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MARKET EFFICIENCY AND GLOBAL ISSUES: A CASE OF INDONESIA

Abstract

The efficient market hypothesis assumes that the stock prices fully reflect all relevant information. Under the weak form, the future prices are independent of current prices or in the other words, they follow the random walk hypothesis. Global issues tend to have an impact on capital markets around the world. Therefore, the objective of this study is to assess the effect of global issues on the movements of expected returns in the Indonesian capital market from January 1, 2022, to June 30, 2022. The sample of 755 listed firms is used to test whether the expected returns have a random pattern during the observation period. The results of runs tests and variance ratio test show that the expected return movements are not random. On those results, the weak form of the efficient market hypothesis is rejected, and it can be concluded that the capital market in Indonesia for this period is inefficient. The findings of this study imply that the information about global issues does not affect the market. The success of the Indonesian government's strategy in dealing with global issues (including the Covid-19 pandemic) in the form of a vaccination program and also followed by excellent fiscal and monetary policies has led to more predictable returns in the capital market. Moreover, investors can set their portfolios to get extraordinary returns as the market is more predictable.

Keywords efficient, weak form, random walk, expected returns, CAPM

JEL Classification D53, G11, G14, G32, G41

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INTRODUCTION

Investor reactions are reflected in stock price fluctuations in the context of an efficient market. The concept of an efficient market assumes that security prices fully reflect the information where the information itself is available and freely accessible to investors (Fama, 1970). Givoly and Lakonishok (1979) and Mayoral and Vallelado (2012) found that information (both from internal and external sources) is the key to investor behavior in the capital market. However, in reality, investors may not have direct access to information about firm performances because they tend to behave like black boxes (Jensen & Meckling, 1976; Andersson & Johansson, 2018). The black box of the firms causes investors to combine historical stock price data with publicly internal information (such as financial information) or other external information (such as global issues). In their perception, this may affect the future performance or business strategy of firms (Asquith & Mullins, 1986; Fama, 1991).

Recently, global issues (such as health, world politics, economics, and the earth's condition) have a tendency to affect world capital markets. These conditions quite affect investors' mentality for making investment decisions in the capital markets. Batten et al. (2022) and Rehan et al. (2022) reported that global issues (including the pandemic of Covid-19) have had a significant impact on the capital markets since

2020. Under these conditions, He et al. (2020), Farooq et al. (2021, 2022), Ngoc et al. (2021), and Iuga et al. (2022) report that most of the capital markets have varying volatility.

The Republic of Indonesia is one of the countries in Asia that has experienced an economic impact due to various global issues, including the Covid-19 pandemic. That is why Indonesia, as an emerging market, has many unique events in its capital market. In response to these events, the government often takes various important policies in controlling market activity to anticipate all possibilities. For example, since 2020, the government has issued many fiscal and monetary policies to assist businesses that are experiencing critical conditions due to the Covid-19 pandemic. In addition, since 2021, the government has also implemented a vaccination program to achieve herd immunity to prevent the spread of the Covid-19 virus. In fact, those policies positively impact businesses and are consistently implemented and adapted to the global issues that have occurred to date.

The basic idea of this study starts from the concept of a weak form of the efficient market hypothesis that stock prices will move randomly according to the market reaction to the information obtained. At this point, this study suspects whether information on global issues is sufficient to contribute to the phenomenon in the Indonesian capital market or is caused by the best considerations of rational investors.

1. LITERATURE REVIEW AND HYPOTHESES

The weak form of the efficient market hypothesis (EMH) is a perspective that can explain the movement of stock prices in the capital market. This is because EMH has a basic assumption that stock price movements in a capital market are generally strongly influenced by the reactions of investors triggered by information from events that occur within a certain period. Malkiel (1989, 2003) and Baker and Wurgler (2006, 2007) underlined that rationality and psychology play significant roles in market valuation. The motive behind those factors is profit so that the prospect is the initial point of view of investors to react in the capital market or in other words, mental accounting (Kahneman & Tversky, 1979; Grinblatt & Han, 2005; Dichtl & Drobetz, 2011). In this case, information that relates to events is the primary key to investor sentiment that shapes stock price patterns in the market (Baker & Wurgler, 2006, 2007; Konchitchki & O'Leary, 2011). De Blas and Hidalgo-Cabrilla (2012) proved that the value of information is a determinant for investors to set their investment portfolios.

The concept of an efficient market by Fama (1970) states that security prices fully reflect the information needed by investors. On this concept, Fama (1970) emphasized that no one will have extraordinary returns. The evidence of Bank et al. (2019) shows that even with the help of social media, investors do not have the opportunity to obtain extraordinary returns. Fama (1970) also explained that the information contained in security refers explicitly to the expected returns, which are a function of the security risk. Therefore, Fama (1970) suggested that the test of an efficient market in the weak form will be based on information on the movement of returns, which is a random walk.

Under the weak form market efficiency, Malkiel (1989, 2003) explained that present returns are independent of past returns and so-called random. Fama (1991) explained that the efficient market relationship with the asset pricing model could be influenced by abnormal conditions (anomalies) such as the size effect. Therefore, Fama (1991) concluded that the hypothesis that arises from the relationship between market efficiency and asset-pricing models could be explained through event studies because events can provide clear evidence of the phenomenon that occurs between stock prices and information. Malkiel (1989, 2003) also explained that the randomness of returns arises due to unpredictable new information so that the new events, such as economic issues and other anomalies, drive the returns more volatile in the capital market.

Some studies provide good evidence as examples of the events: firms' private information (Nguyen & Nielsen, 2010; Phan et al., 2019; Prasad et al., 2020; Lotto & McMillan, 2021), economic issues (Piccoli & Chaudhury, 2018; Zahera & Bansal,

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2018), politic issues (Ziobrowski et al., 2004; Füss & Bechtel, 2008; Eldomiaty et al., 2020; Imrana et al., 2020), earth condition issues (Antoniuk & Leirvik, 2021; Plantinga & Scholtens, 2021), and health issues (Haroon & Rizvi, 2020; Ortmann et al., 2020; Naseem et al., 2021; Ngoc et al., 2021).

There are various findings on market efficiency in weak form as the implication of the events. Smith and Ryoo (2003) examined the market returns of five European emerging markets (Greece, Hungary, Poland, Portugal, and Turkey). They found that only the market of Turkey is consistent with the random walk hypothesis because it is relatively more liquid than other markets. Jarrett and Kyper (2005) found that the daily closing prices in the US are not completely random during economic effects from April 1992 to September 2002. Borges (2010) examined the European stock market indexes (UK, France, Germany, Spain, Greece, and Portugal) from January 1993 to December 2007 and found mixed results as most European countries moved from emerging to developed markets. Borges (2010) pointed out that the markets of France and UK are more predictable than those of Germany and Spain.

