

THE IMPACT OF GLOBAL LIQUIDITY ON MACROECONOMIC AND FINANCIAL VARIABLES OF SELECTED SOUTHEAST ASIAN COUNTRIES: A PANEL VECTOR AUTOREGRESSION METHOD

(Dampak Likuiditas Global Terhadap Variabel Makroekonomi dan Keuangan Negara-Negara Terpilih di Asia Tenggara: Metode Panel Vector Regression)

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Abstrak

Tingkat keterbukaan keuangan di negara-negara maju dan berkembang di Asia Tenggara cenderung meningkat sejalan dengan melonggarnya peraturan devisa dan arus modal internasional. Aliran modal masuk ke negara-negara berkembang di Asia Tenggara (Indonesia, Malaysia, Filipina, dan Singapura) telah menunjukkan tren yang meningkat relatif terhadap PDB sejak berakhirnya krisis Asia. Sejalan dengan itu, kesadaran para pelaku ekonomi dan pembuat kebijakan di beberapa negara (Association of Southeast Asian Nations) ASEAN terhadap kerentanan kondisi ekonomi domestik terhadap fluktuasi likuiditas global juga semakin meningkat. Kami membangun metode yang mempertimbangkan keberagaman keuangan beberapa negara Asia Tenggara (SEA). Penelitian kami menganalisis response Indeks Harga Saham, inflasi, indeks harga konsumen dan GDP di beberapa negara SEA akibat gangguan dari variabel global seperti VOX, GDP dunia dan likuiditas dunia. Artikel ini menerapkan model PVAR (Panel Vector Autoregression) karena dinamika dan hubungan endogenitas antar variabel. Data panel terdiri dari beberapa negara Asia Tenggara dari tahun 2003 hingga 2019. Hasil penelitian menunjukkan bahwa shock pada variabel VOX, GDP dunia, dan likuiditas dunia memengaruhi inflasi dan GDP di beberapa negara SEA. Implikasi penelitian sangat relevan dimana terjadi perubahan yang sangat cepat mengenai likuiditas global dan VOX saat ini. Pemerintah di beberapa negara SEA harus memerhatikan perubahan pada variabel-variabel ini yang akan memengaruhi GDP dan Inflasi di beberapa negara SEA. Sumber-sumber perdagangan dan dukungan faktor input produksi sangat diperlukan untuk mempertahankan GDP dan inflasi di beberapa negara Asia Tenggara tetap terjaga.

Kata kunci: panel vector autoregression, global liquidity, impulse response function, cholesky decomposition

Abstract

The level of financial openness in developed and developing countries in Southeast Asia tends to increase in line with the loosening of foreign exchange regulations and international capital flows. Capital inflows to developing countries in selected Southeast Asia (Indonesia, Malaysia, the Philippines, and Singapore) have shown an increasing trend relative to GDP since the end of the Asian crisis. The awareness of economic actors and policymakers in the Association of Southeast Asian Nations (ASEAN) countries to the vulnerability of domestic economic conditions to fluctuations in global liquidity is also increasing. We developed a method that considers the financial heterogeneity of selected Southeast Asian (SEA) countries. Our research analyzes the response of the stock price index, inflation, consumer price index, and GDP in selected SEA countries due to disturbances from global variables such as VOX, world GDP, and world liquidity. This article applies the Panel Vector Autoregression model because of the dynamics and endogeneity between variables. The panel data consists of selected SEA countries from 2003 to 2019. The results show that the shock on the VOX variable, world GDP, and world liquidity affects inflation and GDP in selected SEA. The Governments in selected SEA countries must pay attention to changes in these variables that will affect GDP and inflation in selected SEA. Trade sources and support for production input factors are needed to keep GDP and inflation in selected SEA under control.

Keywords: panel vector autoregression, global liquidity, impulse response function, cholesky decomposition

INTRODUCTION

Arner & Schou-Zibell (2011) found that the global financial and economic crisis marked a significant turning point for Asia's financial and growth models. The current regional consensus supports the economy's rebalancing from a dominant focus on exports to developed markets towards a more balanced economic structure supported by domestic and regional financial developments. Index of financial disclosure in Aizenman, Chinn & Ito (2008) studies is based on four criteria: (1) the existence of several exchange rates in a country; (2) the number of restrictions on capital account transactions; (3) the number of restrictions on the current account

transactions; and (4) the existence of rules to submit export earnings to financial authorities .

Since the 1990s, global liquidity has tended to be looser, as reflected by monetary indicators such as aggregate monetary base and aggregated global money growing faster than output. This anomaly is commonly associated with the loose monetary policy adopted by developed countries in response to recessions, ranging from post-bubble Japan (early 1990s) and the US to the post-burst dot-com bubble (2001-2005). The monetary tightening that followed this period of loose policy was not fully able to absorb excess liquidity, and interest rates did not return to their original baseline (follow Aizenman, Chinn &

Ito (2008) and Belke, Orth & Setzer, (2010)). Many papers show the actions of central banks facing the global financial crisis. Central banks (CB) have used mixed policies to sustain price stability (Ermisoglu et al. 2014).

Another aspect of global liquidity that is often of concern is the accumulation of foreign exchange reserves, especially in Asia's developing and developed countries, such as China and Japan. For most of these countries, the accumulation of foreign exchange reserves is a rational response to anticipate the reversal of capital flows that can occur at any time and mitigate the negative impact of financial disclosures on exchange rate movements. However, this accumulation of foreign exchange reserves gives negative externalities to global financial stability. The majority are invested in financial instruments in developed countries and thus contribute to relaxing financial conditions in those countries (Arner & Schou-Zibell, 2011).

The concept of global liquidity is broad and has no clear boundaries, as described above, making empirical studies on this topic quite problematic. The essential issue in this regard is the lack of consensus on how best to measure global liquidity (Darius & Radde 2010). So far, monetary aggregates, particularly global broad money or excess relative to global nominal output, are the most commonly used measures in empirical studies (Samsi, Yusof & Cheong, 2018). Goyal (2013) provided helpful research concepts for studying global liquidity, particularly in Southeast Asian (SEA) economies. Vector autoregression (VAR) analysis used in his research revealed the heterogeneity of responses between countries to global liquidity shocks. The effect of global liquidity on macro and financial conditions in different countries is due to differences in economic structure of each countries. Darius & Radde (2010) found that global liquidity significantly impacted rising house and commodity prices in general. They did not consider the diversity of the unobserved economy. We propose an economic framework that expands the impact of global liquidity on the degree of variation between countries. Global liquidity triggers dynamic changes in the economy of various countries. As part of the world economy, SEA is not immune from economic changes. Our research adopts a method that can dynamically consider the economic heterogeneity of various countries. The elements of heterogeneity are represented in the form of panel data. The concept of dynamics was developed from the VAR method. This environmental diversity is implemented in the Panel VAR (PVAR) model.

