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## Article

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# The Economic Impact of the US Unconventional Monetary Policy, Global Commodity Shocks, and Oil Price Shocks on ASEAN 3

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## ABSTRACT

This study examines the implications of the United States unconventional monetary policy, global commodity prices, and the oil price shock on monetary policy responses and economic growth in the ASEAN 3 countries of Indonesia, Malaysia, and the Philippines. The empirical evidence suggests that the shock from the United States unconventional monetary policy led to the change in ASEAN's monetary policy. The fluctuation of crude oil and global commodity prices considerably impacts ASEAN's monetary policy response. The Central Bank can use such evidence as a reference to alter monetary policy in reaction to the global oil price and the unconventional monetary policy of the United States. The government will also be able to foresee the impact of global oil and commodities prices and preserve ASEAN 3's economic growth.

**Keywords:** GDP Growth, Interest Rates, VECM, Spillover Effect, Global Commodity Price, World's Oil Price

**JEL Classifications:** E1, E43, C39, D62, Q02

## 1. INTRODUCTION

Economic integration promotes economic and financial linkages between countries. The spillover impact, which refers to trade and financial connections, affects all ASEAN countries. The spillover Effect is the result of one country's policy reaction to another through two channels, trade and finance (Arin et al., 2020; Hong et al., 2019; Knobel et al., 2019; Taiwo Onifade et al., 2021). The Spillover Effects emphasize the importance of developing countries such as Vietnam, Turkey, and Sahara African countries because they are vulnerable to changes in developed countries as well as external shocks such as increases in global oil prices, stock prices, and commodity prices (Akkoc and Civcir, 2019; Amendolagine et al., 2019; Mensi et al., 2021; Ribeiro et al., 2020). On the other hand, the Fed's interest rate policy has become a critical worry for developing countries such as ASEAN 3, which includes Indonesia, Malaysia, and the Philippines. The Fed's policy of changing interest rates exacerbated the deterioration of macroeconomic conditions (Trung, 2019). Several types of studies

in various nations demonstrated empirical evidence of developed countries' spillover effects on ASEAN.

The study by (Hoek et al., 2022) discovered that the United States' interest rate policy disrupted the economic progress of developing countries. Similar findings were produced by (Aizenman et al., 2020; Kabundi et al., 2020; Kolasa and Wesolowski, 2020; MacDonald and Popiel, 2020; Trung, 2019), which demonstrated that the US Tapering off policy caused financial spillovers to economic growth in emerging nations. According to the study (Georgiadis and Schumann, 2021), the United States' change in export and import caused spillover effects. The movement in trade sectors was also influenced by changes in global commodity prices and the world oil price. (Agnello et al., 2020; Jiang and Cheng, 2021; Long et al., 2021; Meng et al., 2020; Sun and Wang, 2021) Research demonstrated that changes in global commodity prices and the global oil price affected economic growth and monetary policy response. The empirical findings of the study by (Bhattarai et al., 2020; Hanisch, 2019; Lee and Bowdler, 2022; Yildirim and

Ivrendi, 2021) showed that the spillover effects of US monetary policy were significantly exerted through financial channels. While the study by (Cerutti, 2019; Déés and Galesi, 2021; Hoek et al., 2022; Koepke, 2019; Qamruzzaman and Jianguo, 2020; Tran and Pham, 2020) on the spillover effects of the Fed's interest rate policy change found that capital flow influenced economic growth more significantly.

Empirically, the ASEAN three countries' economic growth fluctuated, followed by changes in global commodity prices and world oil prices. Figure 1 depicts the insecurity of ASEAN 3's economic growth, which tends to follow the movement of global commodities and oil prices. This is evidenced by the drop in ASEAN 3 economic growth in 2016, which was followed by a decline in global commodity prices and the global oil price. Worldwide commodity and energy prices rose in 2017 in parallel with improved economic growth. When international commodity prices rise, demand for exported goods falls, reducing economic growth (Li, 2023; Long et al., 2021; Meng et al., 2020; Sun and Wang, 2021; Wei and Lahiri, 2019). The in-depth research refers to the drop in global oil prices, which has resulted in a downturn in ASEAN economic growth 3. Lowering global oil prices boosts productivity and economic progress.

The first topic covered is the effect of oil price fluctuations and worldwide commodity price shifts on the economies of ASEAN's

three countries (Indonesia, Malaysia, and the Philippines). The second concern is how the normalization of US monetary policy will affect the monetary policy responses of ASEAN's three countries (Indonesia, Malaysia, and the Philippines). This research is divided into four parts. The first part of this article serves as an introduction and brief evaluation of the empirical study on the spillover effects of US unconventional monetary policy, the effects of oil price shocks on monetary policy response and economic growth, and the observed data from ASEAN 3. The study's methodology is described in Part 3, and the research's results are discussed in Part 4. The conclusion is presented in Section 5.

