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Impact of COVID-19 on ASEAN-5 Stock Markets

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Abstract

This paper assesses the impact of COVID-19 on the stock markets of emerging market economies in the ASEAN+3 region (Indonesia, Malaysia, the Philippines, Thailand and Vietnam, denoted as ASEAN-5). Applying the Arellano–Bond estimator for dynamic panel regression models, we find that the global COVID-19 development has more impact on the ASEAN-5 stock market daily returns than that of the local COVID-19 situation. However, in general, the COVID-19 development does not increase the volatility of ASEAN-5 stock markets during the pandemic in 2020. Using weekly data for a longer sample period, the empirical results show that the current pandemic has a significant impact on the returns and volatilities of the ASEAN-5 stock markets, while the impacts of GFC and Taper Tantrum are limited. In addition, our empirical results suggest that the local monetary policy could help in reducing the stock market volatility during the pandemic, while the exchange rate policy could also mitigate adverse impacts on the stock markets in the region.

JEL classification: G01, G15, C23, C32

Keywords: ASEAN-5, stock market, spillovers, dynamic panel, COVID-19, GFC, Taper Tantrum

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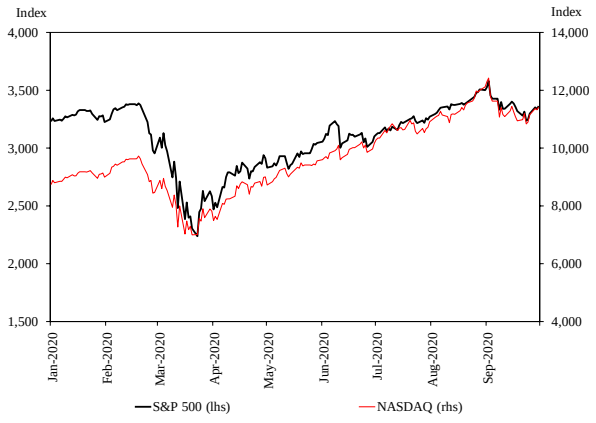
I. Introduction

The coronavirus disease (COVID-19) was first reported in Wuhan China around the end of 2019 and then has spread rapidly to many countries in the world since February of 2020. The World Health Organisation (WHO) declared COVID-19 as a global pandemic on 11th March 2020. As of 30th September 2020, there were approximately 34 million confirmed COVID-19 cases and over 1 million cases of death. For the ASEAN plus China, Korea and Japan (ASEAN+3) region, the confirmed and death cases were 884 thousands and 24 thousands respectively.

The COVID-19 pandemic has brought a severe economic contraction to the world as well as to the ASEAN+3 region. Different from the impact of the SARS in 2003 (Siu and Wong, 2004), the damage of the COVID-19 has turned out to be much larger and longer than the SARS. On the real sector, the world economic growth is estimated by the International Monetary Fund to fall from 2.8% in 2019 to -4.4% in 2020, while the ASEAN+3 region will see its growth slipping from 4.8% to -0.3% according to the ASEAN Macroeconomic Research Office (AMRO) estimation.

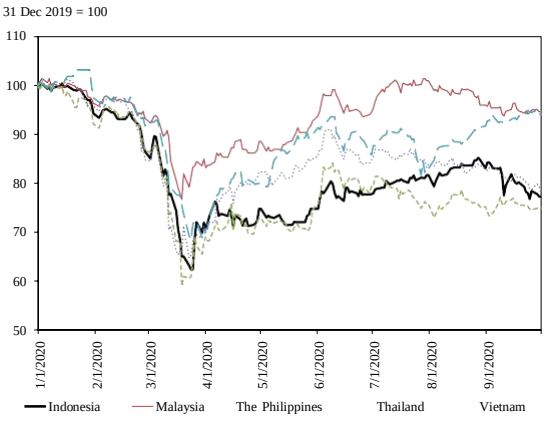
On the capital markets, particularly the stock markets, the COVID-19 pandemic caused the largest turbulence since the Global Financial Crisis. While stock market price movements reflect investors' expectation on the future earnings of listed corporates, corporate earnings are directly affected by the contraction of consumption and production subject to the size and persistence of the pandemic. Furthermore, the economic outlook and hence the expected future earnings will be adversely influenced by the stricter and longer restrictions or lockdown imposed by the government. For the largest economy, the US, its stock market reaction to the pandemic was first a huge fall of 34% in S&P 500 index (the daily closing) from near 3,400 on 19th February to around 2,200 on 23rd March, while the NASDAQ saw a big slip of 30% from around 9,800 to below 6,900 around the same period (Figure 1). However, with the liquidity flooding from the US Federal Reserve, both markets have rallied again since then.