Changes in the global economy that have occurred so far cannot be avoided, causing changes in regional economies such as in ASEAN. This study aims to estimate changes that occur in selected global economic variables, namely global GDP, and global commodity prices, due to shocks to global liquidity. In this case, the shock of drastic changes in the amount of USD (United States Dollar) money supply and world financial volatility (CBOE index). Analysis methods and strategies are needed to produce relevant analysis. For this reason, we propose a dynamic analysis of the Panel VAR to estimate the response that occurs in several economic indicators for selected SEA country, namely CPI, GDP, exchange rates, and interest rates. The research gap can be explained as follows. First, this study uses a dynamic panel model that captures responses due to disturbances in global liquidity. In previous studies, the data used was partial data from one country (Raghavan & Devadason, 2020 and Thanh & Lan, 2017). Second, data from selected SEA countries that capture the heterogeneity of the ASEAN economy, are considered in the study. In previous studies, it was assumed that the heterogeneity of the country's economy did not exist. This research is based on the concept of dynamics occurring in all variables, so the most appropriate model is the Panel VAR. In previous studies, the model applied was a dynamic panel (Generalized Methods of Moments Pnel (GMM Panel)), because dynamics only occurs in the dependent variable.

The usefulness of the research, specifically for the DPR Commission XI which handles issues of Banking, Finance, and National Development Planning, must monitor developments in the international economy and global liquidity. Global liquidity is based on inherently unstable dynamics. In the development of the global economy, fluctuations in global liquidity were more extreme than those at the domestic level. It is hoped that this study will be able to present integrated policies between monetary (through exchange rates and interest rates) and fiscal policies through prices and financial markets (through stock prices) to maintain better economic growth.

METHODS

Types and Sources of Data

We obtain data from International Financial Statistics (IFS), Bloomberg LP, and the Central Statistics Agency (BPS). Data is logarithmic, except for global GDP, global GDP deflator, and interest rates. To minimize the seasonality of the data, the authors apply the Census X12 procedure to the data at the level and use the year-on-year differential for the first differential.

Table 1. Data Sources

Variable	Sources	Definition
Global inflation using a global GDP deflator ()	IFS	Variables show increases in prices and goods due to increased demand for goods, etc.
Real global output (), g	IFS	The total output of the world economy at constant prices
Global US Dollar supply (),	IFS	The money supply (or money stock) refers to the total volume of currency held by the public at a particular time.
CBOE Volatility Index (),	Bloomberg	The VOX variable is the ticker symbol and the popular name for the CBOE (Chicago Board Options Exchange) Volatility Index. This value is the expected stock market volatility based on the S&P 500 index.
Global commodity price index (),	Bloomberg	A value represents the global market price. Prices are the average period of each ASEAN country in US dollars.
Consumer price index of country i	IFS	The consumer price index (CPI) is an index number that measures changes in the prices of goods and services obtained by households. Represents the country's GDP
Real output of country (),		The variable that measures the interest rate under the prevailing interest rate in the money market
Nominal money market interest rate (),	IFS	The variable that measures the interest rate under the prevailing interest rate in the money market
Nominal effective exchange rate of country (),	IFS	NEER measures a currency's value against a weighted average of several major foreign currencies.
Stock price index country ()	CB	Market stock index, which helps investors compare current stock prices to see market performance. IHSG (Indonesia), KLCI (Malaysia), PSEi (Philippines), dan FTSE-STI (Singapore)

We selected Malaysia, the Philippines, and Singapore based on their completeness and contrasting characteristics with Indonesia. Malaysia and Singapore have high financial depth. and capital/GDP flows. Malaysia's level of financial openness is much lower than Singapore's. The Philippines, on the other hand, has a level of financial depth on par with Indonesia. Financial depth is measured as a credit to GDP or capital market capitalization to GDP (Figure 1).

and 159.4 percent; the Philippines, 35.3 percent and 78.4 percent; Singapore, 152.7 percent and 194.0 percent (Bloomberg LP, processed).

Research Methods

The term liquidity may refer to two concepts, namely market liquidity or the ease of converting an asset into a means of exchange or money, and funding liquidity or the ease of obtaining financing. A financial market is called a liquid if the above transactions can

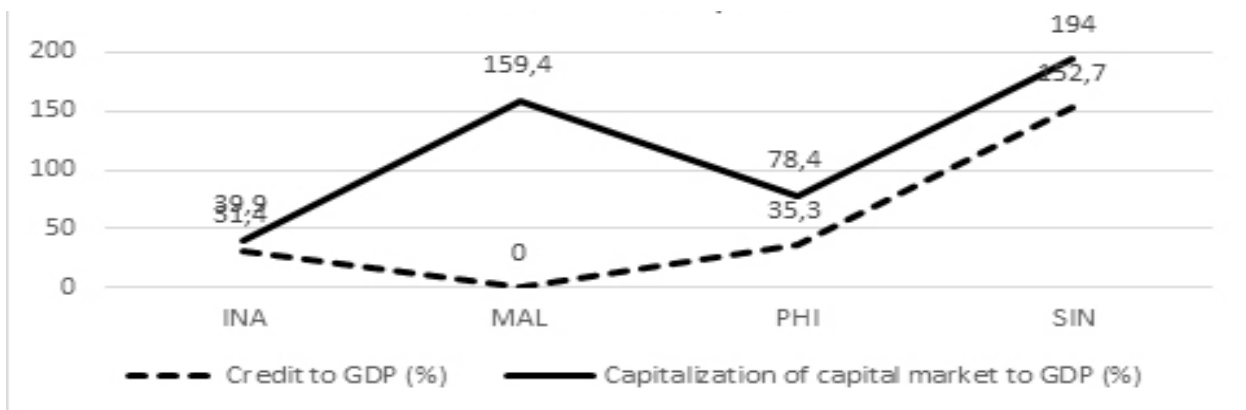


Figure 1. Financial Depth in Four Countries

For the four countries studied, the two ratios at the end of 2013 were as follows: Indonesia, 31.4 percent and 39.9 percent; Malaysia, 119.5 percent

be made without significantly affecting the price of the asset - or the financing. Although different, these two things are interrelated. Tight financing reduces

an investor’s chance to take a position on the asset, while a lack of liquidity of an asset will reduce its function as a guarantee for financing (Brunnermeier & Pedersen, 2009). According to Domanski, Fender, and McGuire (2011), the interaction between the two is what constitutes liquidity at the aggregate or macro level, namely the availability of funds in the economy as a whole. In the literature, this aggregate liquidity is generally identical to monetary aggregates, especially in broad definition such as M2. Frenkel & Razin (1987) retold the Mundell-Fleming model of balance in the goods market (IS), money market (LM), and the forex market (BOP) in an open economy as follows:

$$Y_t = A_t(r_t) + NX_t(s_t, Y_t, Y_t^*) \dots\dots\dots (1)$$

$$L_t(r_t, Y_t) = M_t(R_t)/P \dots\dots\dots (2)$$

$$\Delta R_t = NX_t(s_t, Y_t, Y_t^*) + K_t(r_t - r_t^*) \dots\dots\dots (3)$$

Equation (1) explains that the domestic absorption (A_t) and net export (NX_t) affect domestic output (Y_t). The NX variable is affected by domestic output, external output (Y_t^*), and nominal exchange rate (s_t). Domestic absorption as a function of the domestic interest rate (r_t). Equation (2) describes the relationship in the money market (LM). The balance occurs between money demand (L_t) and money supply (M_t) at the price level (P_t) and certain foreign exchange reserves (R_t). Equation (3) describes the relationship of foreign exchange reserve (ΔR_t) changes. Foreign exchange reserve will increase if there is an increase in NX_t and net capital inflow (K_t). Capital net inflow is caused by the domestic and foreign interest rates (r_t^*) difference. This model assumes that prices have not changed in the observed period, while expectations of exchange rate changes do not affect the flow of capital into a country.