## 2. LITERATURE REVIEW

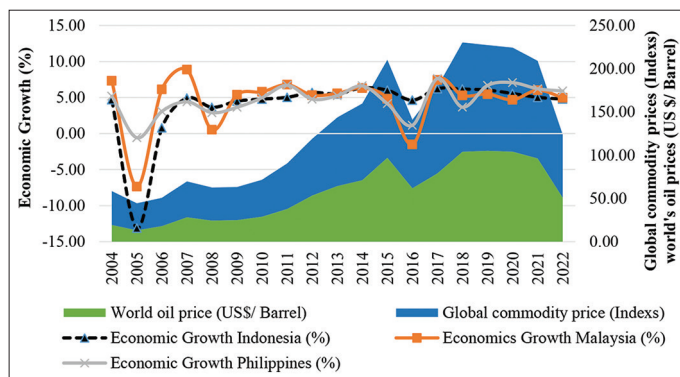
Economic openness in the modern period creates dependency among nations, promoting capital flow liberalization. Financial liberalization impacts the economy positively and badly (Karwowski, 2019; Murshed et al., 2021; Nasir et al., 2021; Waldron, 2019). The tremendous impact is reflected in the flow of funds to more productive locations, which is seen favourably by investors, and the spillover effect will promote economic growth. Meanwhile, one of the negative consequences of financial liberalization is the occurrence of financial market shocks, which can hurt other economic sectors in integrated countries (Kalcheva et al., 2020; Moyo and Le Roux, 2020; Ni and Liu, 2019; Spahiu and Durguti, 2023; Yakubu et al., 2020).

The phenomenon of capital outflow should be adequately explored since it may result in an abrupt reversal, posing significant threats to financial stability. Furthermore, the drop in capital flow may be addressed among policymakers in different nations regarding the economic spillover impact. Capital outflows from developing countries towards wealthy ones will cause asset prices to fall and interest rates to rise, signalling a financial squeeze in developing countries (Davis et al., 2021; Shim and Shin, 2021).

Several channels can be used to examine the impact of a developed country's monetary policy on an emerging market nation. The spillover effect is primarily caused by financial shock transmission and commerce. Financial disruptions are identified when an economic imbalance occurs in developing countries, particularly in the United States and the European Union. The normalization of U.S. monetary policy is reflected in the tapering off, wherein the reference rate rises. The studies by (Antonakakis and Kizys, 2015); Kempa and Khan, 2017; Zhai and Morgan, 2016; Israel and Latsos, 2020; Klose, 2020; Maitra and Hossain, 2020; Nghiem and Narayan, 2021; Tiwari et al., 2019) reveal that the difference in interest rates between a developed country and a developing country causes a financial imbalance in the form of portfolio investment. Such a condition reverses capital flows into the developed nation, generating greater returns with minimal risk. The outflow of capital from developing countries to developed nations causes a decline in asset prices and an increase in interest rates, indicating a financial contraction in developing nations.

On the other hand, the interest rate shock in the United States was mostly driven by the difficulties provided by bank loans, which played an essential role in obtaining a robust response from the

**Figure 1:** The Movement of Economic Growth in ASEAN 3, global commodity price and the world's oil price



**Table 1: Result of root data panel test**

| Variables | LLC        | IPC        | ADF-Fisher | PP-Fisher  |
|-----------|------------|------------|------------|------------|
| GDP_      | -1.9844    | -4.9291    | 37.1192    | 28.9431    |
| ASEAN3    | [0.0236]*  | [0.0000]*  | [0.0000]*  | [0.0001]*  |
| Trade     | -7.7233    | -8.7846    | 76.5299    | 159.8451   |
|           | [0.0000]*  | [0.0000]*  | [0.0000]*  | [0.0000]*  |
| HK        | -6.2800    | -6.4494    | 50.9890    | 61.8813    |
|           | [0.0000]** | [0.0000]** | [0.0000]** | [0.0000]** |
| OP        | -6.1607    | -6.1177    | 47.5590    | 73.2913    |
|           | [0.0000]** | [0.0000]** | [0.0000]** | [0.0000]** |
| i_US      | -1.8444    | -1.8110    | 13.6418    | 59.8991    |
|           | [0.0326]*  | [0.0351]*  | [0.0339]** | [0.0000]** |
| I_asean3  | 0.4792     | -6.3883    | 51.1912    | 28.1855    |
|           | [0.6841]   | [0.0000]** | [0.0000]** | [0.0001]*  |
| M2        | 1.2166     | 3.8160     | 0.2494     | 0.2366     |
|           | [0.8881]   | [0.9999]   | [0.9997]   | [0.9997]   |
| IP        | -6.7515    | -6.7410    | 54.1503    | 120.3910   |
|           | [0.0000]*  | [0.0000]*  | [0.0000]*  | [0.0000]*  |

[ ]: Probability; \*: Level; \*\*: 1<sup>st</sup> level; \*\*\*: 2<sup>nd</sup> level

EMU and affecting interest rates. Punzi and Chantapacdepong (2017) used the Maximum Entropy approach to examine the financial transmission spread across the EU. The study took a snapshot of the dynamic financial network. It used counterfactual modelling to spread the shocks from systemic risk sources such as intra-bank, asset price, and default credit risks. Such pathways have the potential to degrade circumstances both directly and indirectly. However, (Kirikkaleli and Gokmenoglu, 2020) discovered that sovereign credit risk was a transmission channel that quickly disseminated shock effects via Turkey's banking network, which differs by country depending on size and reliance on international financial relations. According to an empirical study (Kempa and Khan, 2017), spillover effects could occur through exchange rates due to monetary policy in developed countries, allowing for the appreciation of exchange rates and resulting in the depreciation of exchange rates in developing countries. As a result, it pushed the market to be too speculative, influencing the volume and movement of capital flow. The intervention by developing-country central banks to stabilize exchange rates reduces reserves and financial liquidity.

