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Analyzing The Impact Of Government's Responses To The Covid-19 Pandemic On The Stock Market's Performance: Empirical Insights From Asean Stock Markets

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Abstract

This study examines the impact of government intervention during the COVID-19 pandemic on the stock market performance in five of the Association of Southeast Asian Nations (ASEAN) member countries including Indonesia, Malaysia, Philippines, Thailand and Vietnam. This study harbors new information by measuring the stock market performance in two aspects, stock returns and volatilities. GARCH(1,1) is adopted in the study to predict the volatilities in stock markets. In examining the effect of government's intervention on stock market performance in ASEAN countries, we use the random-effected model with consideration of country fixed-effect dummy variables. Using data from 2nd January 2018 to 22nd July 2021, we figure out that the stock markets in the sample react so much more forcefully once the government's policy responses to Covid-19 are enacted. The main finding indicates a positive react of stock returns in these financial markets to the intervention of governments. On the other hand, higher stock volatilities are witnesses under the intervention of governments, implying the potential risks and uncertainties in these stock markets. These empirical results are expected to provide policy implications to key stakeholders in order to mitigate the dramatic effects of COVID-19 widespread.

Keywords: *government intervention, stock market performance, ASEAN countries, COVID-19.*

1. INTRODUCTION

The COVID-19 outbreak is announced as a global pandemic in March 2020, characterized by an unknown etiology and lack of experience in treating this disease. Under the widespread of the pandemic, countries all over the globe have suffered dramatic losses on both economic and health aspects. According to Albulessu (2021), this deadly coronavirus causes a huge loss to various economic industries such as trade, tourism, transport or even local food. As a pillar of an economy, the stock market could provide the prospects of a company and also the whole economy. Concerning the stock market as a powerful tool of an economy, the influence of the COVID-19 pandemic on the financial system could not be disregarded. Specifically, investors face a higher degree of uncertainty, resulting in extraordinary volatility, especially in the leading stock markets (Zhang et al., 2021). March 2020 witnessed dramatic drops in stock markets around the globe (Morales & Andreosso-O'Callaghan, 2020). Responding to these circumstances, governors around the world then propose in order to mitigate the losses posed by the pandemic such as school closures, travel restrictions, social distancing, etc. Various studies have been implemented to investigate the impact of COVID-19 on the macroeconomic indicators, financial markets (Liu et al., 2020; Ramelli and Wagner 2020; Al-Awadhi et al. 2020). Even so, the studies on the scope to which influence of government's policy responses to COVID-19 affect the economy and stock markets is still scant. Also, previous studies typically concentrate on countries such as the US, China, but a lack of research is conducted on stock markets in ASEAN countries or the most affected countries in ASEAN during the COVID-19 pandemic.

This research then aims to evaluate the behavior of the financial markets during the time of government's intervention and compare it with the time before the policy enacted. To be more specific, we would like to capture the influence of the government's intervention on the stock market performance characterized by two aspects, which are stock returns and stock volatilities. Specifically, the analysis seeks to detect the influence of government intervention on the ASEAN countries which have been affected the most during the time of COVID-19. Additionally, we aim to explore whether there exists any difference in the stock market performance before and after government's policy responses implemented. In other words, two questions that are addressed in our study, which are:

- How do stock markets in these countries change once the public policy responses to COVID-19 pandemic executed?
- How does government's intervention affect stock market performance in ASEAN countries?

This paper contributes to the literature in three-fold. First, to the best of our knowledge, this is one of the first studies investigating the impact of policy response to COVID-19 on the ASEAN stock markets by a panel regression

approach. Second, previous studies focus on either stock market returns or stock market volatilities. In our study, we consider comprehensively the impact of government intervention on stock market performance by two aspects, including stock returns and volatilities. Third, this paper provides a comparison of stock market performance before the policy enacted and during the time of government intervention.