The Mundell-Fleming framework explains that the expansion of global liquidity creates an expenditure-switching effect that harms the recipient country unless the monetary authority in that country responds by loosening domestic liquidity conditions. Expenditure-switching is the tendency of the recipient country to shift consumption from domestic goods to imported goods or in the opposite direction in the source country of the liquidity expansion. Monetary authorities face a tradeoff between maintaining output and price stability. The monetary authority can adjust the two through interest rate and exchange rate instruments. Although not reflected in the model with fixed prices above, the increase in domestic prices is a consequence of the expansion of domestic liquidity according to the quantity theory of money. In financial market conditions where the diffusion of information takes place relatively quickly, the price adjustment of financial assets tends to occur earlier than the goods’ prices (Mitra, 2010).

According to the above model, the spillover effect of global liquidity expansion on a small open economy with perfect capital mobility occurs primarily through capital flows to the country. This is due to lower external interest rates on domestic interest rates. The effect of capital flows on output, inflation, and stock prices depend on their exchange rate regime. Equation (3) describes the foreign exchange market’s balance mechanism. In a fixed exchange rate regime, the balance of the foreign exchange market is achieved through an increase in foreign exchange reserves. The increase in foreign exchange reserves will increase the supply of money in countries that receive capital flows will experience an increase in money supply due to the rise in foreign exchange reserves. An increase in money supply causes the LM curve to shift to the right, causing interest rate cuts and output to change to higher

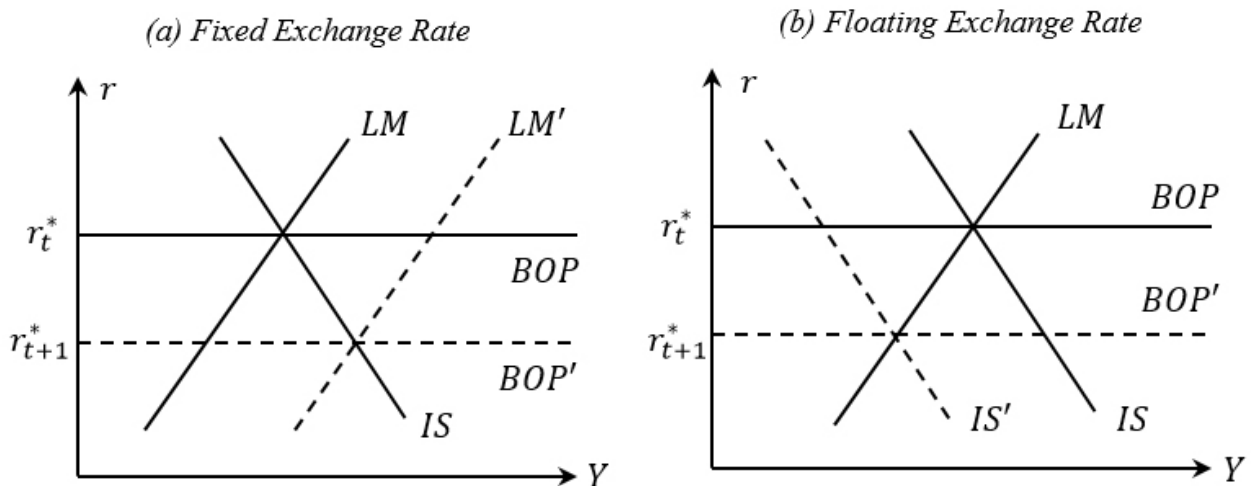


Figure 2. Expantionary Shock at Global Liquidity, Mundell-Fleming Model

levels (Figure 2a). In a floating exchange rate regime, capital inflows will lead to currency appreciation and decrease the competitiveness of export products. The drop in exports will depress output smaller (Figure 2b).

The expansion of global liquidity, within the framework of Mundell-Fleming, creates an expenditure-switching effect (the tendency to divert consumption from domestic goods to imported goods, or to the reverse direction in the source country of such liquidity expansion) which tends to harm the recipient state, monetary measures in the country responded by contributing to loosening the condition of domestic liquidity (Mitra, 2010). Liquidity in the global safe asset market is identified by monetary aggregate (M_t), while a risk premium of (R_t) projects liquidity in global risk asset markets. The global economy is modeled according to the equation:

$$out_t^* = E_t out_{t+1}^* - \frac{1}{\rho} (ir_t^* - E_t \Delta cpi_{t+1}^*) \dots\dots (4)$$

$$\varepsilon(ms_t^* - cpi_t^*) = -\frac{\beta}{1-\beta} ir_t^* + \rho \cdot out_t^* \dots\dots (5)$$

$$\Delta cpi_t^* = \beta \cdot E_t \Delta cpi_{t+1}^* + \rho \cdot \kappa \cdot out_t^* \dots\dots (6)$$

Equations (4) and equation (5) are the equations of money in the goods market (IS) and (LM) separately. Equation (4) describes the relationship between global output (out_t^*) which is determined by global output expectations ($E_t out_{t+1}^*$), global interest rates (ir_t^*) and expectations global inflation ($E_t \Delta cpi_{t+1}^*$). The difference between interest rates and global inflation expectations will affect global output levels (Ciccarelli & Mojon, 2010). Equation (6) describes the balance between the global money supply (ms_t^*) with interest rates (ir_t^*) and global output (out_t^*). This relationship is similar to equation (2). Equation (6) describes the Phillips curve, where there is a relationship between output (out_t^*) and global inflation (Δcpi_t^*).

The three equations explain the effect of increasing global liquidity on several global variables. In the global safe asset market, the increase in global liquidity (ms_t^*), will lead to a decrease in global interest rates, an increase in global output, and an acceleration of global inflation. For a small open economy, the output and domestic inflation rate is modeled as a function of the past value, current value, and expected future value of global output (Y^*), global inflation (ΔP^*), domestic interest rate (ir), nominal exchange rate (s_t), and real exchange

$$Y = f(Q, Y^*, \Delta P, ir) \dots\dots (7)$$

$$\text{where } \frac{\partial Y}{\partial Q} > 0; \frac{\partial Y}{\partial Y^*} > 0; \frac{\partial Y}{\partial (\Delta P)} > 0; \frac{\partial Y}{\partial ir} < 0$$

$$\Delta P = f(\Delta S, \Delta P^*, \Delta Y) \dots\dots (8)$$

$$\text{where } \frac{\partial (\Delta P)}{\partial (\Delta S)} > 0; \frac{\partial (\Delta P)}{\partial (\Delta P^*)} > 0; \frac{\partial (\Delta P)}{\partial (\Delta Y)} > 0$$

Meanwhile, the nominal exchange rate is assumed to move in accordance with the uncovered interest rate parity, namely:

$$E_t \Delta s_{t+1} = ir_t - ir_t^* + rpm_t \dots\dots (9)$$

We assume that the central bank has a degree of monetary independence γ , so interest rate movements will partially follow the domestic targets, which is named by follow the Taylor rule:

$$ir_t = \gamma[\tau + \phi(out_t - \overline{out}) + \varphi(\Delta cpi_t - \overline{\Delta cpi})] + (1-\gamma)ir_t^* \dots (10)$$

Equation (10) describes the following monetary policy pattern with $0 < \gamma < 1$. The γ is the coefficient of liquidity expansion in the global safe asset market, positively impacting inflation, domestic asset prices, and output. If the exchange rate appreciates, it will be offset by increasing inflation to a certain point. The expansion of liquidity in the global risk asset market rpm_t will have a spillover effect in the same direction (Mahdi & Abbes 2018).

