Efficient market and the COVID-19 pandemic: Case of ASEAN-5

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ABSTRACT
The issue of Covid-19 has a negative impact, especially on the capital markets of ASEAN-5 countries (Indonesia, Malaysia, Singapore, Thailand, and the Philippines). This study aims to examine the movement of market returns in ASEAN-5 countries at the start of the Covid-19 pandemic. The data used are daily market indices for the period 2020 to 2021. The findings show that market indices for all ASEAN-5 countries move unstable throughout 2020. In 2021, efficient market conditions under the assumption of a weak form only occur in Singapore where the trend of the index of the market becomes more predictable. Empirical evidence also shows that the interrelationship between market indices in ASEAN-5 countries is varied.

Keywords: returns; random walk; ASEAN-5; Covid-19
JEL Classification: G01; G14; G15

1. Introduction

The economic sector and capital market performance in all countries have started to experience unfavorable conditions since the World Health Organization (WHO) officially announced the identification of Covid-19 in China on 31 December 2019. Altig et al. (2020) investigate economic uncertainty in the US and UK and find that capital market volatility became higher in mid-March and fell back at the end of March as stock prices began to recover. Tetteh et al. (2022) report that the case reports including the death rate from Covid-19 had a negative impact on the performance of financial markets in Ghana and Botswana from March 1, 2020, to September 30, 2021. At the ASEAN level, some studies from Dewi et al. (2021), Octavera and Rahadi (2021), and Romadhon and Ardiansyah (2022) report that capital market conditions have worsened due to the Covid-19 pandemic.

Some studies as found by Putri (2020), Nasution et al. (2020), Sumarni (2020), Aeni (2021), Hamzah et al. (2021), and Akhmad (2022) also report the adverse impact of Covid-19 on the economy and especially the capital market in Indonesia. Budiarso et al. (2020) also report that there has been a decline in the market index in Indonesia until April 2020 which tends to be due to the pessimistic behavior of investors. Pontoh and Budiarso (2021) report that systematic risk and unsystematic risk do not significantly affect stock returns using the liquidity-based capital asset pricing model approach. These results indicate that the

condition of the capital market during the Covid-19 pandemic is heavily influenced by liquidity. The objective of this study is to examine the movement of market returns in ASEAN-5 countries when the Covid-19 pandemic started.

2. Literature review

2.1. Efficient market hypothesis and random walk theory

The movement of market returns in principle can be explained by the efficient market hypothesis. According to Fama (1965), an efficient market is defined as a market with information that is freely accessible to investors which will be used to predict the intrinsic value of a security. Furthermore, Fama (1965) explains that free access to information would result in different interpretations by investors, causing market prices to move randomly (or so-called random walk theory). According to Fama (1970), stock prices in an efficient market will soon be adjusted to the presence of new relevant information from an event. Fama (1970) confirmed that one form of an efficient market is a weak form which is tested by historical stock prices.

Fama (1998) finds that anomalies from stock returns will disappear in the long term with changes or developments in the methodology used, for example, the development of the capital asset pricing model. Therefore, Fama (1998) explains that overreaction or underreaction to security due to new relevant information is common thing among investors. Malkiel (2003) emphasizes that decisions based on the rationality or irrationality of investors will not cause a portfolio of securities to provide extraordinary returns. According to Malkiel (2003), this is because basically, the capital market mechanism will immediately adjust security prices in the presence of new relevant information.

2.2. Hypothesis development

Some empirical evidence shows the impact of the Covid-19 pandemic on the efficiency of market indices in the world. Rodoni et al. (2022) prove that conventional market indices in Indonesia, Malaysia, and Thailand moved randomly during the Covid-19 pandemic, especially in the period from January 2020 to August 2021. Other interesting evidence comes from Aslam et al. (2022) which prove that the Covid-19 pandemic has caused equity indexes in European markets (UK, France, and Spain) and Asian markets (China, India, and Japan) to not move stably during the period January 1, 2020, to December 3, 2020.

However, Wang and Wang (2021) find that the S&P 500 experienced inefficiencies during March 2020. In addition, Ozkan (2021) also finds that several market indices (S&P 500, IBEX 35, FTSE 100, FTSE MIB, CAC 40, and DAX) in several developed countries (US, Spain, the UK, Italy, France, and Germany) have movements that are not random, especially in the period from July 29, 2019, to January 25, 2021. Similarly, Dias et al. (2022) prove that market indices in Botswana, Egypt, Kenya, Morocco, Nigeria, South Africa, Japan, the UK, and the USA from 2 September 2019 to 2 September 2020 were inconsistent with the random walk theory. Based on previous empirical evidence, the hypothesis of this study can be noted as follows.