2. LITERATURE REVIEW

It is noted that a quickly growing of research have been done related to the impact of the COVID-19 outbreak on the economy and financial markets. Also, a huge body of literature has already carried trying to analyze the impacts of government interventions on stock market during the outbreak of COVID-19. However, the literature is yet to form a consensus around this topic. Using panel data of 20 countries in the period from January 2 to July 21, 2020, Chang et al. (2021) claim that government responses such as closing down workplaces, restricting international travel, implementing financial supports... have a positive impact on stock market returns. Ashraf (2020) has the same findings when analyzing daily data of market returns from January 22 to April 17, 2020 for 77 countries. He states that stock market returns will increase as a result of government interventions such as raising public awareness campaigns, quarantining policies, providing income support packages. Interestingly, the government social distancing measures affect the stock market returns negatively. Therefore, government responses have both positive and negative impacts on the stock market. Yang and Deng (2021) apply the panel regression model for the data from 20 OECD countries and obtain a similar conclusion. According to their findings, the government response index, containment and health index and stringency index all positively affect the stock market returns. However, the interaction terms between those indices and COVID-19 variable are significantly negative. It indicates that these government's intervention measures would magnify the decreasing effect of the COVID-19 pandemic on the stock market.

While authority's intervention is predicted to boost the market sentiment and hence, increase market returns, many scholars have the opposite findings (Gil-Alana & Claudio-Quiroga, 2020; He et al., 2020; Zaremba et al., 2020). According to Shanaev et al. (2020), government policy intervention, which can be specified into two categories namely lockdown measures and financial supports, is even the main driver for the downturn of the stock market. By applying the dynamic Spatial Durbin Model with fix effect on the data of 45 major stock indices, Alexakis et al. (2021) also conclude that stock market returns are negatively correlated with the intensity of social distancing. By adopting the event study, Liu et al. (2020) indicate an increase in stock volatility in countries which are affected by the COVID-19 outbreak.

Another strand of literature on this topic is the impact of government interventions on the volatility of stock markets as the COVID-19 pandemic was causing high market volatility in most of the countries (Sharif et al., 2020). With the data from 11 countries in the Asia-Pacific region, Ibrahim et al. (2020) have studied the relationship between stock market volatilities with government response measures. The result indicates that the volatility in most of domestic equity markets have been significantly decreased by the application of government intervention measures. In contrast, Zaremba et al. (2020) use the sample of 67 countries about the stringency of policy responses to prove that such interventions would increase the volatilities of the equity market. To be more specific, providing information programs and cancelling public events are two main factors that drive the volatility up high. Baker et al. (2020) also agree on that point and state that the trading restrictions and social distancing are the main reasons for the unprecedented reaction of the US stock market, which never happened even in the previous pandemics. The same finding has been drawn by Zhuo and Kumamoto (2020) in the attempt to analyze the reaction of stock markets over the world to COVID-19 and the government's social distancing policy. Utilizing panel VAR model for the data from 15 countries, they state that when the government raises the level of containment policies, stock market volatility goes up, while stock returns decrease.

Government interventions also affect the market liquidity depended on different measures (Zaremba et al., 2021). Evidence from 49 countries with the sample from January to April 2020 shows that shutting down workplaces and schools will decrease the liquidity of emerging markets. On the other hand, information campaigns boost the trading activity, which in turn, increase the liquidity of the equity market. The overall effects are different in those countries. Government responses in the form of social distancing also contribute to stabilize the international financial market, although in a small magnitude (Bickley et al., 2021).

Regarding the COVID-19 related studies in ASEAN countries, several studies have been done lately. Using an event study approach, Sutrisno et al. (2021) document a significant relation between the COVID-19 pandemic and stock returns on ASEAN stock exchanges. Using the ST-HAR-type Bayesian posterior model, Sadiq et al. (2021)

investigate the effects of COVID-19 on ASEAN stock markets from 21st March 2020 to 31st April 2020, with a focus on the most affected sectors. The empirical results show that the COVID-19 negatively affects the stock markets in these countries, in which Indonesia and Singapore were the most affected countries. Furthermore, Sadiq et al. (2021) indicate the most affected sectors during COVID-19 are healthcare, utilities, consumer services and technology, which account for a small proportion in the whole industry. In a study on South-East and East-Asia markets, La and Miranti (2021) document that government intervention such as public event cancellations, school closures, domestic travelling bans, stay-at-home encouragement helps to reduce the COVID-19 spread in these countries.

