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Spillover Effect of Chinese Export on New ASEAN-5 Stock Markets using Markov Regime Switching Model

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ABSTRACT

China as the second largest economy supposes to produce spillover effect on the emerging market economies especially the ASEAN nations. The main objective of this paper is to study the spillover effect of the Chinese export on the new ASEAN-5 stock markets (Indonesia, Malaysia, Philippines, Thailand, and Vietnam). In this paper, multivariate Markov-Switching Intercept Autoregressive Heteroscedasticity (MSIAH) model is employed to analyze the linkage between Chinese export and the new ASEAN-5 stock markets over the sample period of August 2000 to December 2018. The monthly data have been analysed using EViews. Their relationship is also strong and positive. The findings report that the spillover effects of China export on new ASEAN-5 stock markets is significant. There is positive relationship between China export and the stock markets for both regimes. The conclusion can be made is China exports should be one of the important factors in determining the stock prices in new ASEAN-5 stock markets. Investors should alert China export information when investing in new ASEAN-5 stock market. New Asean-5 are important emerging economies in Asia Pacific region and China is a rising economic power, but there is very least literature to study the Spillover effect of China export on stock market in new Asean-5.

1.0 Introduction

China is the world's largest exporter of goods since 2009 and a highly diversified exporter which allows it to compete with a broad range of countries. According to the ASEAN+3 Macroeconomic Research Office (AMRO)'s report (Li & Liu, 2018), the rise of China's economic linkages with the Association of Southeast Asian Nations (ASEAN) alongside with potential spillover effects through goods and services trade, investments, and

financial markets, etc. Spillover effect is explained as the effect of the seemingly unrelated events in a country to the economies of other nations. The more spillover effects will be produced across the global economy if the economy of a nation is larger. The majority of the ASEAN countries are emerging markets economies so China as an influential economy in the world will produce more spillover effects over these countries.

China becomes the second largest economy in the world after the U.S., China also appeared as a major source of spillover effects because a significant number of countries will experience the spillover effects from the performance of China's economy. The Asian Development Bank stated China's economic slowdown is expected to reduce GDP growth in the rest of developing Asia by roughly one third of a percentage point (Rowley, 2016). When China economic slows down, it reduces the purchase of commodity from other countries. Asian economies with strong trade links to China such as Malaysia, Singapore, Thailand and Indonesia will be vulnerable. Eventually, economic growth in the ASEAN region is expected to slow down as well. China's slowdown indirectly has a negative impact on ASEAN countries' GDP and subsequently brings effect to their stock market returns.

Due to the booming China's domestic demand and enhancing assembling capacity, ASEAN's total trade with China continually increase. In 1990, only 2% of ASEAN's total exports to China, ASEAN's goods exports to China have been increasing continually, hence by 2016, the value increased to over 12%. This value accounts for a significant share of Gross Domestic Product (GDP) in ASEAN countries. In 2016, in terms of share of GDP, especially Vietnam has 18% and Malaysia has 17% of their exports to China. In addition, there is significant rise in ASEAN's imports from China because of the enlarging regional production networks as well as the growing demand in ASEAN. Growth shocks in China will have significant impact on ASEAN, which was suggested by the results from the Oxford Economics model (Business Times, 2018). The Oxford Economics model provides a rigorous and consistent structure for forecasting and testing scenarios of economic topic. Assume the decrease of Chinese exports affect China's GDP growth falls by 1 percentage point in 2020 before bouncing back, China's demand for imports of goods and services from ASEAN immediately decreases by 0.3% to 0.6%. Thus, the impact on ASEAN's GDP will be significantly dropped by around 0.1% to 0.6% (Business Times, 2018). As a result, when the data on Chinese export becomes available and if it shows a decline, the expected GDP of the ASEAN countries generally will drop, this is also in the consequence of the expected decrease of the national income per capita , so the business environment will be expected to be worsen. Subsequently, the expected profit from the listed companies in ASEAN will also drop, therefore, the investors will act based on the newly announced export information, which is to sell the stock. The repercussion of this, the stock market in ASEAN will go down due to oversupply of the stock.

There were less studies done about spillover effect of a country's export on another country's stock market. However, prior studies were interested to examine the volatility spillover effect between exchange rates and stock markets. Xiong and Han (2015) found a negative correlation of dynamic price spillovers between China's foreign exchange and its stock markets after the reform of the Renminbi (RMB) exchange rate mechanism by using Granger causality-MSV (GC-MSV) model.