Findings in the relevant literature on this research can be summarized as follows. The growth of monetary aggregates has been decoupled from the growth of global output, resulting in what is called excess liquidity. Brana, Djigbenou & Prat (2012) found structural breaks on this excess liquidity growth in 1995, wherein subsequent periods showed a higher and persistent rate of growth. Mitra (2010) and Arner & Schou-Zibell (2011), found positive effects of global liquidity on the price of various commodities. Meanwhile, Debata & Mahakud (2018) found a positive response to house prices on global liquidity expansion.

Researchers use PVAR for endogenous data. According to Greene (2018), several purposes for using panel data include: first, panel data can consider heterogeneity from various selected countries; second, the application of panel data involves unobserved variables coming from variables outside the model; third, able to reduce collinearity

between variables; and fourth, panel data estimation can minimize the bias generated by individual aggregation because there are more data units. The Fixed Effect model in PVAR is expected to capture unobserved variables from various countries.

The method stage begins with determining the PVAR analysis method according to the research objectives. In the second stage, the researcher determines the variables' transmission order to construct the Cholesky decomposition. The third stage tests the unit root panel to determine the level of data integration. The fourth stage determines the exact individual effect. Alternative testing between general, fixed, and random effects uses the Wald and Hausmann test. The fifth stage determines the lag optimization.

The discussion of research results begins with an explanation of the description of the data and continues with data testing and model selection. The steps for selecting the model are presented as follows: selecting the variable transmission array (cholesky decomposition), panel data cointegration test and optimal lag test. Subsequent analysis observes response patterns due to global liquidity disruptions.

In the first stage, this study determines PVAR as an analytical method. The full description of the PVAR model is described in Ekananda (2017a) and Sousa & Zaghini (2007) for the research of the interaction of banking variables using PVAR. As explained in equations (4) to (10), the variables analyzed are mutually endogenous. Briefly, the PVAR framework is described as follows, the system of structural equations (11), where Y_t is the vector of the n endogenous variable, $B(L)$ is the matrix $n \times n$ lag operator for Y_t , and e_t is error terms:

$$\Gamma Y_t = B(L)Y_t + e_t \dots\dots\dots (11)$$

This article follows Ekananda & Suryanto (2021) obtaining impulse response function (IRF). We adopted the PVAR prototype program created by Love et al. (2002) uses STATA programming. Love (2002) also applied the matrix structure proposed by Rosen (1988) and Ekananda (2017b) to calculate the parameter β . The estimation results are parameters that collect all the information obtained from global economic data and selected SEA countries.

Second stage composes the variable transmission sequence. We form a PVAR where there are fixed effects, exogenous restrictions, control variables, and Cholesky decomposition. Control variabel yaitu consumer price index of country i (cpi_t^i), output (gdp_t^w), and the global commodity price index (com_t^w). This variable acts as a control over the

PVAR model (Debata & Mahakud, 2018). Cholesky decomposition is applied by arranging endogenous variables. In general, the arrangement of endogenous variables designates the transmission of the impact of global variables on domestic variables. The author lists the variables in this study as follows.

$$Y_t' = [cpi_t^w, gdp_t^w, msup_t^w, vox_t^w, com_t^w, cpi_t^i, gdp_t^i, ir_t^i, neer_t^i, stock_t^i] \dots\dots (12)$$

Equation (12) explains that the order of the variables gets to the right, the more endogenous it is. The left side is the global variable, while the right side is the country variable in selected SEA. The analysis was developed by measuring the response of the variables of selected SEA countries in the event of disturbances in global variables. Meanwhile, asset prices such as commodities (com_t^w), and stocks are placed most recently on their respective blocks, in accordance with the efficient market hypothesis in which financial markets can react instantly to new information may shape expectations of the asset's price (Goyal, 2013). Based on the same framework, the VOX index (vox_t^w) as an indicator of the derivative market, in this case the option, is placed after the global GDP (gdp_t^w), and money supply ($msup_t^w$).

Specifically, STATA provides do-files: pvar.ado, pvarirf.ado. To make it easier for readers to follow the stages of data processing, the following: `syntax : pvar cpiw gdpw msupw vox comw cprii gdpi iri neeri stocki, lags(2) fod and syntax : pvarirf, impulse(msupw vox) response(comw) step(15) porder (cpiw gdpw msupw vox comw cprii iri gdpi neeri stocki) oirf`. Note that the ordering variabel under the orthogonally cholesky setting in the porder().

This ranking draws on theory and literature on the transmission of monetary shocks (Abeygunawardana et al., 2017) and follows the strategy used in previous studies on global liquidity (Sousa & Zaghini, 2007). The global variable block is placed before the domestic variable block to avoid the emergence of contemporary effects of domestic variables on global variables. The order corresponds to the assumption that a shock in a small open economy such as Indonesia cannot affect global economic conditions. Inflation is placed first in each block, according to the assumption of nominal rigidity in the Keynesian/neo-Keynesian model where the price level only adjusts for shocks in other variables after a certain lag. The global price level is only determined by the previous realization of other global variables. In contrast, the domestic price level is determined by the lag of domestic and global variables and the contemporary realization of global variables. Output is placed after

inflation but before liquidity/monetary variables and asset prices (commodities, stocks), following the findings of Abeygunawardana, et al. (2017) that output and inflation only react to liquidity shocks after a certain lag.

We describe PVAR and VAR in this paper as a data matrix that will help researchers perform IRF and Variance Decomposition analysis. The fundamental difference between PVAR and VAR lies in the data structure that adopts behavior between individuals and dynamic behavior between variables. Continue equation 11, the PVAR used uses the estimator concept proposed by Holtz-Eakin (1988). In the case of a Panel VAR, a data set consists of $i = 1, 2, \dots, N$ individuals. Each individual has $t = 1, 2, 3, \dots, T$ period. The following is an example of model 1 where the W matrix consists of 10 endogenous variables cpi_t^w , gdp_t^w , $msup_t^w$, vox_t^w , com_t^w , cpi_t^i , gdp_t^i , ir_t^i , $neer_t^i$, and $stock_t^i$. The arrangement of the PVAR(1) equations which consist of 10 equations, are:

$$\begin{aligned} cpi_t^w &= \beta_{10} + \beta_{11}cpi_{t-1}^w + \beta_{12}gdp_{t-1}^w + \beta_{13}msup_{t-1}^w + \dots + \alpha_{110}stock_{t-1}^i + \varepsilon_{1,it} \\ gdp_t^w &= \beta_{10} + \beta_{11}cpi_{t-1}^w + \beta_{12}gdp_{t-1}^w + \beta_{13}msup_{t-1}^w + \dots + \alpha_{110}stock_{t-1}^i + \varepsilon_{2,it} \\ &\dots \\ stock_t^i &= \beta_{10} + \beta_{11}cpi_{t-1}^w + \beta_{12}gdp_{t-1}^w + \beta_{13}msup_{t-1}^w + \dots + \alpha_{110}stock_{t-1}^i + \varepsilon_{10,it} \end{aligned} \dots (13)$$

The matrix structure for Panel VAR, different with time series data for VAR. Where cpi_t^w and $cpi_{(t-1)}^w$ are vector, the dimension is $[T-(m+2)+1]N \times 1$.