Concerning the gap in the literature, our study aims to provide a comprehensive look into the effect of government’s policy responses on stock market performance in ASEAN stock exchanges by approaching two aspects of performance: stock returns and stock volatilities. Different from previous studies, we extend the investigation period longer to address the intervention of the government more carefully.

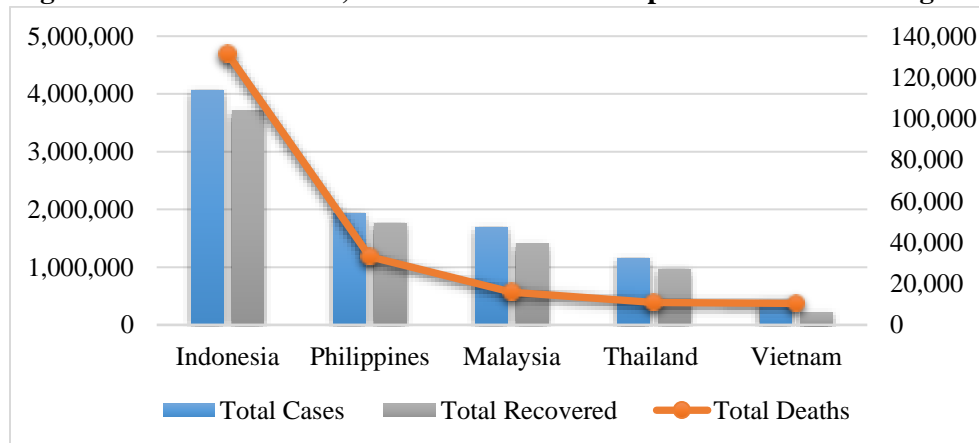
3. DATA AND METHODOLOGY

3.1 Data Sources

The time frame in this study is collected from 2nd January 2018 to 22nd July 2021 in order to capture the movements of stock markets before and once the policy responses implemented. The stock indices used in the study are retrieved from the website Investing.com. The stock market return is calculated by the daily change in the stock index. The government’s policy response is collected from the database of the Oxford COVID-19 Government Response Tracker (OxCGRT). OxCGRT has constructed the Overall government response index¹⁵¹ with four main indicators, which are stringency index, economic support index, containment and health index and risk of openness index. The indices describe the effort of governments in implementing suitable policies during the Covid-19 pandemic but do not imply whether the policies are effective or not. The information of confirmed cases is retrieved from a scientific project implemented by a research team based at the University of Oxford, which is called Our World in Data¹⁵² (OWID).

In this study, we select the top five most affected countries in ASEAN according to Reporting ASEAN¹⁵³ as of 28 August 2021. Figure 1 presents the number of confirmed cases, deaths and recovered patients in our sample countries, containing Indonesia, Malaysia, Philippines, Thailand and Vietnam.

Figure 1. COVID-19 cases, deaths and recovered patients as of 28th August 2021



(Source: Worldometers¹⁵⁴)

Moreover, Ashraf (2020) states that national stock market performance is also affected by global factors that might create spill-over effects among countries. Hence, to control for the global market fluctuation and control for unobserved effects, we adopt global factors such as the stock return on the US stock exchange, international oil

¹⁵¹ More details are provided at: <https://www.bsg.ox.ac.uk/research/research-projects/covid-19-government-response-tracker>

¹⁵² <http://www.ourworldindata.org/coronavirus>

¹⁵³ <https://www.reportingasean.net/covid-19-cases-southeast-asia/>

¹⁵⁴ <https://www.worldometers.info/coronavirus/#countries>

price, exchange rates between the US and each country in the sample. In addition, previous papers (Kharchenko & Tzvetkov, 2013; Nghi & Kieu, 2021) document that there exists a volatility spillover effect from the US to other countries. The CBOE's volatility index, or the VIX represents the market risk and sentiments of investors, which is measured by the standard deviation move of the S&P 500. This indicator is used as a gauge to make investment decisions as it seems like a “Fear Index” of the stock market.

The control variables included in the regression model are S&P 500, VIX (CBOE Volatility Index), WTI (West Texas Intermediate) Oil price, Exchange rates between USD and other currencies. Data on these variables are also collected from the website Investing.com.