Another research done by Aliyu and Wambai (2018) analysed the volatility spillover between exchange rate and stock market in Nigeria using a regime heteroskedastic Markov switching model. The data used is the daily observation on the only two variables of the paper, which were all share index and the Naira/Dollar exchange

rate, from 4th January 2010 to 30th June 2017. Their results revealed a positive effects of exchange rate returns on the stock market returns in the bear market whereas there was a negative influence in the bull market. In other words, the exchange rate appreciation during bear market yields positive stock returns while exchange rate depreciates lowers stock returns in the bull market. Most researchers who studied spillover effects solely focused on the independent variables and dependent variables without including other control variables (Aliyu and Wambai, 2018; Xiong and Han, 2015; and Yang and Hamori, 2013). This is especially when the dependent variables is stock market as the stock price efficient stock market in new Asean five have been reflected based on the past information, including economic growth and inflation. Hence, the control variables are not necessary.

Most prior studies were mainly interested to examine the spillover effect of US monetary policy to ASEAN stock markets (Yang & Hamori, 2014) and spillover effect of China's exchange rate changes on the exports of other 124 developing countries such as Bangladesh, Cambodia, Thailand, etc. in third country markets (Mattoo, et al., 2012). In addition, there are few studies examine the effects of China's export performance on the economy of other Asian countries but not focus on stock markets (Hanson & Robertson, 2008; Eichengreen, et al., 2004; Ahearne, et al., 2003). While Hanson and Robertson (2008) performed OLS to investigate the impact of Chinese export on manufacturing sectors in 10 developing economies; Eichengreen, et al. (2004) studied the impact of Chinese economic growth on export of other Asian countries using regression analysis; and Ahearne et al (2003) analyzed the effects of Chinese export on export of other Asian emerging economies using correlation analysis. Hence, as per now, only very little researches examined the spillover effect of Chinese export on ASEAN stock market as well as employing the Markov Regime Switching Model for the research. Therefore, the main objective of this paper is to analyze the spillover effect of Chinese export on new ASEAN-5 stock markets.

The rest of the paper is organized as follows. Section 2 discusses the methodology which were used in this paper. Section 3 describes the data and statistical issues. Section 4 will be the empirical results. Finally, Section 5 concludes.

2.0 Specifications of Markov Regime Switching Model

Markov Chain is a stochastic process with discrete state spaces and discrete time that satisfies the Markov property which can be characterised as memorylessness. The property of a Markov Chain is the future event is conditionally independent of the past events, given the current state. The returns on stock markets are not easy to predict by using the financial models with assumptions. Hence, this study uses the model with Markov property to analyze the spillover effect of Chinese export on new ASEAN-5 stock markets.

It is identified that the Markov Switching is better than other conventional modelling as it allows for explicitly handle the possibility of structural changes (Simon, 1996), there are some evidences that Markov-switching model to be superior at predicting the direction of change of the exchange rate (Engel, 1994). Even when comparing with the linear model, Mohseni and Modallal (2017), in their findings, proposed that Markov Regime Switching Model is better as the Root Mean Square Error (RMSE) is relatively smaller. In more recent development, based on information criterion, Rahman, et al. (2020) confirmed that the Markov Switching Model is superior as compared to linear model in examining the financial development and economic growth relationship in Pakistan. On top of that, due to the memoryless property of Markov regime switching model is

consistent with efficient market in ASEAN 5 stock market, therefore, this model is appropriate. Besides Markov Regime Switching model, the regime switching model which was developed by Chang et al (2017) may be another alternative, however, there are very limited statistical packges which embeded this procedure.

In this study, the multivariate Markov-Switching Intercept Autoregressive Heteroscedasticity (MSIAH) model (Yang & Hamori, 2014; Ang & Timmermann, 2012; Guidolin & Timmermann, 2006) is employed to analyze the linkage between Chinese export and the new ASEAN-5 stock markets. In general, the model can be written as follow:

$$y_t = \mu_{S_t} + \beta_{S_t} y_{S_{t-1}} + \epsilon_t \quad (1)$$

where y_t is a matrix include the return of ASEAN stock index and the value of Chinese export. $\mu_{S_t}$is a vector of means in state S_t while $\beta_{S_t}$is a 2x2 matrix of autoregressive coefficients in state S_t. Assuming the residuals ϵ_t follow a normal distribution for all regimes:

$$\epsilon_t \sim \mathrm{N}(0, \sum S_t) \quad (2)$$

where $\epsilon_t = (\epsilon_{1t}, \epsilon_{2t})$ and $\sum S_t$ is a 2x2 variance-covariance matrix conditional on S_t. Assume the unobservable state-dependent parameter S_t follows an irreducible ergodic N-state Markov process with a transition matrix P:

$$P = \begin{bmatrix} p_{11} & p_{12} & \cdots & p_{1N} \\ \vdots & \vdots & \vdots & \vdots \\ p_{N1} & p_{N2} & \cdots & p_{NN} \end{bmatrix} \quad (3)$$

where $p_{ij} = P[S_t = \mathrm{j} \,|S_{t-1} = \mathrm{i}]$ and $\mathrm{i}, \mathrm{j} = 1, \ldots, \mathrm{N}$.
Lastly, the conditional distribution of y_t based on state S_t and past information is:

$$\mathrm{f}(y_t|S_t, y_{t-1}) = \frac{1}{2\emptyset^{M/2}|\sum S_t|^{1/2}} \exp\left(-\frac{1}{2}\epsilon_t' \sum {S_t}^{-1} \epsilon_t\right) \quad (4)$$

where M =2 is the number of variables in the system with the estimated joint distribution.