Figure 1: US Stock Market Indices



Source: Thomson Reuters Datastream.

Figure 2: ASEAN-5 Stock Market Indices



Note: The stock indices for ASEAN-5 are: Indonesia: Jakarta Composite Index (IDX), Malaysia: FTSE Bursa Malaysia Kuala Lumpur Composite Index (FTSE Bursa Malaysia KLCI), The Philippines: the Philippine Stock Exchange Composite Index (PSEi), Thailand: Stock Exchange of Thailand SET Index (SET), and Vietnam: Vietnam Ho Chi Minh Stock Index (VN Index).
Source: Thomson Reuters Datastream.

The emerging market economies in the ASEAN+3 region (namely, Indonesia, Malaysia, the Philippines, Thailand and Vietnam, and hereafter we call them ASEAN-5), except Malaysia, have not seen their stock market indices recovered to around the February level at end-September (Figure 2). All these markets first had a rapid plunge from mid-February to late March, similar to the US markets. However, their subsequent recovery was weaker than that in the US. Some attributed this to the changes in global risk appetite towards emerging markets even though the regional authorities have put up several rounds of substantial packages to support their economies, including extremely easy monetary measures and huge fiscal spending. To what extent are the ASEAN-5 stock markets affected by the domestic factors versus the spillover of the external conditions?

There are some studies of the COVID-19 impact on stock markets already, in spite of the short period of time since the outbreak. For instance, Baker et al. (2020) find that the US stock market reacted so much more forcefully to COVID-19 than to previous epidemics (including the 1997-98 Bird Flu, the 2003 SARS, the 2009 Swine Flu and the 2015 Ebola epidemics) mainly due to government restrictions on commercial activity and voluntary social distancing. Tahat and Ahmed (2020) used the UK data to show that sectoral market returns have been severely affected by the outbreak and there is a positive relationship between market returns and liquidity. Khan et al. (2020) find that the announcement of the human-human transmissibility of COVID-19 virus significantly impacted the stock returns of 16 major countries, including China, Japan and Korea. He et al. (2020) and Liu et al. (2020) show that Asian stock markets experienced more negative returns than other markets, despite the fact that the impact were short-term. Furthermore, He et al. (2020) also find the bidirectional spillovers between Asian countries (namely China, Japan and Korea) and the advanced economies.

This paper aims to investigate the COVID-19 impact on the return and volatility of the ASEAN-5 stock markets. First, using the daily data from 2nd January to 30th September 2020, we examine the impact of COVID-19 development by including the daily number of new confirmed cases and new deaths, and stringency for containment of both their own economies and the US in the dynamic panel regression models. Second, we extend the sample back to 2005 to compare the impact of COVID-19 with the impacts of the global financial crisis (GFC) and the Taper Tantrum on the ASEAN-5 stock markets. Specifically, dynamic panel regression model is estimated for the weekly data from January 2005 to September 2020, while the impact of different crises are captured by the dummy variables. Arellano–Bond estimator for dynamic panel regression model is employed for the empirical investigation, and the models also include the control variables for the global and local financial factors.

This paper contributes to the literature in three ways. First, this paper examines the COVID-19 impact from both domestic and external conditions on the return and volatility of the stock markets of ASEAN-5, which fills a gap in the existing literature that has not studied ASEAN emerging market economies as a whole yet. Second, this paper compares the impact of the current pandemic against the impact of the financial crises on the ASEAN-5 stock markets, namely the GFC and the Taper Tantrum. Third, this paper enhances ASEAN policymakers' understanding of the impact of COVID-19 and other financial factors, both domestically and externally, on their stock markets so that they could have better policy responses to maintain their capital markets to function relative better during the pandemic and in the future.

The paper is structured as follows. In Section 2, we discuss the dynamic panel regression model and describe the data set. Section 3 presents the empirical results. Finally, Section 4 concludes with a summary of the main messages and policy issues.