Jarrett (2010) examined the daily returns of the Pacific basin (Singapore, Malaysia, Korea, and Indonesia) across different periods (the interval period is 1975 to 2001). It was found that most of the returns of those markets are generally more predictable, which is inconsistent with the efficient market hypothesis in weak form. In addition, Hiremath and Kumari (2014) in India, from January 1991 to March 2013, found that the returns are more predictable as the impact of the event of financial crises.

Saeedi et al. (2014) examined the efficiency of the Tehran Stock Exchange from 2005 to 2013 and proved that the daily returns are not applicable with the random walk as there is a change in market regulations. Kok and Munir (2015) examined the daily stock prices of the finance sector in Malaysia from January 1, 1997, to December 31, 2014. They found that those prices were mostly consistent with the random walk.

Sonjaya and Wahyudi (2016) investigated the stock market index of 10 Muslim-majority countries (Bahrain, Indonesia, Jordan, Malaysia, Morocco, Kuwait, Oman, Qatar, Saudi Arabia, and Tunisia) with 139 Ramadan as the events through the period from 1989 to 2013. They found that not all of those markets are efficient. For example, the evidence of Heymans and Santana (2018) shows that the daily index values of the Johannesburg Stock Exchange from July 3, 1997, to March 3, 2015, are efficiently related to their size and liquidity. On the other hand, by the logarithm of returns, Almujamed and McMillan (2018) analyzed the market efficiency on the Qatari Stock Exchange from January 5, 2004, to September 1, 2017. They found that the market is not efficient in a weak form. Specifically, they also concluded that only the sectors of consumer goods and services, industrial sector, and insurance were the most efficient during the period.

Recently, de Villiers et al. (2020) within the sample period of 2001 to 2017 showed that most African frontier markets are not efficient (except for Kenya and Botswana) as the countries have good economic growth. Dias et al. (2020) examined the weak form of market efficiency around the issue of the Covid-19 pandemic from December 1, 2019, to May 14, 2020. They found that the rate of return for the markets in the US, China, and Portugal are more predictable, which is inconsistent with the random walk hypothesis. The study also found randomness in the markets of Spain and Ireland, which means the returns for those markets are more unpredictable around the pandemic issue. Dias et al. (2020) also noted interesting results for Greece, Belgium, France, and Germany, where the returns for those markets were more random after the first period of the pandemic. In a further study, Dias et al. (2022) examined the weak form in six African markets, the UK, Japan, and the US, from September 2, 2019, to September 2, 2020, under the Covid-19 pandemic. During this period, the returns for those markets do not match the random walk hypothesis because investors are filled with pessimism about the bad news.

Similarly, J. Wang and X. Wang (2021) assessed the market efficiency for the S&P 500 Index besides gold, Bitcoin, and US Dollar Index from January 2, 2018, to May 29, 2020. They concluded that the efficiency of the market decreases with the impact of the Covid-19 pandemic. Vasileiou (2021) tested the efficiency in the US market from December 31, 2019, to October 30, 2020. The study

did not find any randomness in the returns during the Covid-19 pandemic. Consistently, the study of Khan et al. (2021) in the US market by using the Socially Responsible Index (SRI) and Shariah Compliance Index (SCI) from September 2010 to October 2018 found that the weak form of efficient market hypothesis is not valid.

Diallo et al. (2021) assessed the market efficiency of the West African Economic and Monetary Union (WAEMU) by using daily returns from December 31, 2013, to January 4, 2019. The findings show that the low level of stock capitalizations, number of individual shares, liquidity, and trading volume cause the rejection of the market efficiency in a weak form.

Hkiri et al. (2021) researched 11 MENA markets (Abu-Dhabi, Bahrain, Dubai, Egypt, Israel, Jordan, Lebanon, Morocco, Oman, Saudi Arabia, and Tunisia). The study revealed that the political events in the regions from March 18, 2005, to March 18, 2016, caused those markets to be mostly inefficient. Yousaf et al. (2021) examined the returns of daily closing prices on the STOXX Europe Christian Index (SECI) from December 31, 2004, to December 31, 2019. It was concluded that the market is weak-form efficient.

On this finding, Yousaf et al. (2021) implied that the prices contain all the relevant information, making the investors unable to earn extraordinary returns. The evidence by Aslam et al. (2022) in European markets (UK, France, and Spain) and Asian markets (China, India, and Japan) from January 1, 2020, to December 3, 2020, found that most inefficiencies in those markets along Covid-19 were caused by herding, which made the investors set profitable portfolio. Similar findings are also provided by Zebende et al. (2022). They researched countries of the G-20 group from May 2019 to May 2020. It was noted that most market returns were highly correlated during the Covid-19 pandemic.

Until the mid of 2022, the information about global issues has a tendency to affect the market activities in Indonesia. On previous evidence cast doubts that whether the information about global issues does convey enough signals to the capital market, so the hypothesis are noted as follows:

H0: The expected returns are random during global issues.

H1: The expected returns are not random during global issues.

2. METHODOLOGY

This study follows Fama (1991) to examine the randomness via expected returns (ER) under the assumption of the weak form of the efficient market hypothesis. For this purpose, this study employs daily closing prices of 755 listed firms on the Indonesian Stock Exchange from January 1, 2022, to June 30, 2022 (or 116 market days). Several procedures are applied and the capital asset pricing model (CAPM) is used as the main base to examine the randomness of ER. First, the daily stock return is estimated by:

$$R_{it} = \frac{P_{it} - P_{it-1}}{P_{it-1}}, \quad (1)$$

where R_{it} is the stock return of firm i at day t, P_{it} is the closing price of firm i at day t, and P_{it-1} is the closing price of firm i at day t-1 (previous day).

Second, this study follows Fama and French (1993), Bali et al. (2005), and Bali and Cakici (2008) to estimate the daily systematic risk (SR_{it}) and daily idiosyncratic risk (IR_{it}) for firm i at day t. The SR_{it} and IR_{it}, respectively, are the slope and standard error based on CAPM that contains 20 returns of current and previous days. The formula of conventional CAPM is:

$$R_{it} - RF_t = \alpha_{it} + \beta_{it}\left(RM_t - RF_t\right) + \varepsilon_{it}, \quad (2)$$

where RF_t is the risk-free rate at day t based on 365 days per year, and RM_t is market return at day t.