Ha1: The market returns of ASEAN-5 are not random
Ha2: The market returns of ASEAN-5 are interrelationship

3. Research method

The sample in this study are countries that are included in the ASEAN-5 group, namely Indonesia (JKSE), Malaysia (KLSE), Singapore (STI), Thailand (SET), and the Philippines (PSEi). The data used are daily market indices from Stooq

(https://stooq.com) and are divided into 2 sub-periods, namely: (1) January 1, 2020, to December 31, 2020; and (2) January 1, 2021, to December 31, 2021. Based on the daily market indices, market returns are calculated using the following formula.

$$MR_t = (MI_t - MI_{t-1})/MI_{t-1} \qquad (1)$$

MR_t is the market return of period t, MI_t is the market index in period t, and MI_{t-1} is the market index in period t-1. In order to test the hypothesis, a runs test is used (together with Monte-Carlo simulation) with the following formula.

$$z = \frac{U - \mu}{\sigma} \qquad (2)$$

z is the z-statistics for the runs test, U is the number of runs, μ is the expected number of runs, and σ is the expected deviation number of runs. The final analysis used is the Pearson correlation test to examine the index relationship between countries. In order to make a decision on the results of the analysis, the significance level used is 5%.

4. Result and discussion

4.1. Descriptive statistics

Table 1 presents descriptive statistics of market returns in countries that are included in the ASEAN-5 group. Throughout 2020, Malaysia is a country that has the highest market return with mean of 0.0002 while Singapore is a country that has the lowest return with mean of -0.0004. These results indicate that investors in Malaysia are still

responding rationally to information about the outbreak of Covid-19 compared to investors in Singapore. The standard deviation (SD) shows that the capital market in the Philippines has the highest risk (or 0.02097) followed by Thailand, Indonesia, Singapore, and Malaysia. The skewness value indicates that Indonesia has a positively skewed form of distribution, indicating the dominance of low market returns during this period. In addition, the kurtosis of each country in ASEAN-5 is positive which indicates that the peak distribution of returns is quite high.

In 2021, capital markets in ASEAN except Malaysia will start to show better conditions where the mean market returns have turned positive. Malaysia has a mean of -0.0001 which indicates the lowest market return. In addition, SD shows a value of 0.00680 which implies that Malaysia has the lowest risk market compared to other ASEAN countries. In contrast, Thailand has the highest mean market return of 0.0006, which implies quite a good market performance. Moreover, SD also shows that Thailand has a relatively higher risk than Singapore and Malaysia. In addition, Thailand has a negatively skewed return distribution which indicates that the market is dominated by relatively optimal market returns. Similar to 2020, the kurtosis of each country in ASEAN-5 is positive which indicates a high peak in the distribution of returns.

Table 1. Descriptive Statistics

	Indonesia		Malaysia		Singapore		Thailand		Philippines	
	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
N	242	247	248	245	251	253	243	241	241	250
Min	-0.07	-0.02	-0.05	-0.02	-0.07	-0.03	-0.11	-0.02	-0.13	-0.04
Max	0.10	0.04	0.07	0.02	0.06	0.03	0.08	0.03	0.07	0.05
Mean	-0.0001	0.0004	0.0002	-0.0001	-0.0004	0.0004	-0.0002	0.0006	-0.0002	0.0001
SD	0.01693	0.00861	0.01225	0.00680	0.01491	0.00724	0.01885	0.00758	0.02097	0.01178
Skew	0.29	0.22	-0.03	0.08	-0.38	0.03	-1.34	-0.01	-1.52	0.13
Kurtosis	6.76	0.87	5.70	0.52	5.67	1.49	9.50	1.19	9.81	2.04

4.2. Sub-period 1

Table 2 presents the results of the runs test for sub-period 1 or throughout 2020. The significance level of the runs test shows that the asymptotic of all ASEAN-5 countries is above 5%. Moreover, the test results using Monte-Carlo simulation also produce a significant level above 5%. These results indicate that the movement of the capital market indices in Indonesia, Malaysia, Singapore, Thailand, and the Philippines tends to be random so it is consistent with the random walk theory. In accordance with the efficient market hypothesis, all capital markets in ASEAN-5 countries can be called efficient or fully reflect the information about Covid-19.

The implication is that the movement of capital market indices in these countries is in an unstable condition. Based on these results, the first hypothesis (Ha1) is rejected because the movement of market returns of ASEAN-5 is random. The findings of this study prove that there are similarities in the conditions of the capital markets in ASEAN-5 with the evidence from Rodoni et al. (2022) in Indonesia, Malaysia, and Thailand in the period January 2020 to August 2021 and Aslam et al. (2022) in UK, France, Spain, China, India, and Japan during the period January 1, 2020, to December 3, 2020.