$$cpi_t^w = \begin{bmatrix} cpiw_{1,m+2} \\ \dots \\ cpiw_{N,m+2} \\ cpiw_{1,m+3} \\ \dots \\ cpiw_{N,m+3} \\ \dots \\ cpiw_{1,T} \\ cpiw_{N,T} \end{bmatrix}, cpi_{t-1}^w = \begin{bmatrix} cpiw_{1,m+1} \\ \dots \\ cpiw_{N,m+1} \\ cpiw_{1,m+2} \\ \dots \\ cpiw_{N,m+2} \\ \dots \\ cpiw_{1,T-1} \\ cpiw_{N,T-1} \end{bmatrix} \dots (14)$$

The other variables (gdp_t^w , $msup_t^w$, vox_t^w , com_t^w , cpi_t^i , gdp_t^i , ir_t^i , $neer_t^i$, $stock_t^i$), follow the $cpiw$. $W_{cpiw,it-1}$ is a diagonal block consisting of a matrix w . Here $W_{gdpw,it-1} = W_{msup,it-1} = W_{vox,it-1} = \dots = W_{stocki,it-1}$ according to variable name. The matrix format is

$$W = \begin{bmatrix} w_{m+1} & 0 & 0 & 0 & 0 & 0 \\ 0 & w_{m+2} & 0 & 0 & 0 & 0 \\ 0 & 0 & w_{m+3} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \dots & \dots \\ 0 & 0 & 0 & 0 & \dots & w_T \end{bmatrix} \dots (15)$$

Matrix w_{m+1} and w_{m+2} have Dimension $[T-(m+2)+1] \times K$ consists of data lag variables cpi_t^w , gdp_t^w , $msup_t^w$, vox_t^w , com_t^w , cpi_t^i , gdp_t^i , ir_t^i , $neer_t^i$,

and $stock_t^i$ that are

$$w_{m+1} = \begin{bmatrix} 1 & cpiw_{1,m+1} & 0 & gdpw_{1,m+1} & \dots & stocki_{1,m+1} \\ 1 & cpiw_{2,m+1} & 0 & gdpw_{2,m+1} & \dots & stocki_{2,m+1} \\ 1 & cpiw_{3,m+1} & 0 & gdpw_{3,m+1} & \dots & stocki_{3,m+1} \\ \dots & \dots & \dots & \dots & \dots & \dots \\ 1 & cpiw_{N-1,m+1} & 0 & gdpw_{N-1,m+1} & \dots & stocki_{N-1,m+1} \\ 1 & cpiw_{N,m+1} & 0 & gdpw_{N,m+1} & \dots & stocki_{N,m+1} \end{bmatrix} \dots (16)$$

The next step we combine all the equations into G_{it} matrix. Matrix G_{it} is dependent and G_{it-1} is independent with dimension $[T-(m+2)+1]M \times N \times 1$. For 5 variables, where M is the number of variables and N is the number of sections, then the dimensions of the matrix G_{it} and G_{it-1} are $[T-(m+2)+1]5N \times [T-(m+2)+1]M \times K$. The matrix format G_{it-1} is

$$G_{it-1} = \begin{bmatrix} W_{cpiw,it-1} & 0 & 0 \\ 0 & \dots & 0 \\ 0 & 0 & W_{stocki,it-1} \end{bmatrix} \dots (17)$$

PVAR is condensed into

$$G_{it} = \beta_0 + \sum_{l=1}^{m+1} \beta_{lt} G_{it-l} + \delta X_{it} + \varepsilon_{it} \dots (18)$$

Greene (2018) states that the unbiased estimator

$$\hat{\beta} = (W'_{it-1} V^{-1} W_{it-1})^{-1} W'_{it-1} V^{-1} Y_{it} = (\sum_{i=1}^n \sum_{j=1}^n \sigma^{ij} W'_i)^{-1} (W_j \sum_{i=1}^n \sum_{j=1}^n \sigma^{ij} W'_i Y_j) \dots (19)$$

RESULTS AND DISCUSSION

Third stage, test the unit root test. Either Phillips-Perron test with lag = 3 benchmark below (Table 2) or ADF and Phillips-Perron test with different specifications, indicate that the majority of variables in this study are integrated in order one (I (1)), although some may be covariance-stationary or trend-stationary at the level. Especially for GDP and the global GDP deflator, the data obtained from IFS has been a year-on-year growth percentage, so that the existence of the unit root at the level can not be known. The hypothesis of a unit root is denied for global GDP growth, but can not be denied for global inflation (GDP deflator growth).

The fourth stage researcher select the individual effect. STATA provides analysis only for the fixed effect and common effect. Research chooses analysis with a fixed effect model compared to the common effect. The fifth stage determines the lag optimum. Based on Hannan-Quinn (HQIC) and Schwartz Bayesian (SBIC) information criteria, the VAR model with maximum lag one (VAR (1)) is the most appropriate for the complete model without lag restriction, while the same criteria application for each block is separately leads to the VAR (1) or VAR (2) model. When analyzing the global economic response, we

Table 2. Phillips-Perron Test

Variable	1 st Diff	Variable	1 st Diff
Dollar AS supply ($msup_t^w$)	-2.909**	NEER of Malaysia ($neer_t^{mal}$)	-3.560***
CBOE Volatility Index (vox_t^w)	-4.525***	Stock price index of Malaysia ($stock_t^{mal}$)	-3.938***
Real Global GDP (gdp_t^w) ++)	-3.571***	Real GDP of Philippine (gdp_t^{phi})	-3.349**
Global GDP Deflator (cpi_t^w)	-1.672	CPI of Philippine (cpi_t^{phi})	-3.596***
Commodity Price Index (com_t^w)	-4.016***	IR of Philippine (ir_t^{phi})	-5.502***
Real GDP of Indonesia (gdp_t^{ind})	-3.059**	NEER of Philippine ($neer_t^{phi}$)	-3.950***
Consumer Price Index (CPI) of Indonesia (cpi_t^{ind})	-3.415**	Stock price index of Philippine ($stock_t^{phi}$)	-3.774***
Interest rates (IR) of Indonesia (ir_t^{ind})	-3.808***	Real GDP of Singapore (gdp_t^{sin})	-4.405***
NEER Indonesia ($neer_t^{ind}$)	-3.766***	CPI of Singapore (cpi_t^{sin})	-3.064**
Stock price index of Indonesia ($stock_t^{ind}$)	-3.733***	IR of Singapore (ir_t^{sin})	-3.918***
Real GDP of Malaysia (gdp_t^{mal})	-3.628***	NEER of Singapore ($neer_t^{sin}$)	-3.554***
CPI of Malaysia (cpi_t^{mal})	-3.618***	Stock price index of Singapore ($stock_t^{sin}$)	-3.984***
IR of Malaysia (ir_t^{mal})	-3.595***		

++) Break point in 1995Q1 For subsequent data, $\tau = -7.149$ ****) Uji Phillips-Perron is done with lag Newey-West = 3, with intercept and without trend

) Significant for level of confidence: * 90% ** 95% *99%

use the same optimal lag for the economic response analysis of the 4 selected SEA countries. The optimal lag is 1, where the order arrangement and the PVAR matrix are under equations 12 and 13. This PVAR identifies the response analysis in a system of equations. The orthogonal relationship between global liquidity variables aims to establish a macro-variable transmission in accordance with the findings of Bekaert, Hoerova, and Lo Duca (2013). According to them, loose monetary policy may decrease market uncertainty, which is significantly affected by the VOX index. If this is true, the presence of macro-variable shock will be characterized by depreciation of risky liquidity coupled with a safe liquidity expansion, thus reducing the significance of the positive relationship between the two in the long term.