Following Kothari and Warner (1997) and Ziobrowski et al. (2004), the daily abnormal returns (AR_{it}) of each firm are also determined by:

$$AR_{it} = R_{it} - RF_t - \beta_{it}\left(RM_t - RF_t\right). \quad (3)$$

Following Ngoc et al. (2021) and Pandey and Kumari (2021), the formula of abnormal return is modified to get the expected return of firm i at day t (ER_{it}):

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$$AR_{it} = R_{it} - RF_t - ER_{it}, \quad (4)$$

$$ER_{it} = R_{it} - RF_t - AR_{it}. \quad (5)$$

Third, this study also calculates the market capitalization (CAP_{it}) for firm i at day t in accordance with Fama and French (1993) as listed shares times closing price. Fourth, the illiquidity of Amihud (2002) is estimated by:

$$ILLIQ_{it} = \frac{1}{D_i} \frac{\sum_{t=1}^{D_{it}} \left| R_{it} - RF_t \right|}{VOLD_{it}}, \quad (6)$$

where D_i is the number of days for firm i, $|R_{it}\text{-}RF_t|$ is the absolute stock return after risk-free of firm i at day t, and $VOLD_{it}$ is the volume (measured in *IDR*) for firm i at day t. The $ILLIQ_{it}$ is the illiquidity for firm i at day t multiplied by 10^6. The higher *ILLIQ* means the securities are less liquid and otherwise for lower *ILLIQ*.

Fifth, this study splits the AR_{it}, IR_{it}, and $ILLIQ_{it}$ by median to determine the high (H) and low (L) values. Similar to Fama and French (1993), the CAP_{it} is separated by median to determine big (B) and small (S) capitalization. Following Fama and French (1993), the $SR_{it} \geq 1$ is categorized a risky firm (H), and the average of $SR_{it} < 1$ is categorized as less risky firm (L). Finally, the AR_{it}, SR_{it}, and CAP_{it}, and $ILLIQ_{it}$ after cut-off are taken as a control to set of portfolio-based ER_t and perform the runs test. According to Borges (2010) and Vasileiou (2021), this study estimates the z-statistics (z) for the runs test by:

$$z = \frac{U - \mu}{\sigma}. \quad (7)$$

The details of equation (7) are as follows:

$$\mu = \sqrt{\frac{2.N_p \cdot N_n}{N}} + 1, \quad (8)$$

$$\sigma = \sqrt{\frac{2N_p \cdot N_n \left(2N_p \cdot N_n - N\right)}{N^2 \left(N - 1\right)}}, \quad (9)$$

U is the number of runs, μ is the expected number of runs, σ is the expected deviation number of runs, N_p is observations that contain positive *ER*, N_n is observations that contain negative *ER*, and N is N_p plus N_n or total observations.

In addition, the procedure of Lo and MacKinlay (1988) is followed to perform variance ratio test (VR test) innovations to examine the randomness of the portfolio-based ER. The formula for VR test is:

$$VR(k) = \frac{\sigma^2(k)}{\sigma^2(1)}. \quad (10)$$

The z-statistics or z(k) of VR test can be defined by:

$$z(k) = \frac{VR(k) - 1}{\sqrt{\varnothing(k)}}. \quad (11)$$

On equation 11, the ∅(k) can be estimated by:

$$\varnothing(k) = \frac{2(2k-1)(k-1)}{3kN}, \quad (12)$$

N is total observations and k is the lags where 2, 4, 8, and 16 are used for the VR test.

3. RESULTS

Table 1 shows that the ER based on all samples are about 0.000294, which indicates that investors still have positive responses about company performance from January 1, 2022, to June 30, 2022. However, descriptive statistics also show that the R-RF (or actual return) based on all samples is about –0.000178 indicating that investors' expectations are not fully met during this period. In more detail, the portfolios based on the control variables show positive ER but various for its R-RF.

The most prominent thing is that the firms with CAP-S/SR-H/ILLIQ-L have the highest ER but have significantly different R-RF. This result interprets that firms in this portfolio (small, risky, and liquid) tend to have investors with high expectations but get significantly lower returns. On the other hand, the firms with CAP-B/AR-H/ILLIQ-L significantly obtained the highest R-RF despite having a lower ER, which indicates that investors who apply this portfolio tend to have fewer expectations but have predictions and a good strategy to obtain optimum returns. In addition, the ER (about 0.000158) for firms in the category of CAP-B/SR-L/ILLIQ-H is insignificantly different

from the R-RF (about 0.00022). Similarly, the ER (about 0.000224) and R-RF (about 0.000021) for firms with CAP-B/IR-H/ILLIQ-H also do not have a significant difference. Those results indicate that large and less liquid firms, without ignoring existing risks, tend to realize investors' expectations.

Technically, if the portfolio preparation is based on the objective of obtaining AR, then the implementation of a combination of CAP-B/SR-L/ILLIQ-L, CAP-B/AR-H/ILLIQ-H, CAP-B/AR-H/ILLIQ-L, CAP-S/AR-H/ILLIQ-H, CAP-S/AR-H/ILLIQ-L, and CAP-B/IR-H/ILLIQ-L for this period turned out to give significant AR results as well as the highest R-RF. Specifically, the combination of CAP-B/AR-H/ILLIQ-L not only produces the highest R-RF (about 0.002755) but also gives the highest AR (about 0.002416). In addition, the combination of CAP-B/AR-H/ILLIQ-H, although has the lowest ER (about 0.0007), gives the highest AR (about 0.001968) and R-RF (about 0.002038). According to Fama (1970), Malkiel (1989, 2003), Almujamed and McMillan (2018), Bank et al. (2019), de Villiers et al. (2020), Dias et al. (2020), Yousaf et al. (2021), and Dias et al. (2022), when returns are more predictable, resulting in investors being able to obtain higher AR, then it indicates that market conditions are in a weak position.

Figure 1 depicts the trend line between expected returns and actual returns. The trend lines of CAP-B/AR-H/ILLIQ-L and CAP-B/AR-H/ILLIQ-H show an interesting pattern. These two portfolios show that the expected returns line is below the actual returns, indicating the importance of early identification of investors for abnormal returns through the CAPM and looking at the size. Those portfolios also indicate that investors have the opportunity to obtain positive abnormal returns.