After incorporating the unobservable state variable S_t can be expressed as

$$\mathrm{f}(y_t|y_{t-1}) = \sum_{i=1}^{N} \mathrm{f}(y_t|S_t, y_{t-1}) \Pr[S_t|\, y_1, \ldots, y_{t-1}] \quad (5)$$

where N represents the number of possible regimes.
Construct the log likelihood function, L

$$\mathrm{L} = \sum_{t=1}^{T} \ln[\mathrm{f}(y_t|y_{t-1})] \quad (6)$$

where T is the number of observations in the data collected. Estimate the parameters μ_{S_t}, β_{S_t} and $\sum S_t$ for S_t =1, … , N and transition matrix P by using the maximum likelihood method.

3.0 Data description

The monthly value of China Exports is collected from the Federal Reserve Bank of St. Louis (2019) in terms of US Dollars units. The data is seasonally adjusted.

As to the selection of the ASEAN countries, we consider the difference among the ASEAN countries. Yang & Hamori (2014) indicates that Singapore is a developed country while compare its stock market with the other ASEAN developing countries stock market, their difference raise a concern. Furthermore, much of the economic growth of Brunei primarily because of its oil and gas industry and it is among the richest countries in the world. Brunei is also one of the world's highest standards of living and per capita GDP (KPMG, 2018). In addition, Lao,

Cambodia and Myanmar's global competitiveness indicators are the lowest among ASEAN nations in 2014-2015, according to World Economic Forum's Global Competitiveness Report 2014-2015 (Schwab, 2014).

Therefore, the selected ASEAN-5 countries are Indonesia, Malaysia, Philippines, Thailand and Vietnam because their economies are similarly growing fast in South East Asia. The stock prices will be collected in monthly frequency. The time frame is expected to collect data from August 2000 to December 2018 since the result will not be affected by the Asian financial crisis in 1997-1998. The source of these data is Asia Regional Integration Center (ARIC) (2019) which was established by the Asian Development Bank. The data is measured in terms of monthly average composite stock price index.

The raw data are plotted in Figure 1 till Figure 6. Based on these figures, the steep fall in 2008-2009 that can be seen for all cases is because of the subprime financial crisis. Table 1 reports descriptive statistics for the monthly China exports and monthly stock price indexes of new ASEAN-5. The highest mean of composite stock price index and volatility is the Philippines stock market while Vietnam stock market has the lowest mean and volatility. Jarque-Bera (JB) is a test statistic for normality. The null hypothesis for this test is data follow normal distribution. The decision criterion for the test is to reject the null hypothesis at the 5% significance level i.e. probability value less than 0.05. The outcome of the Jarque-Bera test indicates that the null hypothesis of the normal distribution is rejected in all cases. Table 2 shows a correlation matrix for the monthly ASEAN-5 stock price indexes and Chinese exports. The results show that Chinese exports and all five ASEAN stock markets are strong and positively correlated. In other words, the increases in China exports, the ASEAN-5 stock indexes rise.

4.0 Empirical results

From the empirical results in Table 3, in regime 1, higher volatility can be observed for all 5 stock markets. However, Indonesia, Philippines and Thailand have lower mean stock price indexes while Malaysia and Vietnam have higher mean stock price indexes in regime 1. Therefore, regime 1 for Indonesia, Philippines and Thailand represents the bear market which the economy is in recession. The case for Malaysia and Vietnam is contrary which their regime 1 is bull market that indicates economic expansion periods with high volatility. Regime 2 refers to bull market in Indonesia, Philippines and Thailand but that regime represents bear market for Malaysia and Vietnam.

One of the significance tests is two-tailed Z-test with critical value of ±1.96. The null hypothesis is a population mean which equals to a comparator or null value while the rejection region is less than −1.96 or greater than 1.96. Besides the mean stock price indexes of Philippines in regime 1, the outcome of z-Statistic shows the null hypothesis is rejected and these variables are statistically significant. A p-value is less than 0.05 also indicates statistically significant. According to Table 3, every variable, except mean of Philippines in regime 1, has p-value of 0.0000. The results are consistent.