The normalization of monetary policy in developed countries affects the real sectors directly through international commerce, in addition to the financial sectors (Bubeck et al., 2020; Cesa-Bianchi et al., 2020; Kiyotaki and Moore, 2019; Nasir et al., 2019; Rashid Khan et al., 2019). The normalization brought about by rapid economic expansion has the potential to increase demand for goods and services from developed to emerging countries. Furthermore, assuming elastic import demand, a devalued currency enhances exports to developed countries. The rise in exports from developing to developed countries boosts the economy.

Studies about international relations in North America and some other countries demonstrated, via the use of global vector autoregression analysis (Benecká et al., 2020; Hoque et al., 2019; Wei and Lahiri, 2019), that the trade sector was the primary channel for conveying the infectious effect of the shock. These studies were conducted in North America and some other countries. Using the global vector autoregression model, (Dalheimer et al., 2021) found that the shock from global financial factors also infiltrated the economies of Sub-Saharan Africa (SSA) countries through trade. This was found to be the case. Nevertheless, the shock felt in the credit markets of the United States, and Europe did not materially alter the situation of the credit markets in the SSA region.

In contrast to this view, the research conducted by Georgiadis (2016) showed that the financial shock in the United States severely impacted the economic climate in Asia. Since there was strong integration done by investors in Asia who depended on the financial market condition in the US, the economic shock's spillover effect was more significant than the trade shock. This was due to the fact that the economic shock was created by the economic shock.

The global oil price shock also contributed to the spillover impact by lowering the demand for oil in developing nations (Alexeev and Chih, 2021; Liu et al., 2020; Mensi et al., 2021; Tan, 2016).

This was one of the channels that caused the spillover effect. These conditions led to a fall in production, decreasing the Gross Domestic Product in developing countries. An increase in additional costs or a high marginal cost drove this. In light of these circumstances, the rise in marginal cost would affect the overall equilibrium of domestic pricing levels. The subsequent shift in the price equilibrium forced the economy to readjust to the new point of equilibrium.

All nations, especially the developing ones, should continue researching the various channels that cause the spillover effects outlined above. Therefore, the ASEAN-3 is used as a proxy for a poor country in this study, and the US is used as a proxy for a developed country that is responsible for the spillover effect on the ASEAN-3 economy. The spillover effect is also explored concerning the rise in global oil prices and how it affects the ASEAN-3 economies. The study looked at the impact of US policy normalization, typified by a tapering off and an appreciation of US exchange rates.

### 3. METHODOLOGY

Within the scope of this study is an examination of the Spillover impact caused by financial and commerce channels. By analyzing the worldwide phenomena, the study concentrates on ASEAN 3, which includes Indonesia, Malaysia, and the Philippines as its primary research subjects. The statistics that were used were secondary data, and they were gathered from the World Bank, the Asian Development Bank (ADB), the International Monetary Fund (IMF), the Organization for Economic Cooperation and Development (OECD), the Bank for International Settlement (BIS), and the World Trade Economy (WTO). The year 2004 as a whole.Q2 to 2022.Q1 was chosen because the events arising in the era that affected the global economy had spillover consequences.

#### 3.1. Model Specifications

The basic model that was developed for this study is an adaptation of one that was used by (Li, 2023; Meng et al., 2020; Sun and Wang, 2021; Wei and Lahiri, 2019), with the exception that the source of shock in the ASEAN 3 nations was changed:

The following equation describes Spillover Effect through the trade channel:

$$GDP^{ASEAN3} = f(TP, HK, OP, i^{US}) \quad (1)$$

Spillover Effect through the financial channel is described by the equation as follows:

$$i^{IASEAN3} = f(M2, IP, i^{US}, OP) \quad (2)$$

Suppose inter-variable cointegration is found in the equation. In that case, the model VAR is calculated by using the error correction term, which includes the long termed balance of the spot and feature price movement. Equations 1 and 2 are transformed into VECM as follows:



Model (1) Spillover Effects through the trade channel:

$$\Delta GDP^{ASEAN3}_{it} = \Gamma_{10} + \Gamma_{11} \Delta GDP^{ASEAN3}_{it-1} + \Gamma_{12} \Delta TB_{it-1} + \Gamma_{13} \Delta HK_{it-1} + \Gamma_{14} \Delta OP_{it-1} + \Gamma_{15} \Delta I^{US}_{it-1} + \alpha_1 (GDP^{ASEAN3}_{it-1} + TB_{it-1} + HK_{it-1} + OP_{it-1} + I^{US}_{it-1}) + \varepsilon_{1it}$$

$$\Delta TP_{it} = \Gamma_{20} + \Gamma_{21} \Delta GDP^{ASEAN3}_{it-1} + \Gamma_{22} \Delta TB_{it-1} + \Gamma_{23} \Delta HK_{it-1} + \Gamma_{24} \Delta OP_{it-1} + \Gamma_{25} \Delta I^{US}_{it-1} + \alpha_2 (TB_{it-1} + TB_{it-1} + HK_{it-1} + OP_{it-1} + I^{US}_{it-1}) + \varepsilon_{2it}$$

$$\Delta HK_{it} = \Gamma_{30} + \Gamma_{31} \Delta GDP^{ASEAN3}_{it-1} + \Gamma_{32} \Delta TB_{it-1} + \Gamma_{33} \Delta HK_{it-1} + \Gamma_{34} \Delta OP_{it-1} + \Gamma_{35} \Delta I^{US}_{it-1} + \alpha_3 (HK_{it-1} + TB_{it-1} + HK_{it-1} + OP_{it-1} + I^{US}_{it-1}) + \varepsilon_{3it}$$

$$\Delta OP_{it} = \Gamma_{40} + \Gamma_{41} \Delta GDP^{ASEAN3}_{it-1} + \Gamma_{42} \Delta TB_{it-1} + \Gamma_{43} \Delta HK_{it-1} + \Gamma_{44} \Delta OP_{it-1} + \Gamma_{45} \Delta I^{US}_{it-1} + \alpha_4 (OP_{it-1} + TB_{it-1} + HK_{it-1} + OP_{it-1} + I^{US}_{it-1}) + \varepsilon_{4it}$$

$$\Delta I^{US}_{it} = \Gamma_{50} + \Gamma_{51} \Delta GDP^{ASEAN3}_{it-1} + \Gamma_{52} \Delta TB_{it-1} + \Gamma_{53} \Delta HK_{it-1} + \Gamma_{54} \Delta OP_{it-1} + \Gamma_{55} \Delta I^{US}_{it-1} + \alpha_5 (I^{US}_{it-1} + TB_{it-1} + HK_{it-1} + OP_{it-1} + I^{US}_{it-1}) + \varepsilon_{5it}$$

Model (2) Spillover Effects through the financial channel:

$$\Delta i^{ASEAN3}_{it} = \Gamma_{10} + \Gamma_{11} \Delta i^{ASEAN3}_{it-1} + \Gamma_{12} \Delta M2_{it-1} + \Gamma_{13} \Delta IP_{it-1} + \Gamma_{14} \Delta I^{US}_{it-1} + \Gamma_{15} \Delta OP_{it-1} + \alpha_1 (i^{ASEAN3}_{it-1} + M2_{it-1} + IP_{it-1} + I^{US}_{it-1} + OP_{it-1}) + \varepsilon_{1it}$$

$$\Delta M2_{it} = \Gamma_{10} + \Gamma_{11} \Delta i^{ASEAN3}_{it-1} + \Gamma_{12} \Delta M2_{it-1} + \Gamma_{13} \Delta IP_{it-1} + \Gamma_{14} \Delta I^{US}_{it-1} + \Gamma_{15} \Delta OP_{it-1} + \alpha_2 (M2_{it-1} + M2_{it-1} + IP_{it-1} + I^{US}_{it-1} + OP_{it-1}) + \varepsilon_{2it}$$

$$\Delta IP_{it} = \Gamma_{10} + \Gamma_{11} \Delta i^{ASEAN3}_{it-1} + \Gamma_{12} \Delta M2_{it-1} + \Gamma_{13} \Delta IP_{it-1} + \Gamma_{14} \Delta I^{US}_{it-1} + \Gamma_{15} \Delta OP_{it-1} + \alpha_3 (IP_{it-1} + M2_{it-1} + IP_{it-1} + I^{US}_{it-1} + OP_{it-1}) + \varepsilon_{3it} \sqrt{a^2 + b^2}$$

$$\Delta I^{US}_{it} = \Gamma_{10} + \Gamma_{11} \Delta i^{ASEAN3}_{it-1} + \Gamma_{12} \Delta M2_{it-1} + \Gamma_{13} \Delta IP_{it-1} + \Gamma_{14} \Delta I^{US}_{it-1} + \Gamma_{15} \Delta OP_{it-1} + \alpha_4 (I^{US}_{it-1} + M2_{it-1} + IP_{it-1} + I^{US}_{it-1} + OP_{it-1}) + \varepsilon_{4it}$$

$$\Delta OP_{it} = \Gamma_{10} + \Gamma_{11} \Delta i^{ASEAN3}_{it-1} + \Gamma_{12} \Delta M2_{it-1} + \Gamma_{13} \Delta IP_{it-1} + \Gamma_{14} \Delta I^{US}_{it-1} + \Gamma_{15} \Delta OP_{it-1} + \alpha_5 (OP_{it-1} + M2_{it-1} + IP_{it-1} + I^{US}_{it-1} + OP_{it-1}) + \varepsilon_{5it}$$