Furthermore, the runs test on ER is performed to confirm the results presented by descriptive statistics. Table 2 shows that the ER of the entire portfolio is not random (p-value of asymptotic is less than 0.05). In the same procedure, the runs test is also performed on the entire ER portfolio by applying the Monte-Carlo simulation. Based on the Monte-Carlo simulation, the z-statistics of all ER

Table 1. Descriptive statistics

Variable	N	ER	R–RF	Difference
All samples	116	0.000294	–0.000178	0.000472***
CAP–B/SR–H/ILLIQ–H	116	0.000734	–0.001700	0.002434***
CAP–B/SR–L/ILLIQ–H	116	0.000158	0.000022	0.000136
CAP–B/SR–H/ILLIQ–L	116	0.000915	–0.000746	0.001661***
CAP–B/SR–L/ILLIQ–L	116	0.000228	0.001009	–0.000781***
CAP–S/SR–H/ILLIQ–H	116	0.000924	–0.000734	0.001658***
CAP–S/SR–L/ILLIQ–H	116	0.000105	–0.000566	0.000671***
CAP–S/SR–H/ILLIQ–L	116	0.000957	–0.000257	0.001214***
CAP–S/SR–L/ILLIQ–L	116	0.000162	–0.000538	0.0007***
CAP–B/AR–H/ILLIQ–H	116	0.000070	0.002038	–0.001968***
CAP–B/AR–L/ILLIQ–H	116	0.000290	–0.001969	0.002259***
CAP–B/AR–H/ILLIQ–L	116	0.000339	0.002755	–0.002416***
CAP–B/AR–L/ILLIQ–L	116	0.000639	–0.001944	0.002583***
CAP–S/AR–H/ILLIQ–H	116	0.000072	0.001281	–0.001209***
CAP–S/AR–L/ILLIQ–H	116	0.000261	–0.002379	0.00264***
CAP–S/AR–H/ILLIQ–L	116	0.000211	0.001529	–0.001318***
CAP–S/AR–L/ILLIQ–L	116	0.000327	–0.003236	0.003563***
CAP–B/IR–H/ILLIQ–H	116	0.000224	0.000021	0.000203
CAP–B/IR–L/ILLIQ–H	116	0.000151	–0.000127	0.000278***
CAP–B/IR–H/ILLIQ–L	116	0.000627	0.001172	–0.000545*
CAP–B/IR–L/ILLIQ–L	116	0.000396	–0.000289	0.000685***
CAP–S/IR–H/ILLIQ–H	116	0.000172	–0.000729	0.000901***
CAP–S/IR–L/ILLIQ–H	116	0.000163	–0.000374	0.000537***
CAP–S/IR–H/ILLIQ–L	116	0.000395	–0.000757	0.001152***
CAP–S/IR–L/ILLIQ–L	116	0.000106	–0.000211	0.000317***

Note: *, **, and *** are significance at 10%, 5%, and 1%, respectively.

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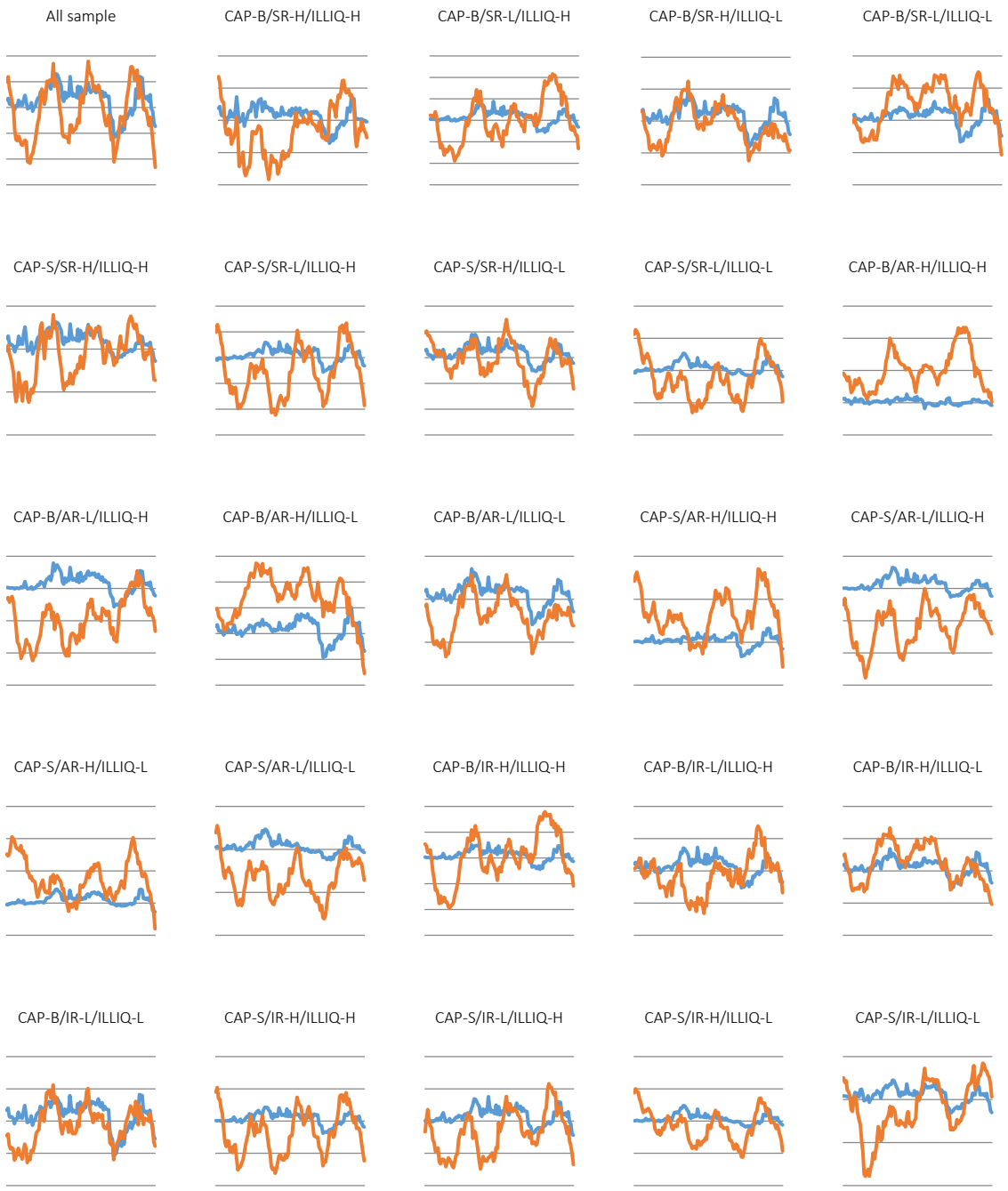

Note: The blue line denotes expected returns (ER), and the red line denotes actual returns (R-RF).

Figure 1. Comparison trend line of expected returns and actual returns

have a significance level below 0.05 so this result confirms the results of the previous runs test. The results for both runs tests reveal that both the ER based on all samples or those built from a portfolio based on a combination of control variables in this period do not have random patterns.