3.2 Methodology

3.2.1. GARCH(1,1) model

To estimate the daily volatilities, we adopt the GARCH(1,1) model which was proposed by Bollerslve (1986). According to GC (2008), this is an appropriate method to predict the volatility in the future. Furthermore, GARCH(1,1) is conceived as the most robust and simplest model in estimating volatilities (Engle, 2001). Similar to Engle (2001), Hansen and Lunde (2005) emphasis GARCH(1,1) as the better method in compared to GARCH models with other number of lags. Also, Bollerslve (1992) argues that the GARCH(1,1) method is able to capture the characteristics of heteroscedasticity of financial variables.

The GARCH (1,1) model equation is presented below:

$$\sigma_n^2 = \gamma V_L + \alpha u_{n-1}^2 + \beta \sigma_{n-1}^2$$

where: V_L : the long-run variance rate

u_{n-1} : the rate of the return of the day n-1

σ_{n-1} : the variance of the day n-1

γ , α and β : the weights assigned to V_L , u_{n-1}^2 and σ_{n-1}^2 respectively and $\gamma + \alpha + \beta = 1$

Setting $\omega = \gamma.V_L$, the GARCH(1,1) model can also be written as:

$$\sigma_n^2 = \omega + \alpha u_{n-1}^2 + \beta \sigma_{n-1}^2$$

To reach a stable GARCH(1,1) process, the condition is that $\alpha + \beta < 1$. The maximum likelihood method is engaged to estimate this model.

3.2.2. Panel regression method

Previous studies on the COVID-19 pandemic regularly adopt the event-study method. Al-Awadhi et al. (2020) propose that the even-study is not suitable since the start date is not the same as the peak of the event. In examining a group of countries, panel data regression serves to be the most appropriate one, as also emphasized by Baltagi (2021) and Hsiao (2014). The authors point out that this regression method has the advantage on reducing bias estimates and controlling for multicollinearity and individual heterogeneity. Specifically, Bell and Jones (2015) assert that the random-effect model is able to deal with the time-invariant variables, which is more appropriate than the fixed-effect regression method. We then apply the random-fixed effect model in our study. Furthermore, the country fixed-effect dummy variables are also included to control for the factors which are fixed over the observed period but can change across 5 countries in our sample. Akin to previous research, the independent variables are employed by their lags of 1.

Our baseline models are described below:

$$Return_{i,t} = \alpha_0 + \beta_1 Government Response_{t-1} + \sum_{i=1}^{c-1} \beta_i C_i + Control Variables_{t-1} + \varepsilon_{i,t} \quad (1)$$

$$Volatility_{i,t} = \alpha_0 + \beta_1 Government Response_{t-1} + \sum_{i=1}^{c-1} \beta_i C_i + Control Variables_{t-1} + \varepsilon_{i,t} \quad (2)$$

Where

$Return_i$ is the stock market returns in country i on day t .

$Volatility_t$ is the stock market volatility in country i on day t .

$Government\ Response_{t-1}$ indicate the action of government in country i during the COVID-19 pandemic on day $t - 1$.

C_i represents for country dummy variables.

$Control\ Variables_{t-1}$ include a set of variables which refers to the variation from the globe market, such as S&P500 daily returns, daily changes in VIX, WTI oil price and exchange rates. Specifically, in the model (1), the control variables include the lag variables of S&P500 daily returns, WTI oil price and exchange rates. In the model (2), instead of using S&P 500, we include daily changes in VIX, other variables are still the same.

Based on previous analysis, we then propose two hypotheses as follows.

Hypothesis 1: The government's policy responses are likely to increase the stock market returns in ASEAN stock exchanges.

Hypothesis 2: The government's policy responses are likely to decrease the stock market volatilities in ASEAN stock exchanges.

To address the research concerns, we perform two following steps:

First, we compare the differences in stock market performance in five ASEAN countries before and during the policy enacted, in terms of stock returns and stock volatilities.

Second, we analyze the impact of government's intervention during the time of COVID-19 outbreak on the stock market performance in these countries.