$GDP^{ASEAN3}$  is the gross domestic product of ASEAN 3 in percentage; Trade Balance (% to GDP) is a result of TB

$EX - IM$  ( $\frac{EX - IM}{GDP}$ ) (see. Garratt et al., 2008; Punzi and Chantapacdepong, 2017; Zhai and Morgan, 2016). Where EX = the export growth of ASEAN 3, IM = the import growth of ASEAN 3, and GDP is the economic growth of ASEAN 3; HK is the global commodity price; OP is the oil price;  $i^{US}$  is US reference interest.  $i^{ASEAN3}$  is ASEAN 3's reference interest; M2 is the quasy money of ASEAN 3; IP is the portfolio investment of ASAN 3; while  $i^{US}$  is the US's reference interest; and OP is the oil price  $b_0, b_1, b_2, b_3$ : coefficient value and  $\varepsilon_t$  is a the error term in the year t-1;  $ECT_t$ : Error corection term the year t; and  $\varepsilon_t$ : error term.

## 4. RESULTS

The estimated Result of the Spillover Effect of US Unconventional Monetary Policy, Oil Price Shocks on monetary policy Reaction and Economic Growth.

The result from pre-estimation obtained by VECM includes a unit root test showing data stationary. The result from the unit root test indicates that the GDP of ASEAN 3, trade, and static IP are in the level; meanwhile, the HK, OP stationary in the story of 1<sup>st</sup> difference is proved by the probability value of <0.05. The US interest rates are not stationary in the unit root, and neither are LLC and M2 (Table 1).

It can be seen from the results of the panel data cointegration test that was carried out with the Kao Residual Cointegration method in Tables 2 and 3, that there is cointegration among the variables, which indicates that VECM was utilized in the process of the estimate of the research model. The findings demonstrate that a significance level of 0.000 for a probability value denotes a cointegration link. In Figure 2, illustrating Model 1 and Model 2, the development of the next pre-estimation is the model stability, which means that all roots in the unit circle with stable VECM on its optimum lag need to be estimated.

According to the estimated outcome of the vector error correction model (VECM), which can be found in Table 4, the GDP variable in ASEAN 3 considerably impacts the variable itself in the first lag. Although the influence of the trade variable on the first period is positive and its effect on the second period is negative, the difference between the two is not substantial. With a value of 0.03 and a probability of 0.004, the change in the price of commodities considerably impacts the GDP growth in ASEAN 3 during the first

Table 2: The result of Kao Residual Cointegration Model 1

| The Type of Test Result | t-Statistic | Prob.  |
|-------------------------|-------------|--------|
| ADF                     | -5.943784   | 0.0000 |
| Residual variance       | 2.092583    |        |
| HAC variance            | 2.435381    |        |

Table 3: The result of Kao Residual Cointegration Model 2

| The Type of Test Result | t-statistic | Prob.  |
|-------------------------|-------------|--------|
| ADF                     | -3.901577   | 0.0000 |
| Residual variance       | 0.416806    |        |
| HAC variance            | 0.673202    |        |

period. Next, the variable representing oil prices had a positive influence both in the first period and the following periods, but its effect was small. On the other hand, the interest rates in the United States likewise have a positive influence during the first period and a negative influence during the second period, albeit the latter's impact is negligible. In the meantime, the interest rates in the US had a considerable and positive influence during the first period, but they had an insignificant and negative influence during the second period.

Model 2's predicted result is shown in Table 5. In the first and second periods, the interest rate variable of ASEAN 3 has a considerable impact on the variable itself. The M2 variable shows positive but insignificant impacts in the first period and negative but significant effects in the second phase. Furthermore, the impact of the portfolio investment variable and US interest rates is insignificant in the first period and significant in the second. The oil price variable has a considerable positive effect on interest rates in ASEAN 3, as evidenced by a probability alpha of 5% and a coefficient value of 0.007.

Figure 3 depicts the effects of the United States unconventional monetary policy, global commodity prices, and oil prices on economic growth in the ASEAN 3 countries via trade channels. The ASEAN-3 economic expansion has shown a positive response to the shifts in export performance seen in the first quarter. The ASEAN-3 economy appears to be quite sensitive to changes in

export performance. Second-period economic development in the ASEAN-3 also reacts favourably to shifts in global commodity

**Table 4: The estimated result of VECM Model 1**

| Variables           | CointEq1       |
|---------------------|----------------|
| GDP_ASEAN3(t-1)     | 1.000000       |
| TB (t-1)            | -251.5014      |
| HK (t-1)            | -0.079107      |
| OP (t-1)            | 0.090634       |
| I_US (t-1)          | 0.302895       |
| C                   | -6.246675      |
| Error Correction:   | D (GDP_ASEAN3) |
| Variables           | -0.006839      |
| D (GDP_ASEAN3(t-1)) | 0.172811       |
| D (GDP_ASEAN3(t-2)) | [0.0189]*      |
| D (TB (t-1))        | -0.055604      |
| D (TB (t-2))        | [0.4281]       |
| D (HK (t-1))        | 2.528695       |
| D (HK (t-2))        | [0.3291]       |
| D (OP (t-1))        | -0.438629      |
| D (OP (t-2))        | [0.7871]       |
| D (I_US (t-1))      | 0.037486       |
| D (I_US (t-2))      | [0.0040]*      |
|                     | -0.072316      |
|                     | [0.2565]       |
|                     | 0.064372       |
|                     | [0.2228]       |
|                     | 0.008902       |
|                     | [0.5001]       |
|                     | 0.436265       |
|                     | [0.1108]       |
|                     | -0.350664      |
|                     | [0.1952]       |