To ensure robustness, the ER of all samples and ER based on the portfolio are analyzed using the VR test. Table 3 shows that the z-statistics of each sub-period for all ER are significant at the 0.05 level, so it can be concluded that all ER are not random. The results of the VR test also support the results of previous runs tests, so this study has the confidence to accept the hypothesis that the average ER of all samples or portfolio-based ER are not random during global issues.

Table 2. Runs test

Variable	N	Number of Runs		z-statistics	p-value	
		Observed	Expected		Asymptotic	Monte-Carlo
All samples	116	14	56.91	–8.305	0.000	0.000
CAP–B/SR–H/ILLIQ–H	116	28	58.38	–5.728	0.000	0.000
CAP–B/SR–L/ILLIQ–H	116	13	59.00	–8.579	0.000	0.000
CAP–B/SR–H/ILLIQ–L	116	18	56.91	–7.531	0.000	0.000
CAP–B/SR–L/ILLIQ–L	116	12	56.91	–8.692	0.000	0.000
CAP–S/SR–H/ILLIQ–H	116	22	58.98	–6.900	0.000	0.000
CAP–S/SR–L/ILLIQ–H	116	11	58.16	–8.926	0.000	0.000
CAP–S/SR–H/ILLIQ–L	116	16	58.72	–8.007	0.000	0.000
CAP–S/SR–L/ILLIQ–L	116	13	58.16	–8.547	0.000	0.000
CAP–B/AR–H/ILLIQ–H	116	20	58.84	–7.264	0.000	0.000
CAP–B/AR–L/ILLIQ–H	116	15	58.57	–8.187	0.000	0.000
CAP–B/AR–H/ILLIQ–L	116	20	58.72	–7.257	0.000	0.000
CAP–B/AR–L/ILLIQ–L	116	18	56.52	–7.508	0.000	0.000
CAP–S/AR–H/ILLIQ–H	116	27	57.90	–5.875	0.000	0.000
CAP–S/AR–L/ILLIQ–H	116	11	58.84	–8.948	0.000	0.000
CAP–S/AR–H/ILLIQ–L	116	11	59.00	–8.952	0.000	0.000
CAP–S/AR–L/ILLIQ–L	116	15	58.93	–8.203	0.000	0.000
CAP–B/IR–H/ILLIQ–H	116	17	58.72	–7.819	0.000	0.000
CAP–B/IR–L/ILLIQ–H	116	20	59.00	–7.274	0.000	0.000
CAP–B/IR–H/ILLIQ–L	116	20	58.16	–7.222	0.000	0.000
CAP–B/IR–L/ILLIQ–L	116	16	56.09	–7.876	0.000	0.000
CAP–S/IR–H/ILLIQ–H	116	17	58.57	–7.812	0.000	0.000
CAP–S/IR–L/ILLIQ–H	116	13	58.57	–8.563	0.000	0.000
CAP–S/IR–H/ILLIQ–L	116	15	58.72	–8.194	0.000	0.000
CAP–S/IR–L/ILLIQ–L	116	23	57.90	–6.636	0.000	0.000

Table 3. Variance ratio test

Variable	Period			
	2	4	8	16
All samples	9.665551*	14.73837*	19.69305*	22.14553*
CAP-B/SR-H/ILLIQ-H	9.149661*	13.59784*	17.81865*	19.37759*
CAP-B/SR-L/ILLIQ-H	9.620618*	14.93251*	20.31986*	24.12944*
CAP-B/SR-H/ILLIQ-L	9.638895*	14.62742*	19.41817*	21.49497*
CAP-B/SR-L/ILLIQ-L	9.425435*	14.09034*	18.26981*	18.51922*
CAP-S/SR-H/ILLIQ-H	9.528177*	14.54867*	20.17028*	25.87017*
CAP-S/SR-L/ILLIQ-H	9.485868*	14.33584*	18.73511*	20.48242*
CAP-S/SR-H/ILLIQ-L	9.780598*	15.00848*	20.28866*	23.93282*
CAP-S/SR-L/ILLIQ-L	9.697279*	14.69967*	19.4273*	21.80469*
CAP-B/AR-H/ILLIQ-H	7.774913*	10.83751*	13.49028*	14.5642*
CAP-B/AR-L/ILLIQ-H	9.775526*	15.14677*	20.43961*	23.43819*
CAP-B/AR-H/ILLIQ-L	9.429311*	14.04482*	18.06307*	17.39428*
CAP-B/AR-L/ILLIQ-L	9.670778*	14.73494*	19.68815*	22.45875*
CAP-S/AR-H/ILLIQ-H	9.153952*	13.49693*	16.38479*	13.86825*
CAP-S/AR-L/ILLIQ-H	9.779362*	15.08811*	20.87003*	26.55028*
CAP-S/AR-H/ILLIQ-L	9.630767*	14.6379*	19.72803*	22.96632*
CAP-S/AR-L/ILLIQ-L	9.836316*	15.12405*	20.4553*	24.11089*
CAP-B/IR-H/ILLIQ-H	9.513944*	14.74947*	19.9586*	23.04216*
CAP-B/IR-L/ILLIQ-H	9.554664*	14.61613*	19.74595*	23.51926*
CAP-B/IR-H/ILLIQ-L	9.566787*	14.43001*	18.98622*	20.34192*
CAP-B/IR-L/ILLIQ-L	9.575011*	14.49878*	19.15113*	20.79895*
CAP-S/IR-H/ILLIQ-H	9.615783*	14.69697*	19.6948*	23.04642*
CAP-S/IR-L/ILLIQ-H	9.485666*	14.34698*	19.15004*	22.35748*
CAP-S/IR-H/ILLIQ-L	9.808198*	15.03522*	20.20557*	23.43787*
CAP-S/IR-L/ILLIQ-L	9.628591*	14.52769*	19.3721*	22.23291*

Note: * significant at 5%.

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4. DISCUSSION

Following Fama (1970), the weak form of the EMH is used to examine whether information from current events immediately adjusts the movements of the stock price in the capital market. As suggested by Fama (1970), this study uses ER from all samples and constructs 24 types of portfolios to obtain a more specific ER in terms to detect whether the market has random movements or not. The runs tests and VR test show that the movement of all expected returns is not random from the beginning of 2022 to June 30, 2022. Empirically, these results prove that information related to global issues does not affect the movement of returns or in the sense that the market condition in Indonesia is still relatively stable.

Consistent with the opinions of Malkiel (1989, 2003) and Baker and Wurgler (2006, 2007), the findings of this study indicate that the rationality and psychology of investors in Indonesia tend to still behave positively in conducting market valuations. In addition, the findings are consistent with Smith and Ryoo (2003) although the portfolios of this study show that liquidity is not a major determinant in creating an efficient market. Similarly, the evidence of this study is also inconsistent with Heymans and Santana (2018). It shows that the size and liquidity in the Indonesian market during this period are not strong enough to create randomness in expected returns. On the other hand, the results show that capitalizations, number of individual shares, liquidity, and trading volume tend to make the Indonesian market inefficient (Diallo et al., 2021).