II. Econometric Model and Data

This section aims to discuss the econometric model and data used for evaluating the impact of the COVID-19 pandemic on the ASEAN-5 stock markets.

2.1 Dynamic Panel Model

In assessing the impact of COVID-19, the panel model is used for modelling the stock market variables (stock returns and volatility) of the ASEAN-5 stock markets. The advantages of panel model are i) capturing the impact across countries over time, particularly if there were cross-sectional and time series variations in the outbreak of the COVID-19; ii) estimating the impact of underlying determinants on all ASEAN-5 stock markets as a whole, while controlling for individual heterogeneity, and iii) minimizing problems such as multicollinearity and heteroscedasticty, particularly for a short sample (see Baltagi, 2005).

Since the stock market variables have some persistence effects, the lagged dependent variable is usually included in the model. Therefore, the dynamic model with one lagged dependent variable is used in this paper. Specifically, the model is given as the following structure:

$$Y_{i,t} = \rho Y_{i,t-1} + \gamma Z_{i,t} + \beta X_{i,t} + \alpha_i + \varepsilon_{i,t} \quad (1)$$

where $Y_{i,t}$ is the ASEAN-5 stock market variables, including stock market returns and stock market volatilities; $Z_{i,t}$ is the vector of crisis variables, which are daily new cases, new deaths and stringency indices in both ASEAN-5 countries and the US for the daily model and the crisis dummy variables for the weekly model; γ is the vector of coefficients for $Z_{i,t}$; $X_{i,t}$ is the vector of control variables, including both external factors (US stock market variables for the spillover effects, and VIX or EM VIX for the global risk) and domestic factors (changes in ASEAN-5 exchange rates and interest rates), while the corresponding coefficients are captured by the vector β; α_i is the country fixed effects; and $\varepsilon_{i,t}$ is the error term.

However, the OLS estimation is inconsistent for the dynamic panel model with fixed or random effects, which is also known as the dynamic panel bias. The problem is that the unobserved heterogeneity (the fixed or random effects in the panel regression) correlates with the error term, particularly for the short sample panel (Nickell, 1981). To solve this problem, this paper applies Arellano-Bond approach (Arellano and Bond, 1991) to estimates the coefficients of the dynamic panel model. Specifically, the model is estimated by taking first difference of equation (1) as in the following:

$$\Delta Y_{i,t} = \rho \Delta Y_{i,t-1} + \gamma \Delta COVID_{i,t} + \beta \Delta X_{i,t} + \Delta \varepsilon_{i,t} \quad (2)$$

Under Arellano-Bond approach, the fixed effect is eliminated, and the difference equation is estimated by the Generalized Method of Moments (GMM) using instrumental variables. In this paper, the lagged dependent and independent variables are used as the instruments.

2.2 Data

In this paper, the financial market data, including stock market indices, interest rate (3-month interbank offered rate), and bilateral exchange rate (per US dollar) in ASEAN-5, S&P 500 index, CBOE VIX and CBOE Emerging Market VIX (the series started from 2013) are obtained from Thomson Reuters Datastream. The daily data cover the period 2nd January 2020 to 30th September 2020, while weekly data are the weekly average of daily data from 2nd January 2005 to 30th September 2020.

In order to create the dependent variables, stock market returns are calculated by the log-difference of the stock market indices. The variance of stock returns is the conditional volatility estimated by a GARCH(1,1) model using the stock returns and the information available at time t-1.[3] These transformations are applied to both the daily and weekly data.

The daily COVID-19 data (daily new cases, new deaths and stringency index) for ASEAN-5 and the US are obtained from Oxford COVID-19 Government Response Tracker (OxCGRT, see https://github.com/owid/covid-19-data/blob/master/public/data/owid-covid-data.xlsx). Since the stock markets closed on weekends, the figures for Friday are the average of the daily COVID-19 data during Friday, Saturday and Sunday. Most of the independent variables are using lag 1 variable to avoid the endogeneity problem (and that the information should exist before time t), except the changes in stringency indices. In general, the changes in stringency policy were announced before the effective date, so that the information of changes in stringency indices have existed in time t-1.