To test this opinion, the authors made an estimate on the PVAR model in the period 2009Q3 - 2019Q2. The impulse response application through PVAR

shows some of the following results. Starting from the simulation of the shock on VOX and increased supply of USD on a global scale (Figure 3). Response is directed to three other global variables: , dan . The result of the ASEAN IRF simulation is a combination of all the countries of Indonesia, Malaysia, Philippine and Singapore.

The figure (3) on the left shows that the shock occurring in VOX (vox_t^w) and increased supply of USD ($msup_t^w$) responded positively by global GDP (gdp_t^w). In accordance with otogonal structure, where the transmission sequence starts from cpi_t^w , gdp_t^w , $msup_t^w$, vox_t^w and com_t^w . Shock on vox_t^w and $msup_t^w$ result in response gdp_t^w starting from zero then rising positively. An increasingly positive value indicates a greater response until the upcoming fourth quarter and then declines until there is no change in the upcoming 10th quarter. The results of the regression and IRF analysis cannot be separated

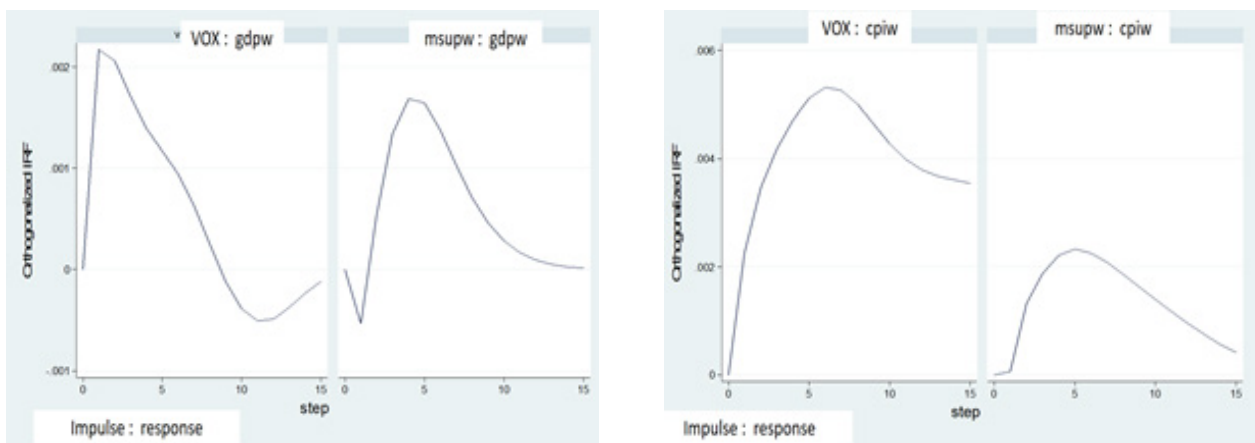


Figure 3. IRF, Global GDP Response (Left) and Global Inflation (Right) due to Global Liquidity Indicator Shock

from the transmission of economic variables that have been defined in equation 12. Changes in global liquidity will be transmitted through changes in world prices (cpi_t^w), then an increase in world prices will reduce consumption levels. Globally, an increase in reduced consumption will result in a contraction in the GDP and money supply. This transmission is expected to be recorded via the responses to gdp_t^w and $msup_t^w$.

The response experienced by global inflation also shows similar behavior. The response starts from zero and then rises positively to the maximum point in the forthcoming 5th quarter. We know that a contraction in the supply of USD and global GDP occurred in 2020. In a short time, there was an increase in VOX and supply of USD in 2021 (Schneider, 2022). The shock to the increase in the supply of USD was driven by the need for world economic recovery after the 2019 covid pandemic. The results of this study are in accordance with Makun & Jayaraman (2021). Global USD and GDP supply stabilized as various economic factors began to adjust.

The equation 12 derives the transmission of $msup$ changes toward commodity prices through changes in world prices and decreases in world consumption. Figure (4) describes the response com_t^w due to shock to VOX (left for vox_t^w) and increased supply of USD (right for $msup_t^w$). The com_t^w was response positive at the beginning of the period. Due to the orthogonal structure, the response com_t^w is positive at the beginning of the period, then according to the zero level in the 5th quarter. The response of com_t^w due to shock $msup_t^w$ start from zero, then positive rise to a peak in the 5th quarter. The next period

We summarize the processed results for the response gdp_t^w and cpi_t^w due to shock to $msup_t^w$ and vox_t^w in the table 3. The expansionary shock on the vox_t^w index has a positive and significant impact on output, inflation, and global commodity prices, although its effect on output and commodity prices is muffled (insignificant) after 1-5 quarters. On the other hand, the global US dollar supply shows no significant effect except contemporaneously on global output, it is not robust against alternative sequences in Cholesky decomposition. The results of this study are in accordance with Prasad et al. (2022), which discusses the dynamics and changes in the world economy towards the CBOE VIX index (VOX). Likewise, changes in the VOX variable on the world economy occur simultaneously to increase global GDP. ASEAN experienced an expansion in GDP due to changes in the global economy.

The (+) sign represents a positive and significant response, the sign (-) indicates a negative and significant response; the figure shows the t-quarter after the shock at which the response is significant. IRF estimates are only made until the 12th quarter after the shock. A significant shock in the 12th quarter may still be significant until a few quarters later. Significance at 80 percent confidence level. The study used the PVAR model for Indonesia, Malaysia, Philippine, and Singapore in the period after the global financial crisis. Following the analysis of the global bloc above, this study uses the first estimates as a benchmark for the effects of liquidity shock on the global risk assets market vox_t^w and the second estimate as a benchmark for the effects of liquidity shock on the global safe asset market $msup_t^w$, as

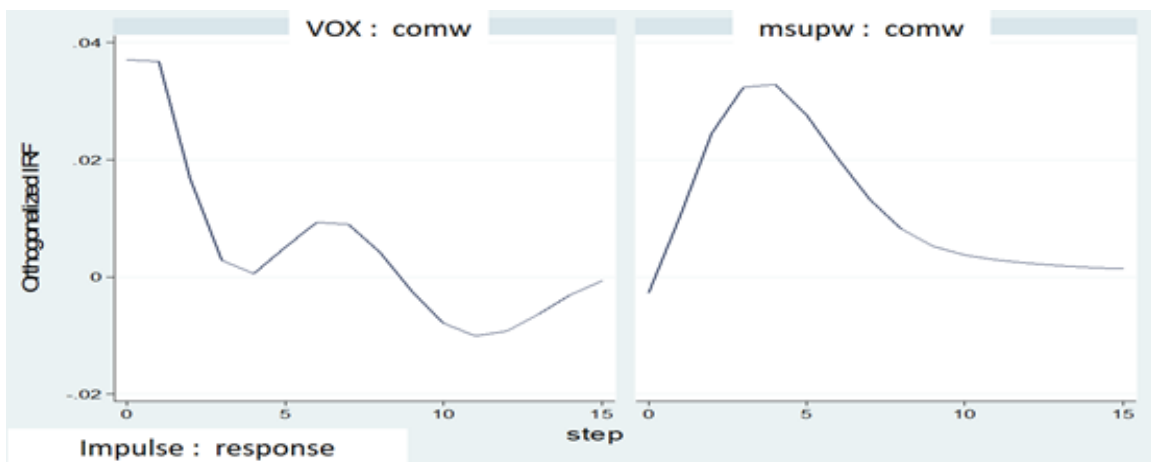


Figure 4. IRF, Global Response Commodity Index (com_t^w) due to Global Liquidity Indicator Shock

decreases until the response disappears around the 10th quarter.