The results of this study have similarities with Jarrett and Kyper (2005), Borges (2010), Hiremath and Kumari (2014), Saeedi et al. (2014), and Almujamed and McMillan (2018) when it comes to the issue of economic conditions in Indonesia. Moreover, the findings of Jarrett (2010) on the Indonesian capital market from 1975 to 2001 show similarities in economic conditions with the observation period of this study. If it is associated with evidence from de Villiers et al. (2020) in African countries from 2001 to 2017, the results indicate good prospects for economic growth in Indonesia. One possible cause is the successful strategy of the Indonesian government in implementing fiscal policy (such as tax incentives) and monetary policy (such as maintaining interest rate stability) in the period range of January 1, 2022, to June 30, 2022.

Furthermore, if it is associated with the issue of the Covid-19 pandemic, these results still have similar results to the findings of Dias et al. (2020) in the US, China, and Portugal. Moreover, they support J. Wang and X. Wang (2021) in the US, Khan et al. (2021) in the US, Hkiri et al. (2021) at 11 MENA, and Zebende et al. (2022) in G-20countries. Despite having similar results to Dias et al. (2022), with the difference in periods, these findings tend not to be caused by investor pessimism. Similar to the opinion of Vasileiou (2021) and Aslam et al. (2022), the existence of a vaccination program in Indonesia since the beginning of 2021 tends to have an optimistic effect on investors.

Runs tests and VR tests provide evidence for this study that the movements of all expected returns based on portfolios are not random. This condition shows that the capital market in Indonesia during this period is inefficient. Consistent with Fama (1970), Malkiel (1989, 2003), Almujamed and McMillan (2018), Bank et al. (2019), de Villiers et al. (2020), Dias et al. (2020), Yousaf et al. (2021), and Dias et al. (2022), the findings imply that the investors can set their portfolios to obtain abnormal returns. The set of portfolios shows that early identification of abnormal returns through the CAPM is critical to estimate optimal returns. As evidence, descriptive statistics show that inefficient market conditions in this period cause the combination of large and liquid securities not only to give higher abnormal returns but also result for higher actual returns. Other evidence is that the combination of large and less liquid securities with the identification of high abnormal returns can provide high actual returns even though they have the lowest expected returns.

CONCLUSION

This study aimed to examine the weak form of the efficient market hypothesis in Indonesia during global issues. The findings show that the expected returns of all samples based on runs tests and variance ratio test are not random. This study also controls the abnormal return, systematic risk, idiosyncratic risk, size, and illiquidity to set portfolios to get specific expected returns. After controlling those variables, the results show that none of the portfolios are random, consistent with the result based on all samples.

Following the findings, the efficient market hypothesis is rejected. The paper concluded that the Indonesian capital market during the observed period is inefficient in the weak form, which means the prices do not fully reflect the information. Those results imply that information about global issues is strong enough to affect the market. The plausible explanation for this phenomenon is the Indonesian government's strategy in dealing with the pandemic problem accompanied by implementing good fiscal and monetary policies. Additionally, the findings also imply that everyone can beat the market to get abnormal returns, as the market is more predictable.

AUTHOR CONTRIBUTIONS

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REFERENCES

1. Almujamed, H. I., & McMillan, D. (rev.ed.). (2018). Predictable returns in an emerging stock market: Evidence from Qatar. *Cogent Business & Management, 5*(1), 1-26. https://doi.org/10.1080/23311975.2018.1497573
2. Amihud, Y. (2002). Illiquidity and stock returns: cross-section and time-series effects. *Journal of Financial Markets, 5*(1), 31-56. https://doi.org/10.1016/S1386-4181(01)00024-6
3. Andersson, A. E., & Johansson, B. (2018). Inside and outside the black box: Organization of interdependencies. *The Annals of Regional Science, 61,* 501-516. https://doi.org/10.1007/s00168-018-0886-1
4. Antoniuk, Y., & Leirvik, T. (2021). Climate change events and stock market returns. *Journal of Sustainable Finance & Investment*. https://doi.org/10.1080/20430795.2021.1929804
5. Aslam, F., Ferreira, P., Ali, H., & Kauser, S. (2022). Herding behavior during the Covid-19 pandemic: A comparison between Asian and European stock markets based on intraday multifractality. *Eurasian Economic Review, 12,* 333-359. https://doi.org/10.1007/s40822-021-00191-4
6. Asquith, P., & Mullins, D. W. (1986). Signalling with dividends, stock repurchases, and equity issues. *Financial Management, 15*(3), 27-44.
7. Baker, M., & Wurgler, J. (2006). Investor sentiment and the cross-section of stock returns. *The Journal of Finance, 61*(4), 1645-1680. https://doi.org/10.1111/j.1540-6261.2006.00885.x
8. Baker, M., & Wurgler, J. (2007). Investor sentiment in the stock market. *Journal of Economic Perspectives, 21*(2), 129-152. https://doi.org/10.1257/jep.21.2.129

http://dx.doi.org/10.21511/imfi.19(4).2022.01

9. Bali, T. G., Cakici, N., Yan, X., & Zhang, Z. (2005). Does idiosyncratic risk really matter? *The Journal of Finance, 60*(2), 905-929. https://doi.org/10.1111/j.1540-6261.2005.00750.x

10. Bali, T., & Cakici, N. (2008). Idiosyncratic volatility and the cross section of expected returns. *Journal of Financial and Quantitative Analysis, 43*(1), 29-58. https://doi.org/10.1017/S002210900000274X

11. Bank, S., Yazar, E. E., & Sivri, U. (2019). Can social media marketing lead to abnormal portfolio returns? *European Research on Management and Business Economics, 25*(2), 54-62. https://doi.org/10.1016/j.iedeen.2019.04.006

12. Batten, J. A., Choudhury, T., Kinateder, H., & Wagner, N. F. (2022). Volatility impacts on the European banking sector: GFC and COVID-19. *Annals of Operations Research*. https://doi.org/10.1007/s10479-022-04523-8

13. Borges, M. R. (2010). Efficient market hypothesis in European stock markets. *The European Journal of Finance, 16*(7), 711-726. https://doi.org/10.1080/1351847X.2010.495477

14. de Blas, B., & Hidalgo-Cabrillana, A. (2012). Portfolio choice and private information: A note. *Cuadernos de Economía, 35*(98), 55-67. https://doi.org/10.1016/S0210-0266(12)70023-7