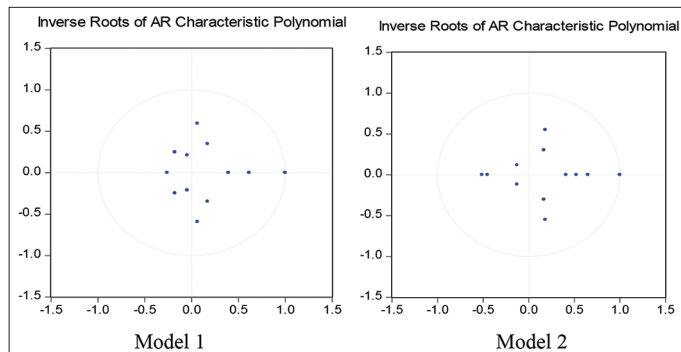
\*: Significant in alpha 5%

**Table 5: Result of VECM estimation in Model 2**

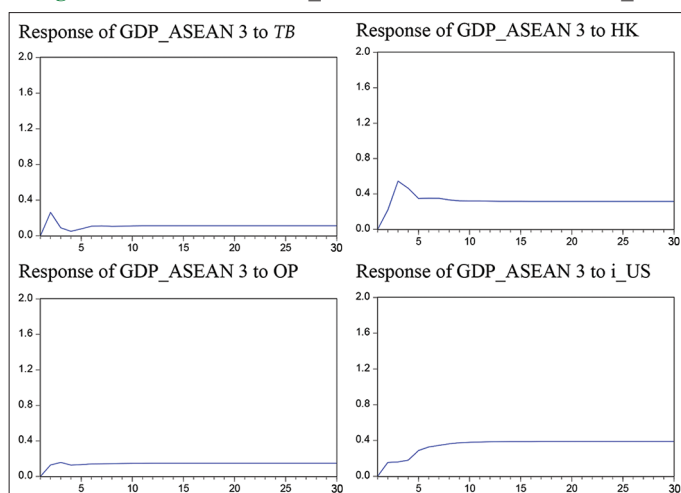
| Variables         | CointEq1     |
|-------------------|--------------|
| I_ASEAN3(t-1)     | 1.000000     |
| M2(t-1)           | -2.418759    |
| IP (t-1)          | -3.500763    |
| I_US (t-1)        | -0.269742    |
| OP (t-1)          | 0.009520     |
| C                 | 20.83207     |
| Variables         | D (I_ASEAN3) |
| CointEq1          | -0.000401    |
| D (I_ASEAN3(t-1)) | 0.377146     |
| D (I_ASEAN3(t-2)) | [0.0000]*    |
|                   | 0.101215     |
|                   | [0.0668]     |
|                   | 0.222708     |
|                   | [0.9221]     |
|                   | -0.293280    |
|                   | [0.8989]     |
|                   | 0.001509     |
|                   | [0.7757]     |
|                   | -0.002404    |
|                   | [0.5167]     |
|                   | 0.104035     |
|                   | [0.1743]     |
|                   | -0.022823    |
|                   | [0.7696]     |
|                   | 0.003912     |
|                   | [0.2310]     |
|                   | 0.007006     |
|                   | [0.0306]*    |

\*: Significant in alpha 5%

**Figure 2: Result of VECM stability test. (a) Model 1. (b) Model 2**



**Figure 3: IRF result of GDP\_ASEAN 3 to TB, HK, OP and i\_US**



prices. Export success is bolstered by rising global commodity prices, proving their importance to overall economic expansion. While GDP expansion in the ASEAN-3 is not tightly correlated to fluctuations in oil prices. This demonstrates that the global price of oil has little bearing on output in the ASEAN-3. The first-period adjustment in the United States Unconventional Monetary Policy has also contributed to economic growth in ASEAN 3.