Table 2. Runs test of sub-period 1

	Indonesia	**Malaysia**	**Singapore**	**Thailand**	**Philippines**
Test Value	-0.0001	0.0002	-0.0004	-0.0002	-0.0002
Cases < Test Value	115	124	131	117	115
Cases >= Test Value	127	124	120	126	126
Total Cases	242	248	251	243	241
Number of Runs	125	132	126	128	126
Z	0.426	0.891	-0.033	0.730	0.615
Asymp. Sig. (2-tailed)	0.670	0.373	0.974	0.466	0.539
Monte Carlo Sig. (2-tailed)	0.704	0.411	1.000	0.475	0.558

Table 3 presents the results of the correlation test between ASEAN-5 countries. This study finds that, in 2020, there is a relatively small and significant correlation between the Indonesian market indices with Thailand and the Philippines so that Ha2 can be accepted. However, the market index in Indonesia does not correlate with the market index in Malaysia and Singapore, so Ha2 was rejected. Rejection of Ha2 also occurs in the Philippines which is not correlated with Malaysia, Singapore, and Thailand. Other results show that the market index among several ASEAN countries has a moderate and significant correlation so Ha2 is accepted.

Table 3. Correlations in sub-period 1

	Indonesia	Malaysia	Singapore	Thailand	Philippines
Indonesia	1	0.018	0.082	0.136[*]	0.133[*]
Malaysia	0.018	1	0.484[**]	0.443[**]	0.122
Singapore	0.082	0.484[**]	1	0.542[**]	0.112
Thailand	0.136[*]	0.443[**]	0.542[**]	1	0.096
Philippines	0.133[*]	0.122	0.112	0.096	1

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

4.3. Sub-period 2

Table 4 presents the results of the runs test for sub-period 2 or for the whole of 2021. This study finds that ASEAN-5 countries (except for Singapore) will still be in the same condition in 2020 so it is consistent with the random walk theory or efficient market hypothesis in weak form assumption. These results indicate that market indices in Indonesia, Malaysia, Thailand, and the Philippines are still moving unstable due to information on the Covid-19 pandemic. Like the results of sub-period 1, this study rejects Ha1 for cases in Indonesia, Malaysia, Thailand, and the Philippines. In contrast, this study finds that the significance level of the runs

test (asymptotic and Monte-Carlo) in Singapore is less than 5% so Ha1 can be accepted because the movement of the market index is not random. It can be interpreted that the capital market in Singapore has changed to be inefficient in the sense that the movement of the market index is predictable or stable. These results also indicate that information about Covid-19 in Singapore has been responded to rationally and anticipated by investors in preparing investment portfolios. Empirically, the conditions in Singapore are still consistent with the findings from Wang and Wang (2021), Ozkan (2021), and Dias et al. (2022).

Table 4. Runs test of sub-period 2

	Indonesia	Malaysia	Singapore	Thailand	Philippines
Test Value[a]	0.0004	-0.0001	0.0004	0.0006	0.0001
Cases < Test Value	122	123	123	120	122
Cases >= Test Value	125	122	130	121	128
Total Cases	247	245	253	241	250
Number of Runs	132	126	144	129	128
Z	0.959	0.320	2.093	0.969	0.263
Asymp. Sig. (2-tailed)	0.338	0.749	0.036	0.333	0.793
Monte Carlo Sig. (2-tailed)	0.342	0.755	0.037	0.327	0.800

Table 5 presents the results of the correlation test between ASEAN-5 countries in sub-period 2 or 2021. This study finds that the significant correlation that occurs between market indices in ASEAN countries is still relatively small so Ha2 can be accepted. However, this study also finds that several market indices

in ASEAN are also uncorrelated, so Ha2 is rejected. For example, Malaysia's market index turns out to be uncorrelated with other ASEAN countries, thus indicating that changes in market conditions will not affect one another.

Table 5. Correlations in sub-period 2

	Indonesia	Malaysia	Singapore	Thailand	Philippines
Indonesia	1	0.036	0.158*	0.100	0.179**
Malaysia	0.036	1	0.035	0.096	0.014
Singapore	0.158*	0.035	1	0.137*	0.047
Thailand	0.100	0.096	0.137*	1	0.176**
Philippines	0.179**	0.014	0.047	0.176**	1

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

5. Conclusion

The movement of market indices in the world has become unstable since the World Health Organization (WHO)

officially announced the outbreak of Covid-19. The countries that are members of ASEAN-5 are also not spared from the negative impact of the Covid-19 issue.

One of the problems that arise in ASEAN-5 countries is the movement of market indices that move uncertainly. In 2020 and 2021, this study finds that market indices in ASEAN countries (except Singapore in 2021) move randomly. This evidence indicates that the capital markets in these countries are efficient. Consistent with the efficient market hypothesis and random walk theory, this study implies that stock market prices fully reflect the information circulating regarding the Covid-19 issue. In 2021, an interesting finding is that the movement of the market index in Singapore tends to be more stable which indicates that investors are rationally responding to issues regarding Covid-19.

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