The interpretation for $\beta_{1(2)}$ is China exports has positive effect on the new ASEAN-5 stock price indexes in both regimes. All the parameters $\beta_{1(2)}$ are significant. The degree of linkage increases in regime 1 for most of the case except Indonesia. The economic interpretation for this statement is when the market is good, the linkage between Indonesia, Malaysia and Vietnam stock markets and Chinese exports increases. In conclusion, the

spillover effect of China export on the new ASEAN-5 stock markets is significant. China exports should be one of the important factors in determining the stock prices in new ASEAN-5 stock markets.

Table 4 also reports the estimated transition probabilities and their respective expected duration. The probabilities of staying at the same regime are large for all the cases. It can be explained that the probability of moving from one state to another is very low when the model is at one state (Aikaterini, 2016). The duration time for each period is different for the ASEAN-5 countries. Overall, most of the ASEAN countries have longer expected duration in their regime 1. Indonesia, Philippines, Thailand and Vietnam have longer duration in the crisis periods. The only exception is Malaysia which the period of its stock market seems to be longer in bull market.

5.0 Conclusion and Discussion

In this paper, the researcher investigated the linkage between Chinese export and the new ASEAN-5 stock markets over the sample period of August 2000 to December 2018. multivariate Markov-Switching Intercept Autoregressive Heteroscedasticity (MSIAH) model was applied and conclude that the spillover effect of China's export on all the new ASEAN-5 stock markets is significant. Moreover, it is found that China export has positive effect on the ASEAN-5 stock price indexes in both bull and bear regimes. Based on the empirical results, the degree of linkage between Indonesia, Malaysia and Vietnam stock markets and Chinese export increases when the market is bull market. Another highlight is Malaysia stock market seems to be in bull market longer. In conclusion, China exports should be one of the important factors in determining the stock prices in new ASEAN-5 stock markets.

However, some profound researchers have highlighted a few limitations of Markov Switching Regime. For instance, according to Chang, Choi and Park (2017) by focusing on the few properties under the Markov Swicthing Regime Model where the first is the exogenity, Chang et al (2017) proposed that assumption of exogenous regime switching implies determining regimes is completely independent from all other parts of the model which is unrealistic in many cases. While the second is related to the first where Chang et al (2017) commented that by assuming exogenous regime switching implies also to the future transitions between states are totally determined by current state and does not rely on the realization of the time series. In addition, Chang et al (2017) believed that, this is not applicable in many prcatical applications. By providing the existing of efficiency in the stock markets in new ASEAN-5 countries, these two assumptions should work well as the current price is reflected based on all the past information and the investors will just make buy or sell decision based on the current publicly available information. The third comment by Chang et al (2017) on the Markov Switching Model is that the Markov chain determined the state of regime in virtually, where all of the existing switching models are assumed to be strictly stationary and therefore, this model does not allow for nonstationarity in the transition probability. Chang et al (2017) added that this may be restrcitive. Considering the stock price behaviour where the past data is very unlikely to aftect the stock price in the upcoming period of time, so the memeryless property of Markov shall still be valid, perhaps this part is still inclusive.

References

Ahearne, A. G., Fernald, J. G., Loungani, P. & Schindler, J. W., 2003. China and Emerging Asia: Comrades or Competitors?. *FRB International Working Paper,* Volume 789, pp. 1-37.

Aikaterini, N., 2016. *The predictive power of regime-switching models for stock market returns,* Thessaloniki: University of Macedonia.

Aliyu, S. U. R. & Wambai, A. A., 2018. Economic Regimes and Stock Market Performance in Nigeria: Evidence from Regime Switching Model. *MPRA Paper,* pp. 1-24.

Ang , A. & Timmermann, A., 2012. Regime Changes and Financial Markets. *Annual Review of Financial Economics,* Volume 4, pp. 313-337.

Asia Regional Integration Center, 2019. *Economic and Financial Indicators*. [Online]
Available at: https://aric.adb.org/
[Accessed 16 June 2019].

Business Times, 2018. How China's economy has spillover effects on Asean: AMRO report. *Business Times*, 2 August.

Chang, Y., Choi, Y. & Park, J. Y., 2017. A New Approach to Model Regime Switching. *Journal of Econometrics,* Volume 196, pp. 127-143.

Eichengreen, B., Rhee, Y. & Tong, H., 2004. The Impact of China on the Exports of Other Asian Countries. *NBER Working Paper ,* Volume 10768, pp. 1-34.

Engel, C., 1994. Can the Markov Switching Model Forecast Exchange Rates?. *Journal of International Economics,* Volume 36, pp. 151-165.