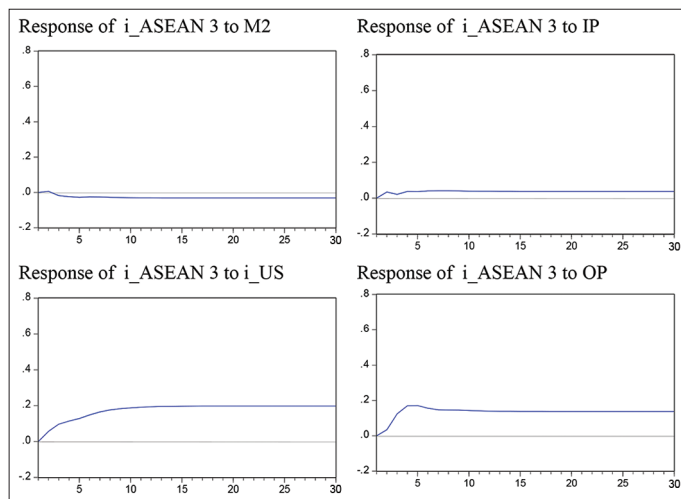
Figure 4 displays the reactions of ASEAN-3 monetary policy to the unconventional monetary policy of the United States and the price of oil worldwide. Negatively, the reaction of ASEAN 3 monetary policy to shifts in M2 is rather moderate. As a result, the monetary policy of the ASEAN 3 will have a negative effect on the growth of the money supply (M2). However, the ASEAN 3 monetary policy response to the shift in portfolio investments in the first period is muted. In the first phase, the ASEAN 3-level interest rate policy responds positively to the U.S. Unconventional monetary policy shift. This means that the United States' Unconventional Monetary Policy is considered when determining the interest rate for the ASEAN 3 countries. The interest rate policy of the Association of Southeast Asian Nations (ASEAN) 3 is heavily influenced by the price of oil on the global market. This demonstrates the crucial conclusions that

the three interest rate strategies of ASEAN were insufficient in their outreach towards inflation targeting as a direct outcome of fluctuations in global oil prices.

Insight into the relative contributions, fluctuations, and shocks of ASEAN-3 GDP, trade, commodity prices, world oil prices, and US interest rates can be gleaned from the results of variance decomposition. From what can be seen in Figure 5, the world commodity price contributed significantly to ASEAN 3's GDP in Period 5, but the world oil price contributed just somewhat. The IRF result for the 20<sup>th</sup> period shows that the US interest rate is the most important factor outside of the variable of GDP in ASEAN 3 itself, contributing as much as 3,799. At the same time, trade has a minor contribution towards the shock from the GDP in ASEAN 3. This contribution is expected to change over time.

Figure 6 presents the results of a VD test on the interest rate shock in ASEAN 3, demonstrating that the interest rate in ASEAN 3 significantly contributes to its variable. As time progresses, the US interest rate becomes the second most important determinant of the interest rate shock in ASEAN 3. The interest rate shock felt by ASEAN 3 in the 20<sup>th</sup> period is a combined result of the US interest rate (5.95%) and the price of oil (3.87%). Also, in the 20<sup>th</sup> period, M2 contributes 0.15% to the interest rate shock in ASEAN 3.

**Figure 4:** IRF result of the interest rates in ASEAN 3 to M2, IP,  $i_{US}$  and OP

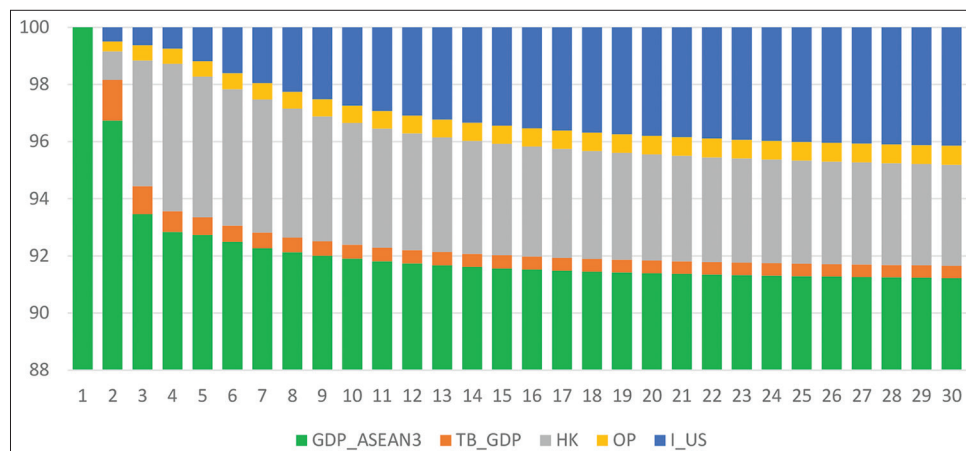


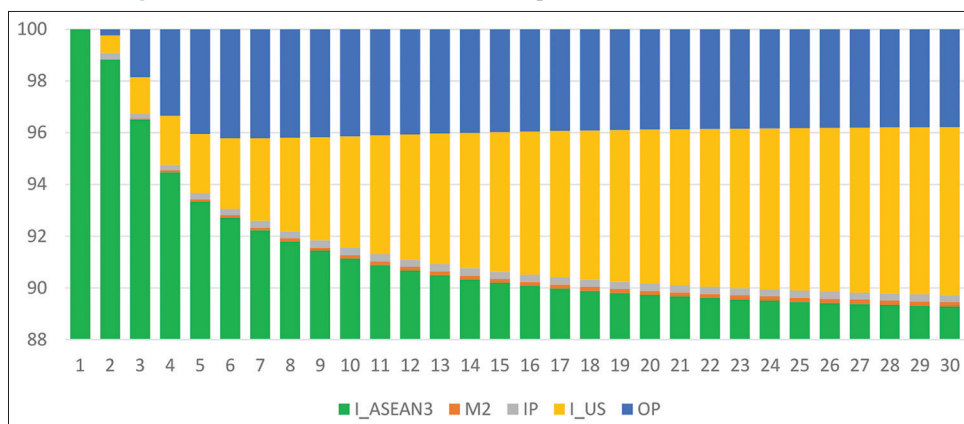
#### 4.1. The Discussion of Results in the Spillover Effect of US Unconventional Monetary Policy, Oil Price Shocks on Monetary Policy Reaction and Economic Growth in ASEAN 3