Matsumoto (2011).

Figure (5) describes the response of selected SEA

Table 3. IRF, Shock of Global Liquidity to Global Macro Variables

	Impulse	Responses		
		Global Output (gdp _t ^w)	Inflation Global (cpi _t ^w)	Global Commodity Price (com _t ^{^w}) see fig 4
0 – peak	VOX Index (vox _t ^w)	(+) 0 – 1	(+) 0 – 5	(+) 0 – 4
	USD Supply (msup _t ^w)	(+) 1 – 5	(+) 0 – 5	(+) 0 – 4
Peak – turning	VOX Index (vox _t ^w)	(+) 1 – 7	(+) 5 – 10	(+) 4 – 8
	USD Supply (msup _t ^w)	(+) 5 – 12	(+) 5 – 10	(+) 4 – 10

country capital market indices (stock_tⁱ) due to shock on (vox_t^w) and increased supply of USD (msup_t^w). stock_tⁱ response is positive at the beginning of the period. Due to the orthogonal structure, the positive (stock_tⁱ) response is at the beginning of the period, then according to the zero level in the 10th quarter. Response stock_tⁱ due to shock msup_t^w starts from zero then rises positively to its peak in the 2nd quarter. The next period decreased until negative in the 9th quarter. Negative responses show less impact. The impact is then smaller and disappears. This result follow Bressan & Weissensteiner (2021).

We summarize the processed results for the response Stock Price Index (stock_tⁱ) due to shock to msup_t^w and vox_t^w in the Table 4. The graph is depicted in Figure 5.

Time	0 – peak	Turning	Long run
VOX Index (vox _t ^w)	(+) 0 – 1	(+) 1 – 8	(+) 8 – ~
USD Supply (msup _t ^w)	(+) 0 – 1	(+) 1 – 4	(-) 4 – ~

The (+) sign represents a positive and significant response, the sign (-) indicates a negative and significant response; the figure shows the t-quarter after the shock at which the response is significant. IRF estimates are only made until the 12th quarter after the shock. Significance at 80 percent confidence level.

Expansionary shocks on global liquidity, both in the safe asset market and risk assets (vox_t^w), have a positive and significant impact on stock prices stock_tⁱ in Indonesia and three other ASEAN countries (Figure 5).

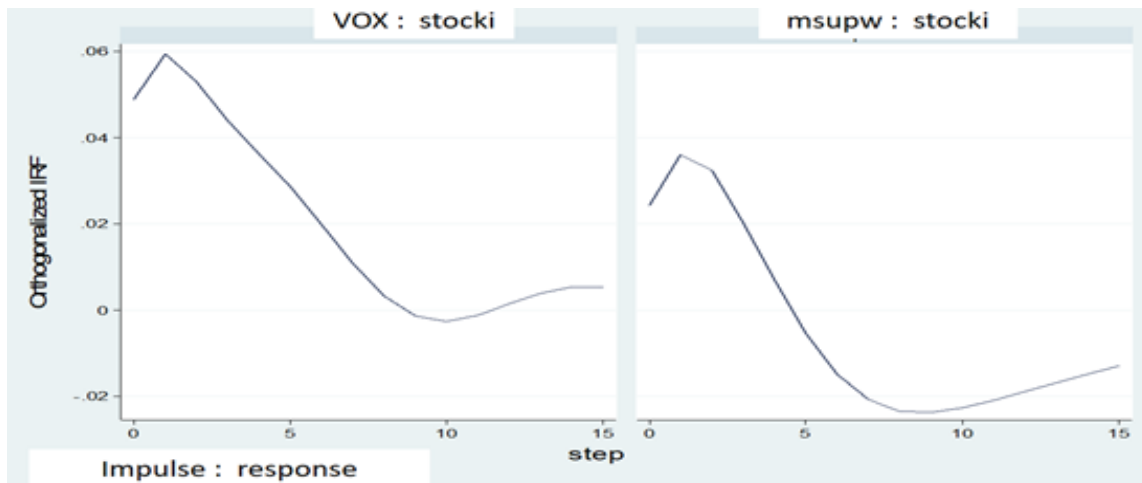


Figure 5. IRF, Response Average Stock Price Index due to Global Liquidity Indicator

Table 4. IRF, Shock of Global Liquidity against Stock Price Index (stock_tⁱ)

Impulse See figure 5	Response of Indonesia, Malaysia, Philippine, Singapore
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This response takes place instantaneously (in the same period as the shock) and shrinks within five quarters or less. Unlike its effect on global variables, liquidity shocks in the safe asset market still have a significant impact on the share price index in selected

SEA countries if the period of global financial crisis is included in the estimate.

The expansion of global liquidity is also able to encourage the increase of ASEAN GDP pdb_t^i in the short term, which generally begins after lag 1 - 2 quarters and muffled in less than two years after shock (Figure 6). In general, the positive response

liquidity shock on Philippine output is also lower in general compared to the other three selected SEA countries (Figure 6).

At first glance, the inflation-disinflation pattern (cpi_t^i) is quite similar to the price puzzle previously found at the global level. However, the decline in domestic prices post-expansion of global liquidity

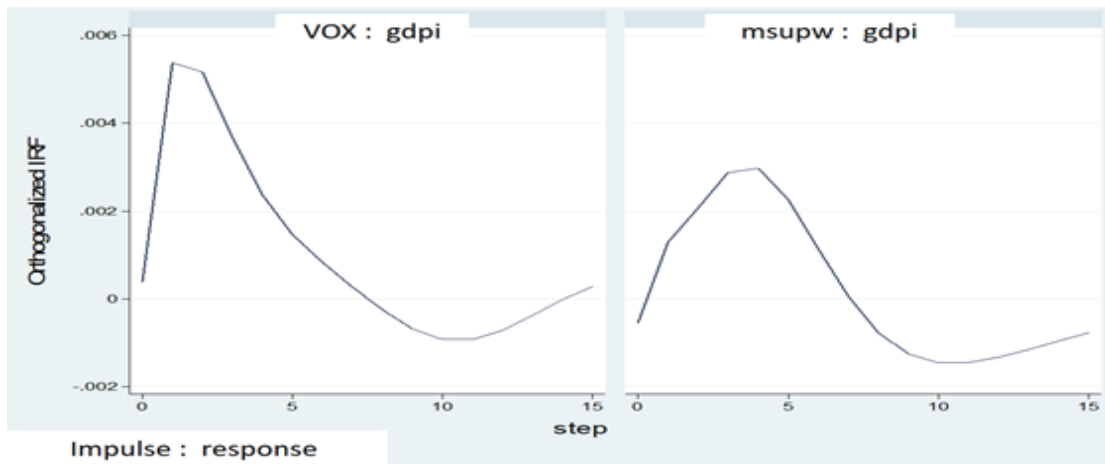


Figure 6. IRF, Response of Real Output due to the Global Liquidity Indicator

of the real output pdb_t^i is in line with the described open economic framework, where positive effects through trade channels and financial channels are more dominant than the expenditure-switching effects. These findings are also consistent with the empirical literature on the effects of global liquidity spillovers (Matsumoto, 2011; Brana, Djigbenou & Prat, 2012) and on global uncertainty (Carriere-Swallow & Cespedes, 2013), which generally show a positive effect on output in the short term two years after the shock).