15. de Villiers, D., Apopo, N., Phiri, A., & McMillan, D. (rev.ed.). (2020). Unobserved structural shifts and asymmetries in the random walk model for stock returns in African frontier markets. *Cogent Economics & Finance, 8*(1), 1-16. https://doi.org/10.1080/23322039.2020.1769348

16. Diallo, O. K., Mendy, P., & Burlea-Schiopoiu, A. (2021). A method to test weak-form market efficiency from sectoral indices of the WAEMU stock exchange: A wavelet analysis. *Heliyon, 7*(1), 1-8. https://doi.org/10.1016/j.heliyon.2020.e05858

17. Dias, R., Pereira, M. J., & Carvalho, C. L. (2022). Are African stock markets efficient? A comparative analysis between six African markets, the UK, Japan and the USA in the period of the pandemic. *Naše Gospodarstvo/Our Economy, 68*(1), 35-51. https://doi.org/10.2478/ngoe-2022-0004

18. Dias, R., Teixeira, N., Machova, V., Pardal, P., Horak, J., & Vochozka, M. (2020). Random walks and market efficiency tests: Evidence on US, Chinese and European capital markets within the context of the global Covid-19 pandemic. *Oeconomia Copernicana, 11*(4), 585-608. https://doi.org/10.24136/oc.2020.024

19. Dichtl, H., & Drobetz, W. (2011). Portfolio insurance and prospect theory investors: Popularity and optimal design of capital protected financial products. *Journal of Banking & Finance, 35*(7), 1683-1697. https://doi.org/10.1016/j.jbankfin.2010.11.012

20. Eldomiaty, T. I., Anwar, M., Magdy, N., & Hakam, M. N. (2020). Robust examination of political structural breaks and abnormal stock returns in Egypt. *Future Business Journal, 6*(1), 1-9. https://doi.org/10.1186/s43093-020-00014-z

21. Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance, 25*(2), 383-417. https://doi.org/10.2307/2325486

22. Fama, E. F. (1991). Efficient capital markets: II. *The Journal of Finance, 46*(5), 1575-1617. https://doi.org/10.2307/2328565

23. Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics, 33*(1), 3-56. https://doi.org/10.1016/0304-405X(93)90023-5

24. Farooq, U., Nasir, A., Bilal, & Bashir, M. F. (2022). The COVID-19 pandemic and stock market performance of transportation and travel services firms: A cross-country study. *Economic Research-Ekonomska Istraživanja*. https://doi.org/10.1080/1331677X.2022.2053784

25. Farooq, U., Nasir, A., Bilal, & Quddoos, M. U. (2021). The impact of COVID-19 pandemic on abnormal returns of insurance firms: A cross-country evidence. *Applied Economics, 53*(31), 3658-3678. https://doi.org/10.1080/00036846.2021.1884839

26. Füss, R., & Bechtel, M. M. (2008). Partisan politics and stock market performance: The effect of expected government partisanship on stock returns in the 2002 German federal election. *Public Choice, 135,* 131-150. https://doi.org/10.1007/s11127-007-9250-1

27. Givoly, D., & Lakonishok, J. (1979). The information content of financial analysts' forecasts of earnings: Some evidence on semi-strong inefficiency. *Journal of Accounting and Economics, 1*(3), 165-185. https://doi.org/10.1016/0165-4101(79)90006-5

28. Grinblatt, M., & Han, B. (2005). Prospect theory, mental accounting, and momentum. *Journal of Financial Economics, 78*(2), 311-339. https://doi.org/10.1016/j.jfineco.2004.10.006

29. Haroon, O., & Rizvi, S. A. R. (2020). COVID-19: Media coverage and financial markets behavior – A sectoral inquiry. *Journal of Behavioral and Experimental Finance, 27,* 100343. https://doi.org/10.1016/j.jbef.2020.100343

30. He, P., Sun, Y., Zhang, Y., & Li, T. (2020). COVID-19's impact on stock prices across different sectors: An event study based on the Chinese Stock Market. *Emerging Markets Finance and Trade, 56*(10), 2198-2212. https://doi.org/10.1080/1540496X.2020.1785865

31. Heymans, A., & Santana, L. (2018). How efficient is the Johannesburg Stock Exchange really? *South African Journal of Economic and Management Sciences, 21*(1), 1-14. https://doi.org/10.4102/sajems.v21i1.1968

32. Hiremath, G. S., & Kumari, J. (2014). Stock returns predictability and the adaptive market hypothesis in emerging

markets: Evidence from India. *SpringerPlus, 3*, 1-14. https://doi.org/10.1186/2193-1801-3-428

33. Hkiri, B., Béjaoui, A., Gharib, C., & AlNemer, H. A. (2021). Revisiting efficiency in MENA stock markets during political shocks: evidence from a multi-step approach. *Heliyon, 7*(9), 1-17. https://doi.org/10.1016/j.heliyon.2021.e08028

34. Imrana, Z. A., Ejaz, A., Spulbar, C., Birau, R., & Nethravathi, P. S. R. (2020). Measuring the impact of governance quality on stock market performance in developed countries. *Economic Research-Ekonomska Istraživanja, 33*(1), 3406-3426. https://doi.org/10.1080/1331677X.2020.1774789

35. Iuga, I. C., Mudakkar, S. R., & Dragolea, L. L. (2022). Time of COVID-19: Stability analysis of stocks, exchange rates, minerals and metals markets. *Economic Research-Ekonomska Istraživanja*. https://doi.org/10.1080/1331677X.2022.2090403

36. Jarrett, J. E. (2010). Efficient markets hypothesis and daily variation in small Pacific-basin stock markets. *Management Research Review, 33*(12), 1128-1139. https://doi.org/10.1108/01409171011092185

37. Jarrett, J. E., & Kyper, E. (2005). Daily variation, capital market efficiency and predicting stock market returns. *Management Research News, 28*(8), 34-47. https://doi.org/10.1108/01409170510784940

38. Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3*(4), 305-360. https://doi.org/10.1016/0304-405X(76)90026-X

39. Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica, 47*(2), 263-292. https://doi.org/10.2307/1914185

40. Khan, A., Khan, M. Y., Khan, A. Q., Khan, M. J., & Rahman, Z. U. (2021). Testing the weak form of efficient market hypothesis for socially responsible and Shariah indexes in the USA. *Journal of Islamic Accounting and Business Research, 12*(5), 625-645. https://doi.org/10.1108/JIABR-02-2020-0055

41. Kok, S. C., & Munir, Q. (2015). Malaysian finance sector weak-form efficiency: Heterogeneity, structural breaks, and cross-sectional dependence. *Journal of Economics, Finance and Administrative Science, 20*(39), 105-117. https://doi.org/10.1016/j.jefas.2015.10.002