Federal Reserve Bank of St. Louis, 2019. *China, Exports, Monthly - Economic Data Series*. [Online]
Available at: https://fred.stlouisfed.org/
[Accessed 16 June 2019].

Guidolin, M. & Timmermann, A., 2006. An econometric model of nonlinear dynamics in the joint distribution of stock and bond returns. *Journal of Applied Econometrics,* 21(1), pp. 1-22.

Hanson, G. H. & Robertson, R., 2008. China and the Manufacturing Exports of Other Developing Countries. *NBER Working Paper,* Volume 14497, pp. 1-31.

KPMG, 2018. *ASEAN Business Guide The economies of ASEAN and the opportunities they present*. [Online]
Available at: https://home.kpmg/content/dam/kpmg/my/pdf/ASEAN_Business_Guide_COMPLETE_web.pdf
[Accessed 21 August 2019].

Li, W. & Liu, S. X., 2018. *China's Increasing Economic Linkages with ASEAN and the Potential Spillover Effects,* s.l.: ASEAN+3 Macroeconomic Research Office.

Mattoo, A., Mishra, P. & Subramanian, A., 2012. Spillover Effects of Exchange Rates: A Study of the Renminbi. *IMF Working Paper,* pp. 1-37.

Mohseni, R. & Modallal, L. S., 2017. Estimating Stock Price in Energy Market Including Oil, Gas and Coal: The Comparison of Linear and Non-Linear Two-State Markov Regime Switching Models. *Iranian Journal of Management Studies ,* 10(3), pp. 715-728.

Rahman, A., Khan, M. A. & Charfeddine, L., 2020. Financial Development - Economic Growth Nexus in Pakistan: New Evidence from the Markov Switching Model. *Cogent Economics & Finance,* Volume 8, pp. 1-15.

Rowley, A., 2016. Spillover impact of China slowdown on Asia to be considerable: ADB. *Business Times*, 4 April.

Schwab, K., 2014. *The Global Competitiveness Report 2014–2015,* s.l.: World Economic Forum.

Simon, J., 1996. *A Markov-Switching Model of Inflation in Australia*. s.l.:Reserve Bank of Australia.

Xiong, Z. & Han, L., 2015. Volatility Spillover Effect Between Financial Markets: Evidence since the Reform of the RMB Exchange Rate Mechanism. *Financial Innovation 1,* Volume 9, pp. 1-12.
Yang, L. & Hamori, S., 2014. Spillover effect of US monetary policy to ASEAN stock markets: Evidence from Indonesia, Singapore, and Thailand. *Pacific-Basin Finance Journal,* Volume 26, pp. 145-155.

Table 1: Summary Statistics of China Exports and ASEAN-5 Stock Indexes

	CHINAEXP...	INDONESIA	MALAYSIA	PHILIPPINES	THAILAND	VIETNAM
Mean	1.20E+11	2892.016	1281.122	4087.601	956.3732	491.5661
Median	1.21E+11	2615.820	1332.670	3313.930	817.2420	478.1110
Maximum	2.63E+11	6585.950	1881.510	8848.680	1809.410	1143.990
Minimum	1.98E+10	359.6650	571.3890	1019.400	267.8210	112.0790
Std. Dev.	6.44E+10	1946.687	422.7294	2463.705	458.2334	250.0200
Skewness	-0.141161	0.159159	-0.156050	0.365582	0.220200	0.715479
Kurtosis	1.656343	1.569638	1.489811	1.593900	1.706983	2.946098
Jarque-Bera	17.35881	19.77269	21.89811	23.12875	17.18133	18.88210
Probability	0.000170	0.000051	0.000018	0.000009	0.000186	0.000079

Notes: The sample period is from August 2000 to December 2018 for a total of 221 months.

Table 2: Correlations of Each Country's Stock Indexes and China Export

Sample: 2000M08 2018M12
Included observations: 221

Correlation	CHINAEXP...	INDONESIA	MALAYSIA	PHILIPPINES	THAILAND	VIETNAM
CHINAEXPORT	1.000000					
INDONESIA	0.969932	1.000000				
MALAYSIA	0.969989	0.969885	1.000000			
PHILIPPINES	0.938611	0.980813	0.946786	1.000000		
THAILAND	0.938803	0.972401	0.944499	0.974861	1.000000	
VIETNAM	0.651265	0.679655	0.679049	0.671345	0.645235	1.000000

Notes: The sample period is from August 2000 to December 2018 for a total of 221 months.