The crisis dummy variables in the weekly model are defined as the followings: i) global financial crisis (GFC): 15th September 2008 – 31st March 2009 (from Lehman Brothers bankruptcy to the US stock markets reached and rebounded from the GFC-trough, see BIS 2009); ii) Taper Tantrum: 22nd May 2013 – 12th December 2013 (from Bernanke's May speech to the official Taper announcement by US Fed); and iii) COVID-19: 23rd January 2020 – 30th September 2020 (from Wuhan lockdown to the end of the sample). We choose GFC and Taper Tantrum for comparison because of the larger impact on the ASEAN-5 stock markets during those two periods. In addition, Shu et al. (2018) suggested that the Asian stock markets are still mainly affected by the US stock market shocks..

III. Empirical Results

This section presents the empirical results of the dynamic panel regression. Our discussion will focus on how the COVID-19 variables impact on the return and volatility of the ASEAN-5 stock markets. In particular, we assess the impact of the COVID-19 development by using the daily data series (from 2nd January to 30th September 2020). On the weekly data series (from

[3] The sample periods for the GARCH(1,1) models are same as those for the dynamic panel regressions.

2nd January 2005 to 30th September 2020), besides the impact of COVID-19, we also focus on the comparison of COVID-19 against the GFC and Taper Tantrum.

3.1 COVID-19 Impact

Table 1 COVID-19 Impact on Daily ASEAN-5 Stock Return

	(1)	(2)	(3)
Dependent variable	Δln(stock)	Δln(stock)	Δln(stock)
Δln(stock(-1))	-0.20032***	-0.20396***	-0.20140***
	(0.05727)	(0.05991)	(0.06336)
newcase(-1)	0.00010	0.00010	0.00011
	(0.00011)	(0.00011)	(0.00011)
newcase_US(-1)	-0.00003***	-0.00003***	-0.00003***
	(0.00001)	(0.00001)	(0.00001)
newdeath(-1)	0.00053	0.00053	0.00066
	(0.00211)	(0.00209)	(0.00202)
newdeath_US(-1)	0.00032***	0.00031***	0.00031**
	(0.00012)	(0.00012)	(0.00012)
Δstringency	-0.05346***	-0.05438***	-0.05434***
	(0.01956)	(0.01936)	(0.01964)
Δstringency_US	-0.27422***	-0.27138***	-0.28027***
	(0.06316)	(0.06074)	(0.06432)
Δln(S&P(-1))	0.19088***	0.20662***	0.20802***
	(0.03817)	(0.04069)	(0.03799)
ln(VIX(-1))		1.03615**	
		(0.50962)	
ln(EM VIX(-1))			1.26470***
			(0.42110)
Δln(FX(-1))	0.26001	0.24934	0.21738
	(0.16577)	(0.17160)	(0.16978)
Δ(IR(-1))	-0.09456	-0.11464	-0.15315
	(0.29346)	(0.28339)	(0.26928)
Constant	0.47441***	-3.00290	-3.76615***
	(0.07574)	(1.75981)	(1.38021)
No. of Observations	965	965	965
Generalized R-squared	0.116	0.092	0.071

Notes: The table presents the dynamic panel results of estimating the daily ASEAN-5 stock returns during 02 Jan 2020 – 30 Sep 2020, using the Arellano-Bond approach. *** and ** respectively indicate significance at the 1% and 5% level. Standard errors clustered by the country are given in parenthesis underneath coefficient estimates. Generalized R-squared is calculated by using the procedure suggested by Pesaran and Smith (1994). The measure of Generalized R-squared is not necessarily monotonous in the number of explanatory variables.

Table 1 presents the empirical results on the daily returns. The control variables, except the two VIX indices, are included at the beginning (Column 1). As expected, the lagged stock variable is highly significant, indicating a mean reverting behaviour because of the negative sign. This shows that the use of dynamic panel regression is appropriate. On the COVID-19 variables, surprisingly, the new cases and new deaths in ASEAN-5 are not significant, but the US new cases and new deaths are significant (but only the US new cases with correct signs). Both the local and the US stringency policies have significant adverse impacts on the stock market returns because the lockdown is directly hurting economic activities, in turn, the expected earnings of listed corporations. However, the empirical results suggest that impact of changing US stringency policy is larger than that of the local policy changes. The results reveal that the ASEAN-5 stock markets are influenced by the global COVID-19 situation more, partly representing the investors' concern on the export performance of the ASEAN-5 economies. On the other hand, the ASEAN-5 stock markets are also affected by the global COVID-19 situation through the spillover effects from the shock of the US stock market. The statistical significance of the S&P 500 return confirms the spillover from the US stock market (proxy of global market). When the global COVID-19 situation deeply affected the US stock market (see Baker et al., 2020), the impact would further spillover to ASEAN-5 stock markets.[4]