According to the VECM method's projected conclusion, the ASEAN interest rates, US interest rates set by the Fed, and the variable of global oil prices all have a substantial impact on the interest rates variable in ASEAN 3. Meanwhile, Money Supply, as measured by M2, is a variable that contributes modestly to the shock. This results from reforms to the monetary policy framework during the Asian financial crisis. The Asian economy is more buoyant and secure. The post-financial-crisis monetary policy framework developed by ASEAN 3 provides financial and cost predictability.

The monetary policy in ASEAN 3 is vulnerable to the change of the interest rates decided by the Fed because of the disintegration

**Figure 5:** The Result of Variance Decomposition of GDP\_ASEAN 3 Model 1



**Figure 6:** The result of the Variance Decomposition Test of ASEAN3 Model 2

of monetary policy among the nations and an improper response to the macroeconomic condition in the country. The Fed's interest rate move is the culprit, which in turn affects money moving through the financial markets of the ASEAN 3 countries. As (Hoque et al., 2019; Tran and Pham, 2020) noted, the ASEAN-3 monetary response is affected by fluctuations in the stock market. However, the Fed's interest rate change brought about volatility in the financial system and banking sector. The volatility of the stock market price index is a symptom of the instability in the financial system. Meanwhile, a procyclical credit index and a correspondingly volatile banking index are indicators of banking instability.

As noted by (Hoek et al., 2022; Shim and Shin, 2021; Trung, 2019), market participants' intolerance of the financial risk and rate of return on investment in EMEs (emerging market economies) makes them vulnerable to a shift in Fed policy. Because of this, EME will lose a lot of money in private investment during the second quarter of 2018. Despite the Fed board's best efforts, the market did not buy their explanation that the slowdown in Fed asset growth was unrelated to the policy of withdrawing federal funds above the Zero Lower Bound (ZLB). It drastically cut back on risky investments, particularly in emerging markets.

Contrarily, changes in the cost of oil around the world significantly impact commodity costs. Therefore, adjusting and strengthening monetary policy in ASEAN 3 by changing the interest rates policy and managing inflation according to domestic macroeconomic conditions in ASEAN 3 is required to maintain price stability and the financial market in ASEAN 3. Monetary policy in the ASEAN-5 countries can fluctuate in response to fluctuations in global oil prices (Pham et al., 2023; Rosnawintang et al., 2021). Monetary policy in ASEAN 3 is subject to change due to the transmission of oil price fluctuations to the macroeconomic situation.

Oil price fluctuations also affect the cost of other commodities around the world. Changes in ASEAN 3 economic growth are affected by fluctuations in global commodity prices. Falling global commodity prices may somewhat dampen interest in the export commodity. Economic growth in ASEAN 3 slows (Izraf et al.,

2015; Sibarani, 2019; Vogiatzoglou, 2019) because exports to trading partners reduce. As goods are transported along the trade route, economic growth slows due to falling global commodity prices.

The study on the direct and indirect effect of oil prices on the domestic consumer price index in ASEAN-3 (Indonesia, Malaysia, and The Philippines) revealed that the oil price in the pre-crisis period in ASEAN-3 (Indonesia, Malaysia, and The Philippines) did not directly affect the domestic consumer price, except Indonesia. However, changes in oil prices directly impacted domestic consumer prices in Malaysia, the Philippines, and Thailand (Razmi et al., 2016) Oil prices indirectly affected domestic consumer pricing in the post-crisis period because policymakers may set financial targets using stock prices and exchange rates. Except in Indonesia during the pre-crisis and post-crisis years, domestic lending was the monetary policy conduit most influenced by oil price changes.

## 5. CONCLUSION

Trade and financial liberalization have far-reaching consequences on the domestic economy, as the spillover effects show. Spillover effects on macroeconomic variables, especially the Central Bank's policy regarding economic growth and interest rate regulation, necessitate a thorough examination of the transmission channel through trade and finance. According to the research, the economic development of ASEAN 3 (Indonesia, Malaysia, and the Philippines) is highly impacted by global commodity price fluctuations via export and import channels. As the price of oil in the worldwide market rises (in US dollars per barrel), the Central Bank of the ASEAN 3 countries must adjust their interest rate policies accordingly. In contrast, the interest rate policy of the US Federal Reserve has a significant impact on economic growth fluctuations and policy shifts in the Central Banks of ASEAN 3. Each country's plan for ensuring economic stability should minimize drains on macroeconomic strength. In this circumstance, policymakers should push for urgent structural changes, boost global commodities, and fortify the financial system in preparation for the possibility of a global shock and the world's oil price fluctuation.



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