42. Konchitchki, Y., & O'Leary, D. E. (2011). Event study methodologies in information systems research. *International Journal of Accounting Information Systems, 12*(2), 99-115. https://doi.org/10.1016/j.accinf.2011.01.002

43. Kothari, S. P., & Warner, J. B. (1997). Measuring long-horizon security price performance. *Journal of Financial Economics, 43*(3), 301-339. https://doi.org/10.1016/S0304-405X(96)00899-9

44. Lo, A. W., & MacKinlay, A. C. (1988). Stock market prices do not follow random walks: Evidence from a simple specification test. *The Review of Financial Studies, 1*(1), 41-66. https://doi.org/10.1093/rfs/1.1.41

45. Lotto, J., & McMillan, D. (rev.ed.). (2021). Does earnings distribution policy influence corporate stock price instability? Empirical evidence from Tanzanian listed industrial firms. *Cogent Economics & Finance, 9*(1), 1-11. https://doi.org/10.1080/23322039.2021.1953737

46. Malkiel, B. G. (1989). Is the stock market efficient? *Science, 243*(4896), 1313-1318. Retrieved from http://www.jstor.org/stable/1703677

47. Malkiel, B. G. (2003). The efficient market hypothesis and its critics. *Journal of Economic Perspectives, 17*(1), 59-82. https://doi.org/10.1257/089533003321164958

48. Mayoral, R. M., & Vallelado, E. (2012). The interaction of environmental factors and individual traits on investors' perception. *The Spanish Review of Financial Economics, 10*(2), 62-73. https://doi.org/10.1016/j.srfe.2012.10.001

49. Naseem, S., Mohsin, M., Hui, W., Liyan, G., & Penglai, K. (2021). The investor psychology and stock market behavior during the initial era of COVID-19: A study of China, Japan, and the United States. *Frontiers in Psychology, 12,* 1-10. https://doi.org/10.3389/fpsyg.2021.626934

50. Ngoc, H. D., Thuy, V. V. T., Van, C. L., & McMillan, D. (rev.ed.). (2021). Covid-19 pandemic and abnormal stock returns of listed companies in Vietnam. *Cogent Business & Management, 8*(1), 1-18. https://doi.org/10.1080/23311975.2021.1941587

51. Nguyen, B. D., & Nielsen, K. M. (2010). The value of independent directors: Evidence from sudden deaths. *Journal of Financial Economics, 98*(3), 550-567. https://doi.org/10.1016/j.jfineco.2010.07.004

52. Ortmann, R., Pelster, M., & Wengerek, S. T. (2020). COVID-19 and investor behavior. *Finance Research Letters, 37,* 101717. https://doi.org/10.1016/j.frl.2020.101717

53. Pandey, D. K., & Kumari, V. (2021). Event study on the reaction of the developed and emerging stock markets to the 2019-nCoV outbreak. *International Review of Economics & Finance, 71,* 467-483. https://doi.org/10.1016/j.iref.2020.09.014

54. Phan, T. K. H., Tran, N. H., & Charfeddine, L. (rev.ed.). (2019). Dividend policy and stock price volatility in an emerging market: Does ownership structure matter? *Cogent Economics & Finance, 7*(1), 1-29. https://doi.org/10.1080/23322039.2019.1637051

55. Piccoli, P., & Chaudhury, M. (2018). Overreaction to extreme market events and investor sentiment. *Applied Economics Letters, 25*(2), 115-118. https://doi.org/10.1080/13504851.2017.1302052

http://dx.doi.org/10.21511/imfi.19(4).2022.01

56. Plantinga, A., & Scholtens, B. (2021). The financial impact of fossil fuel divestment. *Climate Policy, 21*(1), 107-119. https://doi.org/10.1080/14693062.2020.1806020

57. Prasad, M., Bakry, W., & Varua, M. E. (2020). Examination of information release on return volatility: A market and sectoral analysis. *Heliyon, 6*(5), 1-14. https://doi.org/10.1016/j.heliyon.2020.e03885

58. Rehan, M., Alvi, J., & Karaca, S. S. (2022). Short term stress of Covid-19 on world major stock indices. *Asia-Pacific Financial Markets, 29*, 527-568. https://doi.org/10.1007/s10690-022-09359-7

59. Saeedi, A., Miraskari, S. R., & Ara, M. S. (2014). The investigation of the efficient market hypothesis: Evidence from an emerging market. *Taylor's Business Review, 4*(1), 121-134. https://doi.org/10.7603/s40932-014-0001-0

60. Smith, G., & Ryoo, H. (2003). Variance ratio tests of the random walk hypothesis for European emerging stock markets. *The European Journal of Finance, 9*(3), 290-300. https://doi.org/10.1080/1351847021000025777

61. Sonjaya, A. R., & Wahyudi, I. (2016). The Ramadan effect: Illusion or reality? *Arab Economic and Business Journal, 11*(1), 55-71. https://doi.org/10.1016/j.aebj.2016.03.001

62. Vasileiou, E. (2021). Behavioral finance and market efficiency in the time of the COVID-19 pandemic: does fear drive the market? *International Review of Applied Economics, 35*(2), 224-241. https://doi.org/10.1080/02692171.2020.1864301

63. Wang, J., & Wang, X. (2021). COVID-19 and financial market efficiency: Evidence from an entropy-based analysis. *Finance Research Letters, 42*, 101888. https://doi.org/10.1016/j.frl.2020.101888

64. Yousaf, T., Farooq, S., & Mehta, A. M. (2021). An investigation of time varying market efficiency: Evidence from STOXX Europe Christian index. *International Journal of Ethics and Systems, 37*(4), 631-643. https://doi.org/10.1108/IJOES-09-2020-0144

65. Zahera, S. A., & Bansal, R. (2018). Do investors exhibit behavioral biases in investment decision making? A systematic review. *Qualitative Research in Financial Markets, 10*(2), 210-251. https://doi.org/10.1108/QRFM-04-2017-0028

66. Zebende, G. F., Santos Dias, R. M. T., & de Aguiar, L. C. (2022). Stock market efficiency: An intraday case of study about the G-20 group. *Heliyon, 8*(1), 1-8. https://doi.org/10.1016/j.heliyon.2022.e08808

67. Ziobrowski, A. J., Cheng, P., Boyd, J. W., & Ziobrowski, B. J. (2004). Abnormal returns from the common stock investments of the U.S. Senate. *Journal of Financial and Quantitative Analysis, 39*(4), 661-676. https://doi.org/10.1017/S0022109000003161