When either the VIX or EM VIX is added separately (Columns 2 and 3 respectively, and they are not added simultaneously because of the high correlation of 0.97 between them), the impact of COVID-19 variables remain significant. However, the two VIX indices have a significant positive impact on ASEAN-5 stock returns. The result does not reflect the trade-off between return and risk, but it can be interpreted by the international portfolio reallocation. The higher VIX indices represent higher global risks, and the international investors tend to reallocate the portfolio into the markets with relatively lower risks and/or higher return potentials. Comparing with the advanced economies and other emerging markets (including Latin America and Eastern Europe), ASEAN-5 were relatively stable and had higher potential in the last two decades. It is natural that the international investors allocate the investment to ASEAN-5 when the global risk is higher. However, when there is low global risk, international investors reallocate their investment again due to the changes in risk appetite.

The empirical results of the return volatility (i.e. the conditional variance from a GARCH model on the returns) in Table 2 reveal some differences from those in returns (Table1). In Column 1, the lagged variance of stock return is significant as expected, while for all the COVID-19 variables only the US stringency index (proxy for the lockdown there) has a significant negative impact on the ASEAN-5 stock volatilities. On the other hand, the local interest rate variable has a significant positive impact on the volatility of the ASEAN-5 stock markets, reflecting the easing of the local monetary condition can reduce the stock market volatility during the pandemic period. The VIX is added in Column 2 and is confirmed to have a positive influence on the volatility of the ASEAN-5 stock markets. The insignificance of the lagged variance of S&P return is confirmed in Column 3. When the EM VIX is added instead of the VIX, the number of local new cases becomes statistical significant in Column 4. Finally, when the EM VIX and S&P index are included together, the significant variables are local new cases, EM VIX and local interest rate, along with the US stringency index (with negative sign) in Column 5. Thus, local new cases, EM VIX and domestic short-term interest rate have impacts on the volatility of the ASEAN-5 stock markets. In general, the results of the return volatility suggest

[4] This may explains why He et al., (2020) and Liu et al., (2020) found the more negative returns in Asian economies.

that the development of COVID-19 does not affect the volatility of ASEAN-5 stocks, except the tightening of the US stringency policy reduced the volatility. Nevertheless, the higher ASEAN-5 stock market volatility is mainly affected by the spillover effects from the global stock market volatility, while the easy monetary policy could help in reducing the volatility.

Table 2 COVID-19 Impact on Daily ASEAN-5 Stock Return Volatility

Dependent variable	(1) Variance of stock return	(2) Variance of stock return	(3) Variance of stock return	(4) Variance of stock return	(5) Variance of stock return
Variance of stock return(-1)	0.81840***	0.76048***	0.76578***	0.74618***	0.75901***
	(0.02590)	(0.02229)	(0.01335)	(0.01550)	(0.01066)
newcase(-1)	0.00003	0.00009	0.00009	0.00012**	0.00012**
	(0.00008)	(0.00006)	(0.00007)	(0.00006)	(0.00006)
newcase_US(-1)	-0.00001	-0.00001	-0.00001	-0.00001	-0.00001
	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)
newdeath(-1)	-0.00347	-0.00522	-0.00531	-0.00420	-0.00418
	(0.00275)	(0.00346)	(0.00337)	(0.00324)	(0.00311)
newdeath_US(-1)	0.00019	0.00011	0.00010	0.00008	0.00006
	(0.00017)	(0.00017)	(0.00016)	(0.00016)	(0.00016)
Δstringency	-0.07919	-0.06616	-0.06285	-0.06507	-0.05910
	(0.04928)	(0.03431)	(0.04273)	(0.03512)	(0.04246)
Δstringency_US	-0.14026**	-0.12608**	-0.12085**	-0.15159***	-0.14370**
	(0.05759)	(0.05016)	(0.05696)	(0.05728)	(0.06139)
Variance of S&P return(-1)	0.02559		-0.00592		-0.01241
	(0.02384)		(0.02184)		(0.01979)
ln(VIX(-1))		3.01986***	3.14767***		
		(0.86701)	(0.96686)		
ln(EM VIX(-1))				3.49411***	3.75310***
				(1.08936)	(1.16668)
Δln(FX(-1))	0.57626	0.44865	0.44833	0.31105	0.30482
	(0.40921)	(0.34360)	(0.33741)	(0.26894)	(0.25523)
Δ(IR(-1))	3.15038***	2.89191**	2.95565***	2.60084	2.72673**
	(1.10516)	(1.41515)	(1.14363)	(1.41998)	(1.20479)
Constant	0.64950***	-9.06686***	-9.46288***	-10.71475***	-11.53709***
	(0.14269)	(2.70491)	(3.03139)	(3.48221)	(3.72195)
No. of Observations	965	965	965	965	965
Generalized R-squared	0.839	0.825	0.824	0.828	0.826

