Trading Volume	Stock Return

ALL	average	78.59	10,422.03	352.12	456,907,647.41	0.06
	max	868.43	119,200.00	979.00	12,779,569,500.00	5.25
	min	(62.05)	24.20	27.00	-	(0.99)
During Pandemic	average	66.95	10,640.36	340.72	552,940,970.96	0.05
	max	733.59	119,200.00	970.00	12,779,569,500.00	2.48
	min	(54.35)	24.20	27.00	-	(0.99)
Economic Recovery	average	87.80	10,249.18	361.08	381,452,893.18	0.07
	max	868.43	115,400.00	979.00	3,178,613,200.00	5.25
	min	(62.05)	49.60	30.00	14,100.00	(0.79)

Interesting findings that can be drawn from Table 1 are as follows:

1. EPS and GSVI experienced an increase in average value from the pandemic period to the economic recovery period. The increase in EPS and GSVI was 25% and 6%, respectively. Meanwhile, Market Cap and TV, on the other hand, experienced a decrease in average value. The declines in Market Cap and TV were 3.7% and 31%, respectively. There is a diversity of data behavior from each factor that represents investor behavior between two different periods.
2. The existence of economic recovery is also supported by an increase in the average stock return which increased from 0.05 during the pandemic to 0.07 during the economic recovery.

The second analysis is the Spearman Rank Analysis correlation. The correlation test was carried out between stock returns and each of the 4 factors tested, namely EPS, Market Cap, GSVI and Trading Volume. This test was carried out in 2 stages, first, the overall test, which tested all data during the observation period, and second, the separated test, which tested data during the pandemic period and data during the economic recovery period. A separate test was conducted to compare the results of the correlation values between during the pandemic and during the recovery period.

The results of the correlation test on overall data during the study period show that each rational and irrational factor has a significant correlation with stock returns. The rational factor that has a significant correlation with return is EPS, while the irrational factor GSVI. These findings support the (Chou el (2011). Verma et.al. (2008) and O'Sullivan et al. (2019) studies which show that there were rational and irrational factors simultaneously in the formation of stock prices. The results of this test are shown

in the table 2 below. This result showed that during Pandemic and also during economic recovery, investors need rational and irrational refference to build their investment decision.

Table 2. Correlations of Irrational and Rational Factors with Stocks Return

IRRATIONAL	GSVI	0.125 SIGNIFICANT
	TRADING VOLUME	0.061 NOT SIGNIFICANT
RATIONAL	EPS	0.125 SIGNIFICANT
	MARKET CAPT	0,074 NOT SIGNIFICANT

There were studies that correlated EPS and Google search with return during Pandemic in Indonesia. Anto et al (2022) found EPS has a positive effect on stock returns in Food and Beverages sector Industry. Contrary to our study, Triwahyuni et al (2022) and Wibowo et al (2022) found EPS has no significant effect to stock return during Pandemic in Indonesia. The differences with our results reffered to the different object. Triwahyuni et al (2022) and Wibowo et al (2022) both studied in banking industry.

Chundakkadan, & Nedumparambil (2022) found that the Google search volume of the pandemic is negatively associated with daily returns. While Anastasiou et al (2022) showed positive sentiment index for COVID-19 were increasing stock return and decreasing stock market volatility. In Indonesian context, Imelda and Pratiwi (2022) found that Google search affect the bond price during Pandemic. During the pandemic, investors have greater information needs to make their investment decisions. Information derived from Google search is widely used for this purpose, because it is easy to do and the results are quickly obtained.

2. The results of the second correlation test, a separate test for each factor during the pandemic and during the recovery period. The test results are shown in Figure 1 and Figure 2 below

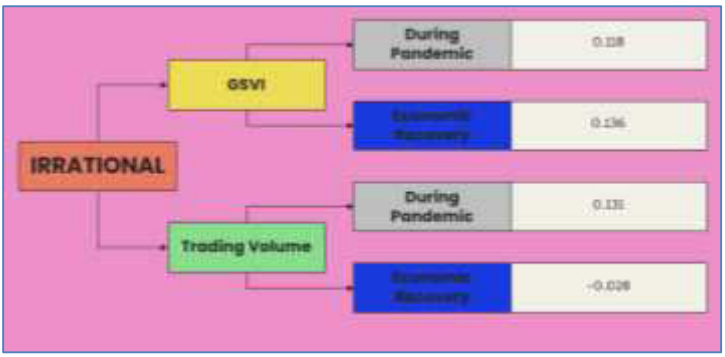

Fig. 2. Correlations of Irrational Factors with Stocks Return

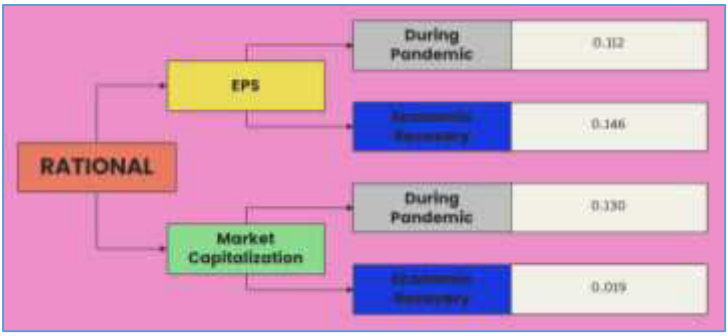

Fig. 3. Correlations of Rational Factors with Stocks Return

The analysis showed that there is no significant correlation between EPS, Market Cap, GSVI and Trading Volume and stock returns in both period. There were no significant differences of the investor behavior between during pandemic and during economic recovery. These results do not support Baker and Wurgler (2007), Thampanya et al. (2020) and Pornpikul and Nettayanun (2021) studies which show that there are differences behavior as the effects of the uncertainty condition on the rational and irrational behavior. Interestingly, ignoring significancy level, there are increasing correlation number for EPS and GSVI, while decreasing for Market Cap and TV. EPS and GSVI are the factors that have significant correlation in the overall data test correlation.We conclude investor behavior in Indonesia stock market were not affected by the stabilty of the economic condition after pandemic. They still need psychological aspect to support their decision even in relatively stable economy.

We believe our results had statistical issue here, due to the number of the data. In first correlation test we processed 300 data (overall data), while in second test (partial test), data processed is fewer, only the half. This affect the result of test statistically.

4 Conclusion

This study supported previous studies showed that there were rational and irrational behavior of the investor when they made decision. But this study failed to showed different behavior of both behavior during two different condition, during pandemic and during economic recovery. The different result shown between overall data test and partial data test, i.e. significant and not significant, showed that it is affected by the number of the data. Due to the data availability that only can be accessed minimum quarterly data, especially for earning data from idx.co.id, the future research are strongly suggested to get more data with shorter unit measurement, i.e. daily data. With more frequent measurement, investor behavior can be explained better.

We believe this study is contributing various insights to many financial market's stakeholders. The results of the study can help investors and traders to identify various factors affecting their trading during pandemic, support managers to make better

investment decision making during uncertain situation, and support stock exchanges and regulators to make policy adjustment by considering irrational factors. Information availability and its contents have crucial effect on the stock market performance in Indonesia. As showed by previous studies, investor behavior is influenced by capital market developments in each country (Thampanya et al., 2020), and by the degree of independence in that country (Erdem, 2020). Topcu and Gulal (2020) show that the effect of a pandemic in emerging markets is greater than that in developing capital markets

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