4 RESULTS

4.1 Descriptive Statistics

Table 1. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Stock Return	1,775	0.0524732	1.716409	-13.34	8.97
Stock Volatilities	1,775	1.464431	0.8475805	0.5875896	6.87158
Government response (t-1)	1,775	59.25647	12.58795	2.08	80
SP500 (t-1)	1,775	0.1178479	1.80061	-11.98	9.38
VIX (t-1)	1,775	1.655502	0.6770892	0.861759	5.20898
Oil price (t-1)	1,775	-0.9691549	18.16059	-305.97	37.66
Exchange rate (t-1)	1,775	0.0065239	0.3598735	-2.75	4.57
New Confirmed Cases (t-1)	1,775	2924.988	5787.151	-10	56757

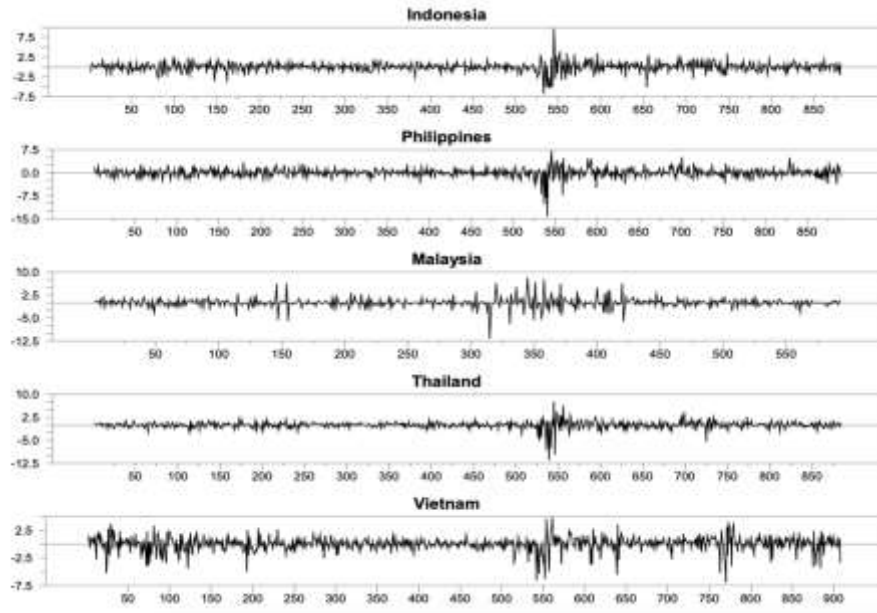
(Source: Author's computation)

The average stock return in the sample is about 0.05% and the lowest point is -13.34%, recorded in Philippines on 19th March 2020. It is noted that March 2020 was also highlighted by the dramatic stock market crash globally. The overall government response index has an average point of 59 and reaches the maximum point of 80, which was recorded in Malaysia recently. Additionally, the government response index gradually increases overtime for each country, meaning that the governors in these ASEAN countries have considerably changed the policy responses to mitigate the influence of the COVID-19 outbreak. Furthermore, the maximum new COVID-19 cases are about 56757, which was recorded in Indonesia on 16th July 2021. According to *Reporting ASEAN*¹⁵⁵, Indonesia was also the most affected country with the highest confirmed cases in ASEAN as of 28th August 2021.