Notes: The table presents the dynamic panel results of estimating the daily ASEAN-5 stock return volatility during 02 Jan 2020 – 30 Sep 2020, using the Arellano-Bond approach. The stock return volatility is the 1-step-ahead variance forecast from the GARCH(1,1) model for the stock return of the individual country. The same procedure is applied to the S&P 500 index. *** and ** respectively indicate significance at the 1% and 5% level. Standard errors clustered by the country are given in parenthesis underneath coefficient estimates. Generalized R-squared is calculated by using the procedure suggested by Pesaran and Smith (1994). The measure of Generalized R-squared is not necessarily monotonous in the number of explanatory variables.

3.2 Comparison among different crises

The sample period is extended back from January 2005 to September 2020 in order to investigate different impacts from the GFC, Taper Tantrum and COVID-19. In order to avoid the noises due to the high frequency data, the data are converted into weekly average.

Column 1 of Table 3 depicts the empirical results on the returns without the presence of VIX. For weekly data series, EM VIX is not applicable because it starts from 2013 and cannot be dated back to 2005. The dummy variable for COVID-19 period is highly significant but surprisingly the GFC and Taper Tantrum are not significant at the 5% significance level (GFC is marginally significant at the 10% significance level). On the control variables, both S&P 500 return and changes in the foreign exchange rate are significant at the 1% level. It is suspected that the insignificance of the GFC may due to the presence of the S&P 500 return, which has strongly represented the GFC impact. For the ASEAN-5, in the longer term, the exchange rate is also an important factor in their financial markets.

When the VIX is included (Column 2), the results are similar to that of Column 1. The dummy variable for COVID-19, S&P 500 return and foreign exchange rate remained significant. The VIX is significant with a positive impact on ASEAN-5 stock returns. This is similar to the results in the daily data series.

Table 3 COVID-19 Impact on Weekly ASEAN-5 Stock Return

	(1)	(2)
Dependent variable	Δln(stock)	Δln(stock)
Δln(stock(-1))	0.05075	0.04333
	(0.04069)	(0.04310)
Dummy for GFC	-1.75702	-2.67191
	(1.45543)	(1.36505)
Dummy for COVID-19	-1.15691***	-0.99791**
	(0.43158)	(0.42475)
Dummy for Taper Tantrum	-0.49251	-0.46569
	(0.36228)	(0.33638)
Δln(S&P(-1))	0.18708***	0.29759***
	(0.03267)	(0.03482)
ln(VIX(-1))		3.73676***
		(0.18611)
Δln(FX(-1))	0.56954***	0.53827***
	(0.11157)	(0.10244)
Δ(IR(-1))	0.08580	0.03291
	(0.17458)	(0.16651)
Constant	0.22136***	-10.44249***
	(0.07126)	(0.50839)
No. of Observations	4095	4095
Generalized R-squared	0.045	-0.161

Notes: The table presents the dynamic panel results of estimating the weekly ASEAN-5 stock returns during Jan 2005 – Sep 2020, using the Arellano-Bond approach. *** and ** respectively indicate significance at the 1% and 5% level. Standard errors clustered by the country are given in parenthesis underneath coefficient estimates. Generalized R-squared is calculated by using the procedure suggested by Pesaran and Smith (1994). The measure

of Generalized R-squared is not necessarily monotonous in the number of explanatory variables, and it does not guarantee the positive number. The negative generalized R-squared also indicates that the inclusion of VIX worsens the explanatory power of the model.