Table 3: Estimated Parameter for MSIAH Models

Variable		Indonesia	Malaysia	Philippines	Thailand	Vietnam
μ_1	Coefficient	-696.1364 ***	521.3634 ***	-245.1383	173.3065 ***	411.2033 ***
	z-Statistic	-9.384308	43.44274	-1.209342	4.305573	6.149739
	p-value	0.0000	0.0000	0.2265	0.0000	0.0000
μ_2	Coefficient	-321.4079 ***	343.3107 ***	169.6475 ***	200.0981 ***	127.9082 ***
	z-Statistic	-4.159907	6.329622	4.972602	21.57362	12.42579
	p-value	0.0000	0.0000	0.0000	0.0000	0.0000
β_1	Coefficient	2.80E-08 ***	6.44E-09 ***	3.65E-08 ***	6.78E-09 ***	2.35E-09 ***
	z-Statistic	51.26920	72.87710	27.54858	25.83601	5.329573
	p-value	0.0000	0.0000	0.0000	0.0000	0.0000
β_2	Coefficient	3.14E-08 ***	5.66E-09 ***	2.86E-08 ***	5.45E-09 ***	2.14E-09 ***
	z-Statistic	64.19093	15.90893	66.24189	56.70410	28.83719
	p-value	0.0000	0.0000	0.0000	0.0000	0.0000
σ_1	Coefficient	319.4200 ***	80.5513 ***	982.0655 ***	180.1661 ***	192.4453 ***
	z-Statistic	96.65528	86.81933	118.0801	84.34525	63.34040
	p-value	0.0000	0.0000	0.0000	0.0000	0.0000
σ_2	Coefficient	250.6378 ***	63.2697 ***	127.3250 ***	43.7111 ***	53.6713 ***
	z-Statistic	56.24325	17.33088	47.69940	42.44642	56.18856
	p-value	0.0000	0.0000	0.0000	0.0000	0.0000

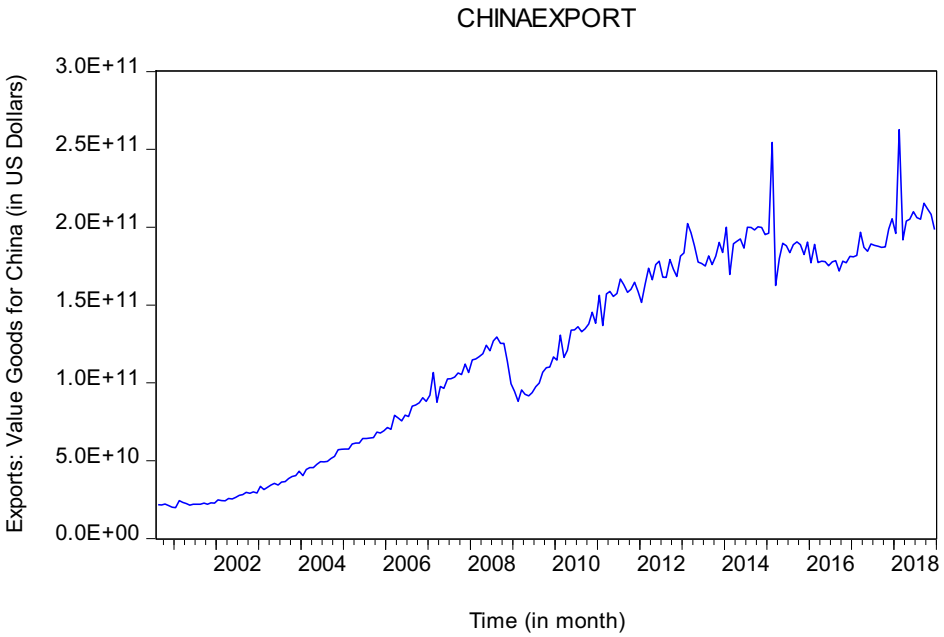
Note: ***, ** and * denote significance at the 1%, 5% and 10% level respectively.

Table 4: Transition Probabilities and Expected Durations

	Indonesia	Malaysia	Philippines	Thailand	Vietnam
p_{11}	0.976199	0.985620	0.983248	0.980426	0.954741
p_{22}	0.959652	0.739555	0.954314	0.969466	0.974588
Duration 1	42.01437	69.54084	59.69606	51.08945	22.09496
Duration 2	24.78443	3.839578	21.88864	32.75031	39.35100