¹⁵⁵ <https://www.reportingasean.net/>

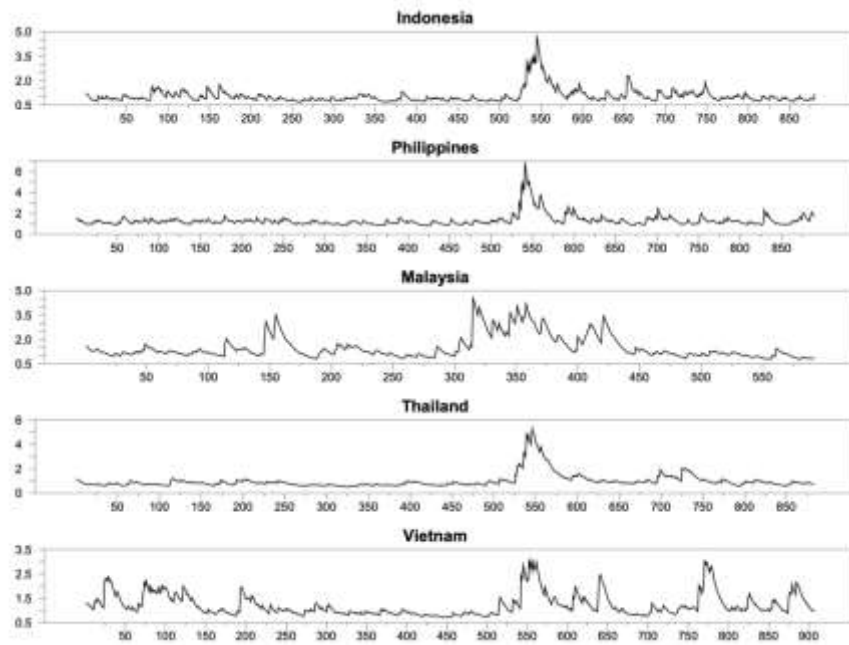
To answer the first research question, we adopt the t-test to examine if there is a significant difference in the means of two samples, before and once the government’s policy responses to COVID-19 are engaged. We firstly observe the variation in stock returns and volatilities from January 2018 to July 2021 graphically. Figure 2 shows significant changes in stock returns in five countries occurring roughly in the same period, which happened in March 2020. Figure 3 also indicates visually the dramatic increase in stock volatilities in the same period.

Figure 2. Stock returns of the five ASEAN countries during the observed period



(Source: Author’s computation)

Figure 3. Stock volatilities of the five ASEAN countries during the observed period



(Source: Author’s computation)

The t-test is then applied to significantly check whether there exist differences between the two periods, before the government’s intervention and once the policy enacted. Table 2 indicates that there is no significant difference in the stock return between the two periods among countries in ASEAN. Regarding the stock volatilities, the t-test result points out that there exist significant in the volatilities on ASEAN stock exchanges once the government imposing policy responses to COVID-19. Specifically, the one-tailed t-test also indicates that the stock volatilities

significantly increase among five stock markets in our sample. To some extent, we can confirm the first hypothesis, stating that the stock market performance in ASEAN countries have changed since the governments execute policy responses to COVID-19 such as lockdowns, school closures, travel and commercial restrictions.

Table 2. The t-test results for stock returns and volatilities in 5 ASEAN countries

Mean	Before the policy enacted	During the policy enacted	P-value of T-test with unpaired variances
<i>Vietnam</i>			
Stock Return	0.0050487	0.0859898	0.3671
Stock Volatility	1.108684	1.371992	0.000
<i>Thailand</i>			
Stock Return	-0.0504348	0.0552125	
Stock Volatility	0.7730822	1.310092	0.000
<i>Indonesia</i>			
Stock Return	0.0263227	0.1176438	0.3603
Stock Volatility	0.8809222	1.412655	0.000
<i>Philippines</i>			
Stock Return	-.0284843	-0.0043045	0.8718
Stock Volatility	1.143045	1.529782	0.000
<i>Malaysia</i>			
Stock Return	-0.0217708	-0.0053546	0.904
Stock Volatility	1.295794	1.7655	0.000

(Source: Author's computation)

4.2 Stationary test

To check whether a time series possess a unit root, we adopt the stationary test. The Fisher-type tests developed by Choi (2001) are then employed, with the hypothesis stating that all the panels contain the unit root. Stock Returns, Volatilities and other control variables are stationary for the whole period. The unit root tests indicate that Government Response Index contains a unit root at level. According to Park (2011), under fixed or random effects in panel data, the unit root is not a compulsory condition.