The volatility of the weekly data in the longer period of the sample show expected results. In Column 1 of Table 4, without the VIX, the GFC and COVID-19 are having impacts on the volatility of the ASEAN-5 stock markets. The significance of the GFC in volatility confirms its contagion effect on Asian financial markets (Yiu et al, 2010). Again, the influence of the foreign exchange rate is shown in the results.

In Column 2 of Table 4, with the inclusion of VIX and without the variance of S&P index, the VIX is having an expected increased on the volatility when it increased. However, when the variance of the S&P index is included (Column 3 of Table 4), the high correlation with the VIX may cause the Taper Tantrum and S&P variance to be significant but with a wrong direction as expected. Given the correlation between S&P variance and VIX is as high as 0.70, the wrong signs are likely due to the multicollinearity problem.

Table 4 COVID-19 Impact on Weekly ASEAN-5 Stock Return Volatility

	(1)	(2)	(3)
Dependent variable	Variance of stock return	Variance of stock return	Variance of stock return
Variance of stock return(-1)	0.85080***	0.81644***	0.84201***
	(0.01335)	(0.00614)	(0.01419)
Dummy for GFC	5.60088***	4.63017***	4.82305***
	(1.70431)	(1.63921)	(1.67702)
Dummy for COVID-19	1.73001***	0.87020***	1.01952***
	(0.47462)	(0.22550)	(0.33587)
Dummy for Taper Tantrum	-0.16410	-0.23396	-0.30611**
	(0.13419)	(0.14434)	(0.14700)
Variance of S&P return(-1)	-0.03628		-0.09658**
	(0.03134)		(0.04102)
ln(VIX(-1))		2.94841***	3.65639***
		(0.73808)	(0.82491)
Δln(FX(-1))	0.72846***	0.62505***	0.58916***
	(0.20710)	(0.19943)	(0.18245)
Δ(IR(-1))	0.08240	0.10157	0.13769
	(0.10085)	(0.09868)	(0.09507)
Constant	0.79197***	-7.47331***	-9.30814***
	(0.21335)	(2.18300)	(2.29840)
No. of Observations	4095	4095	4095
Generalized R-squared	0.863	0.857	0.858

Notes: The table presents the dynamic panel results of estimating the weekly ASEAN-5 stock return volatility during Jan 2005 – Sep 2020, using the Arellano-Bond approach. The stock return volatility is the 1-step-ahead variance forecast from the GARCH(1,1) model for the stock return of the individual country. The same procedure is applied to the S&P 500 index. *** and ** respectively indicate significance at the 1% and 5% level. Standard errors clustered by the country are given in parenthesis underneath coefficient estimates. Generalized R-squared is calculated by using the procedure suggested by Pesaran and Smith (1994). The measure of Generalized R-squared is not necessarily monotonous in the number of explanatory variables.

IV. Conclusion

The paper provides empirical evidence for the impact from the COVID-19 pandemic on the ASEAN-5 stock markets. On the daily stock returns from the beginning of 2020 to end September 2020, the dynamic panel regression results show that the global COVID-19 development has a larger impact on ASEAN-5 stock markets than the local COVID-19 situation, while the global COVID-19 development could further dampen the performance of ASEAN-5 stock markets through the spillover from the US stock market shock. On the volatility, the COVID-19 does not have significant impact in general, except the US stringency. However, both the VIX and EM VIX are having positive impacts on ASEAN-5 stock market volatility, approximating the spillover effect of global volatility on ASEAN-5 stock markets. Nevertheless, the ASEAN-5 stock market volatility can be reduced by the easy monetary policy of the regional authorities during the pandemic.