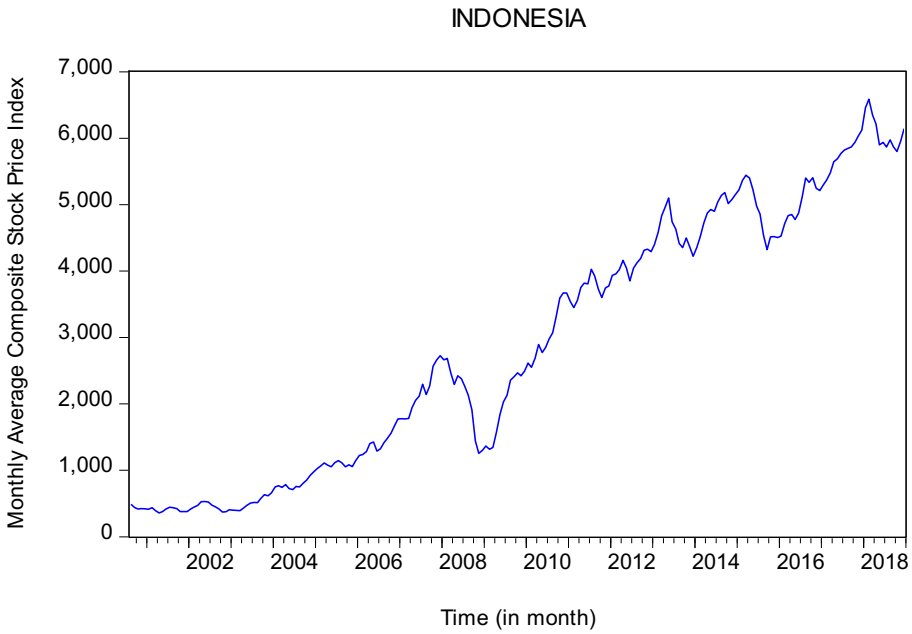
Note: $p_{11\,(22)}$ refers to the transition probability in regime 1(2), duration 1(2) represents the expected duration in regime 1(2). The expected durations in one regime i is calculated as $\frac{1}{(1-p_{ii})}$.

Figure 1: Line Graph of Chinese Exports



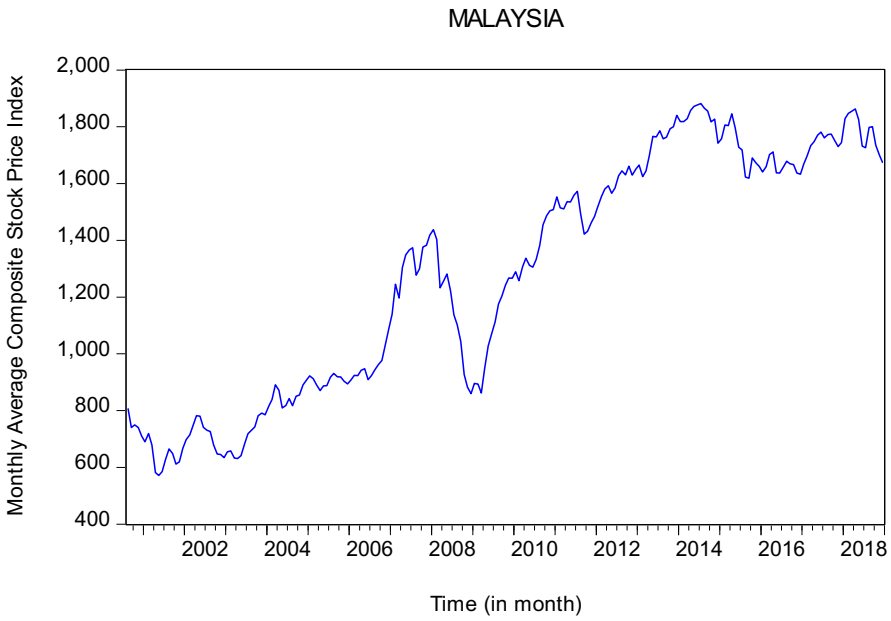
Notes: The sample period is from August 2000 to December 2018 for a total of 221 months.

Figure 2: Line Graph of Indonesia Monthly Stock Price Index



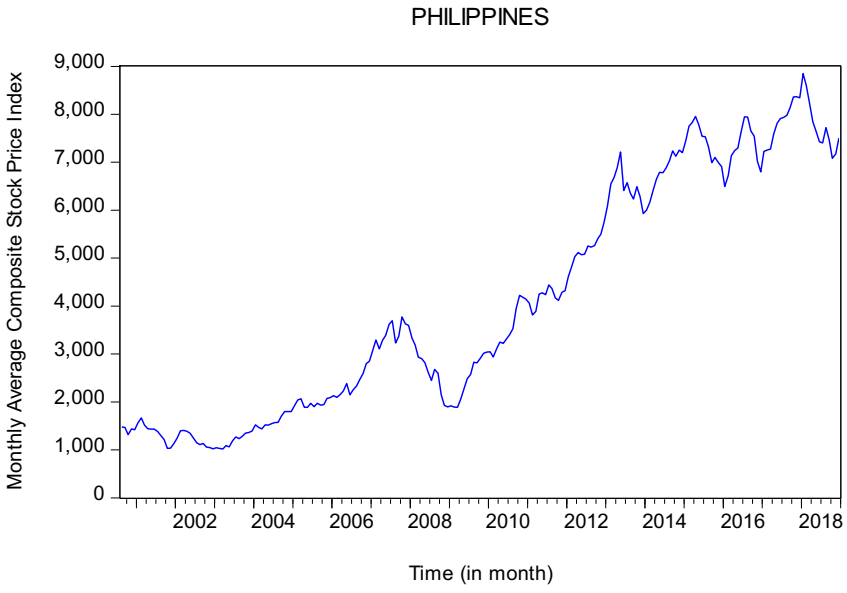
Notes: The sample period is from August 2000 to December 2018 for a total of 221 months.