4.3 Panel regression results

Table 3. Panel regression results

DEPENDENT VARIABLES	(1)	(2)
	Stock Returns	Stock Volatilities
Government response (t-1)	0.0169*** (0.00399)	0.00282*** (0.00106)

SP500Return (t-1)	0.210*** (0.0132)	
Oil price changes (t-1)	0.00774*** (0.00125)	8.38e-05 (0.000766)
Exchange rate changes (t-1)	0.250 (0.214)	-0.0424 (0.0766)
VIX (t-1)		0.917*** (0.157)
Constant	-1.146*** (0.270)	0.0716 (0.241)
Country fixed-effects	Yes	Yes
Observations	1,775	1,775
Number of Code	5	5

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

(Source: Author's computation)

The empirical indicates that the stock returns in five ASEAN countries positively react to the intervention of governments during the COVID-19 widespread. This evidence supports the second hypothesis and also reinforced the findings of previous studies (Ashraf, 2020; Yang & Deng, 2021). Notably, the intervention of government in the five ASEAN countries has triggered a surge in stock volatilities in the sample countries. This result is akin to Baker et al. (2020), Sharif et al. (2020), Zaremba et al. (2020). Similar to Zaremba et al. (2021), we also find that the intervention of governments in ASEAN countries seems to be limited and quite small.

The result also shows that the return on the US stock exchange can improve the stock returns in ASEAN countries. We can also find out that CBOE VIX leads to higher volatility in ASEAN stock markets, meaning that the market risk from the US stock exchange boosts the fear and stress of investors in these countries. This supports previous studies regarding the volatility spill-over effects between stock markets, indicating that the developing stock markets are strongly affected by the developed ones.

Oil price changes at the lag of 1 seem to increase the stock returns but do not affect the stock volatilities. It can be partly explained that the WTI oil price takes time to influence the national stock markets negatively. Also, changes in exchange rates seem to not influence the stock market performance in the five countries.

In brief, the empirical evidences support the first two hypotheses. Specifically, stock market performance in ASEAN countries significantly changes once the policy responses to COVID-19 are implemented. Also, the intervention of governors in these countries seems to boost the returns on stock markets. However, we do not have evidence to confirm the third hypothesis. The government's reaction to the coronavirus spread essentially increase the volatilities in ASEAN stock markets. This implies that the government's reaction to COVID-19 could lead to risk aversion and pessimism among investors in ASEAN countries as volatility refers to the financial risk and financial uncertainty of one stock market. This evidence somehow supports the argument of Apergis and Apergis (2020), stating that the financial markets are mainly driven by investors' behaviors, without concerning the fundamental trends of the stock market. In other words, although we can see higher stock returns in ASEAN countries when the governments intervene, however, the higher market volatilities suggest unpredictable tendencies. These results can provide insightful suggestions for investors and policymakers in ASEAN countries.

4.4 Robustness checks¹⁵⁶

We re-examined the results in two ways. First, we include another variable to the baseline models, which is new confirmed COVID-19 cases in each country. The result stays the same as that of the baseline models. Second, rather than using the random effect model, we use the Panel-Corrected Standard Errors (PCSE) instead, which could also account for the contemporaneous correlation across the panel. The result also confirmed that the government's policy responses to COVID-19 positively influence stock returns in ASEAN countries. Furthermore, the stock markets in these countries seem to be more volatile once the public policies are employed.

5 CONCLUSION

Our study aims to look into the influence of the government's intervention on stock market performance during the COVID-19 pandemic in ASEAN stock exchanges. We confirm that there is a significant change in the stock market performance in ASEAN countries under the response of governments to COVID-19. Crises might be linked with new opportunities. Specifically, the policy responses of the government do increase the stock returns on the ASEAN countries. Additionally, higher volatility on stock markets is also evidenced once the government's intervention engaged. Hence, it is not an easy task to confirm whether the government's policy responses during the COVID-19 are efficient or not. To some extent, this empirical evidence implies instability of stock market performance in ASEAN countries. An implication for rational investors in these markets is to pay close attention before making any investment decision.

Further research can extend this study by several directions. First, it would be meaningful to examine the effect of the government's intervention on other asset prices, for example, bonds or national currencies. Also, it is valuable to compare the efficiency of the government's reaction to COVID-19 on stock market liquidity and quality during different coronavirus waves. Furthermore, future studies can dig more into the resilience of stock markets in developing and developed countries under the widespread of COVID-19, which seems to be still severe and endless. The analysis can develop by comparing their similarities and differences, which later could more insightful outcomes for investors and key stakeholders.

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¹⁵⁶ Results are available upon request.

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