On the weekly return from the beginning of 2005 to end September 2020, the ASEAN-5 stock markets are adversely impacted by the COVID-19 pandemic while the GFC is just marginally significant (at the 10% significance level) and the Taper Tantrum has no effect. This reveals that the ASEAN-5 economies are more badly hit by the current pandemic than the previous two financial crises. The exchange rate movements of the ASEAN-5 are having an effect on their stock market performance. On the weekly volatility, there are impacts from the GFC and current pandemic, for which there was a contagion effect from the GFC while the current pandemic has both domestic and external impacts on the ASEAN-5 stock markets. Again, the exchange rate movements have an influence on the stock market volatility.

The results of the paper suggest that the ASEAN-5 policymakers have to beware of not only their domestic lockdown but also the lockdown in the US in the current pandemic. Also, the policymakers should beware of their stock market reaction to their monetary policy introduced since the COVID-19 pandemic, as the local monetary condition and short-term local interest rate could affect investors' expectation on the economic outlook and financial stability. According to the results of the weekly data in a longer sample period, the impact of the COVID-19 is greater than that of the GFC and Taper Tantrum. Thus, policymakers should use all policy options to mitigate the adverse impact of the COVID-19. The results from the longer sample of the weekly data also suggest that, besides monetary and fiscal policies, exchange rate policy could also be an effective tool to the policymakers.

Finally, this paper provides the first assessment of the COVID-19 impact on ASEAN-5 financial markets, and the assessment can be updated and expanded to other financial markets in the future research. Also, this paper confirms that the ASEAN-5 stock markets are affected by the spillover of global financial market, while some local policies could help to mitigate the adverse impact. The results show that the spillover effects from the US massive quantitative easing on the ASEAN-5 financial markets should be further studied. In particular, the regional policymakers could benefit from the policy implications of these studies.

References

Arellano, M. and S. Bond (1991), “Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations”, *The Review of Economic Studies*, 58, pp. 277-297.

Baker, S., N. Bloom, S. Davis, K. Kost, M. Sammon and T. Viratyosin (2020), “The Unprecedented Stock Market Impact of COVID-19”, NBER Working Paper No. 26945.

Baltagi, B.H. (2005), *Econometric Analysis of Panel Data* (3rd ed.), John Wiley and Sons Ltd, West Sussex.

BIS (2009), “The international financial crisis: timeline, impact and policy responses in Asia and the Pacific,” background paper for “The International Financial Crisis and Policy Challenges in Asia and the Pacific” a wrap-up conference of the BIS Asian Research Programme on 6–8 August 2009 in Shanghai.

He, Q., J. Liu, S. Wang and J. Yu (2020), “The Impact of COVID-19 on Stock Markets”, *Economic and Political Studies*, 8(3), pp. 275-288.

Khan, K., H. Zhao, H. Zhang, H. Yang, M. Shan and A. Jahanger (2020), “The Impact of COVID-19 Pandemic on Stock Markets: An Empirical Analysis of World Major Stock Indices”, *Journal of Asian Finance, Economics and Business*, 7(7), pp. 463-474.

Liu, H., A. Manzoor, C. Wang, L. Zhang and Z. Manzoor (2020), “The COVID-19 Outbreak and Affected Countries Stock Markets Response”, *International Journal of Environmental Research and Public Health*, 17(8), pp. 2800-2819.

Nickell, S.J. (1981), “Biases in dynamic models with fixed effects”, *Econometrica*, 49, pp. 1417-1426.

Pesaran, M.H., Y. Shin and R. P. Smith (1999), “Pooled Mean Group Estimation of Dynamic Heterogeneous Panels“, *Journal of the American Statistical Association*, 94, pp. 621-34.

Shu, C., D. He, J. Dong and H. Wang (2018), “Regional pull vs global push factors: China and US influence on Asian financial markets”, *Journal of International Money and Finance*, 87, pp. 112-132.

Siu, A. and R. Wong (2004), “Economic Impact of SARS: The Case of Hong Kong”, *Asian Economic Papers*, 3(1), pp. 62-85.

Tahat, Y. and A. Ahmed (2020), “Stock Market Returns and COVID-19 Outbreak: Evidence from the UK”, Memo, University of Dundee.

Yiu, M. S., A. Ho and D. Choi (2010), “Dynamic Conditional Correlation Analysis of Financial Spillover and Contagion in the Asian Markets in the Global Financial Turmoil”, *Applied Financial Economics*, 20(4), pp. 345-354.

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