Figure 3: Line Graph of Malaysia Monthly Stock Price Index



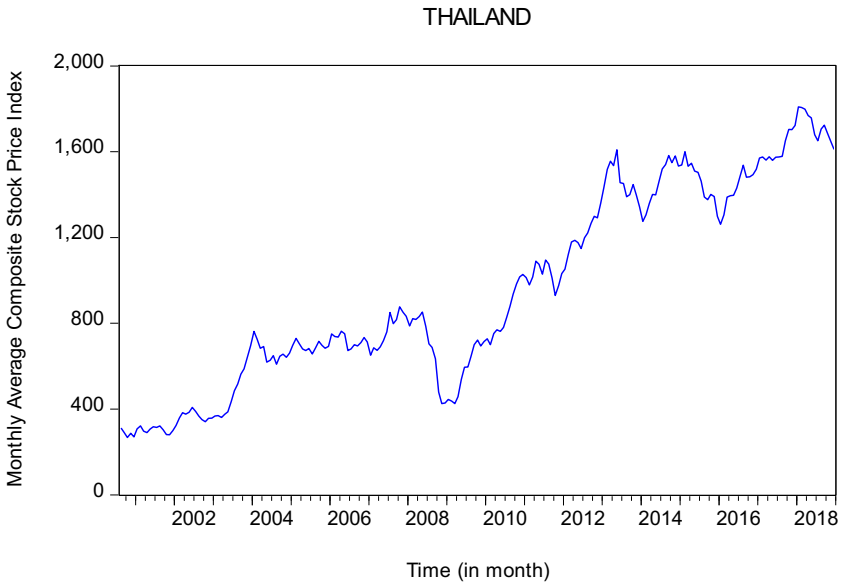
Notes: The sample period is from August 2000 to December 2018 for a total of 221 months.

Figure 4: Line Graph of Philippines Monthly Stock Price Index



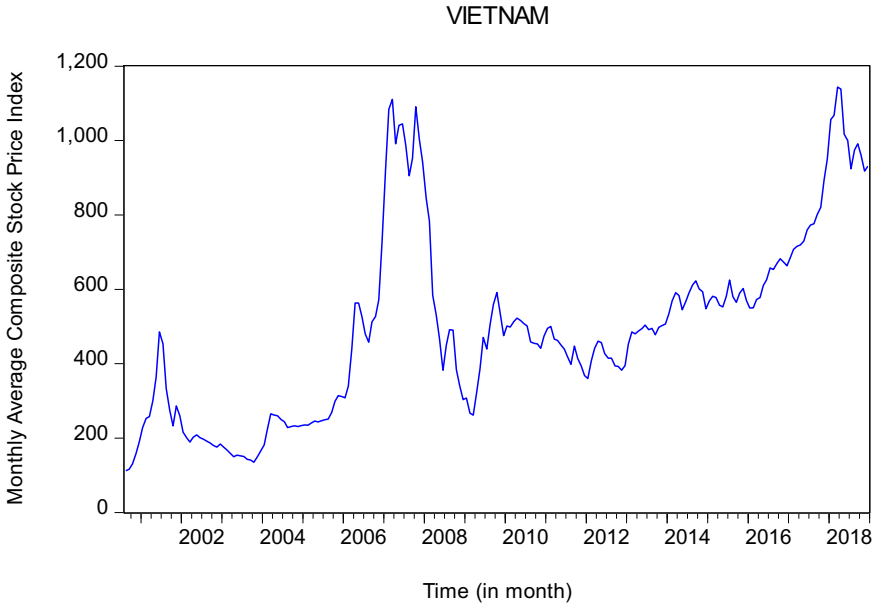
Notes: The sample period is from August 2000 to December 2018 for a total of 221 months.

Figure 5: Line Graph of Thailand Monthly Stock Price Index



Notes: The sample period is from August 2000 to December 2018 for a total of 221 months.

Figure 6: Line Graph of Vietnam Monthly Stock Price Index



Notes: The sample period is from August 2000 to December 2018 for a total of 221 months.