We summarize the processed results for the response Output of selected SEA (gdp_t^i) due to shock to $msup_t^w$ and vox_t^w in the Table 5. The graph is depicted in Figure 6.

Table 5. IRF, Global Liquidity Shock of Real Output (gdp_t^i)

Impulse See Figure 6	Response of Indonesia, Malaysia, Philippine, Singapore		
	0 – peak	Turning	Long run
VOX Index (vox_t^w)	(+) 0 – 1	(+) 1 – 7	(-) 7 – 14
USD Supply ($msup_t^w$)	(+) 0 – 4	(+) 4 – 7	(-) 7 – ~

Interestingly, despite the effects of liquidity shock on the safe asset market significantly for all four countries studied, liquidity shock in the global risk asset market has only a significant impact on Malaysia and Singapore output. The impact of global

does not violate the quantity theory of money, because domestic liquidity does not always grow in proportion to global liquidity. The policies of each country to deal with changes in global liquidity were carried out by Rishabh & Sharma (2015). They discuss emerging policy issues in a rapidly changing global commodities market. Therefore, the authors need to discuss the posture of monetary policy, which through the instruments of interest rates and exchange rates, can reduce the shock transmission of global liquidity to domestic liquidity.

Figure (7) explains the inflation response of selected SEA countries (cpi_t^i) due to expansionary Shocks on global liquidity ($msup_t^w$), both in secured asset markets and risk assets (vox_t^w). Response cpi_t^i negative at the beginning of the period then adjusted in the fifth quarter. CPI deflation for four periods after the shock occurred. Under stable economic conditions, deflation will lead to a decline in prices and an increase in household consumption. Facts prove that an increase in household demand will result in inflation for the following ten periods. Price deflation will be corrected by increased consumption to its fundamental level (Rishabh & Sharma, 2015). Due to orthogonal structure, the response cpi_t^i negative at the beginning of the period, then according to the zero level in the 5th quarter. Response cpi_t^i due to shock $msup_t^w$,

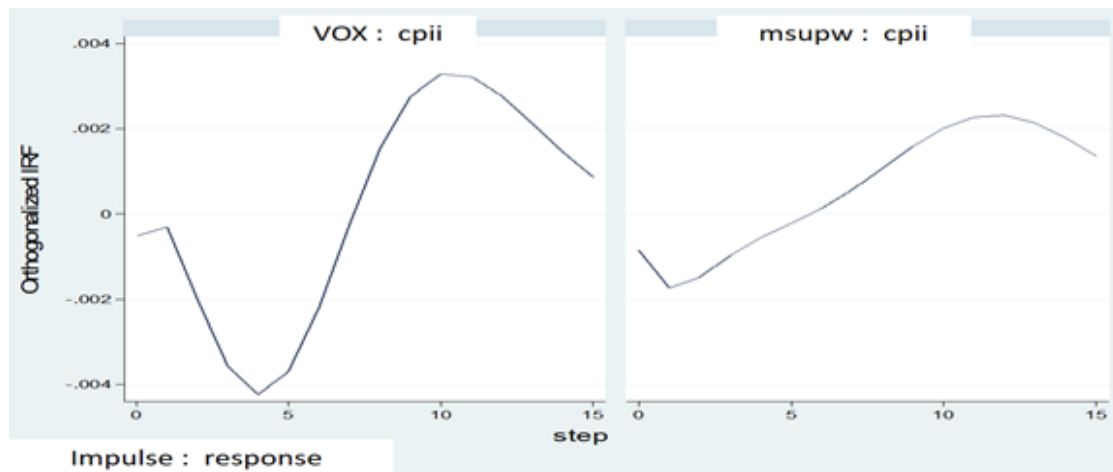


Figure 7. IRF, Response of Inflation due to the Global Liquidity Indicator

start from negative menudian increased until positive in the 2nd quarter. The next period saw an increase reaching its peak in the 11th quarter, then decline in the long run. Negative responses show less impact. The impact is then smaller and disappears.

We summarize the processed results for the response Consumer Price Index of ASEAN (cpi_t^i) due to shock to $msup_t^w$ and vox_t^w in the Table 6. The graph is depicted in Figure 7.

Table 6. IRF, Shock of Global Liquidity on Consumer Price Index (cpi_t^i)

Impulse See figure 7	Response of Indonesia, Malaysia, Philippine, Singapore		
	0 – peak	Turning	Long run
VOX Index (vox_t^w)	(-) 1 – 4	(+) 4 – 7	(+) 7 – ~
USD Supply ($msup_t^w$)	(-) 0 – 1	(+) 1 – 6	(+) 6 – ~

All countries tested in this study show a significant post-shock expansionary $neer_t^i$ in global liquidity, which is generally muffled in less than two years (Figure 8). This finding supports the possibility that short-term inflationary decline can be explained by the strengthening of the exchange rate that reduces imported inflation. From 2020 to 2021, there will be a drastic increase in the USD money supply and VOX Index. According to IMF (2021), USD Supply will increase from 5,000 billion in 2020 to 3,500 billion USD in 2021. This extraordinary increase will affect the global liquidity supply. The oversupply of the dollar causes an appreciation in the exchange rates in selected SEA countries. Exports in selected SEA countries have contracted (Kiyota, 2022).

We summarize the processed results for the response NEER of ASEAN ($neer_t^i$) due to shock to $msup_t^w$ and vox_t^w in the Table 7. The graph is depicted in Figure 8.

Table 7. IRF, Shock of Global Liquidity against NEER ()

Impulse See figure 8	Response of Indonesia, Malaysia, Philippine, Singapore		
	0 – peak	Turning	Long run
VOX Index ()	(+) 0-2	(+) 2-6	(+) 6 - ~
USD Supply ()	(+) 0-3	(+) 3-7	(-) 7 - ~

We cannot separate the analysis per country, but the results of the panel data analysis show that changes generally occur in all selected SEA countries. All countries tested in this study show significant NEER appreciation post-expansionary shock due to global liquidity. These findings support the possibility that the increase in inflation in the short term can be explained by a decrease in the exchange rate, which increases imported inflation (Belke et al, 2010). The NEER of selected SEA countries are sensitive due to the global US Dollar supply shock ($msup_t^w$). NEER response in selected SEA countries (Indonesia, the Philippines, Malaysia, the Philippines, and Singapore) to the VIX index shock (vox_t^w). These two findings are in line with Matsumoto (2011), who observed that liquidity shocks in global risk asset markets had a greater effect on the exchange rates of Latin American countries and several developing countries such as ASEAN.

Several studies have found that each country has a counter-interest rate response. This difference is caused by the specific economy in selected SEA. Ekananda & Suryanto (2021) stated that the response results from each country in selected SEA were different. They focus on Indonesia’s results but consider analysis for other selected SEA countries. Singapore interest rates barely increased significantly. On the other hand, interest rates in Indonesia tend to fall in the short term (up to the 4th quarter post-shock) before turning positive in

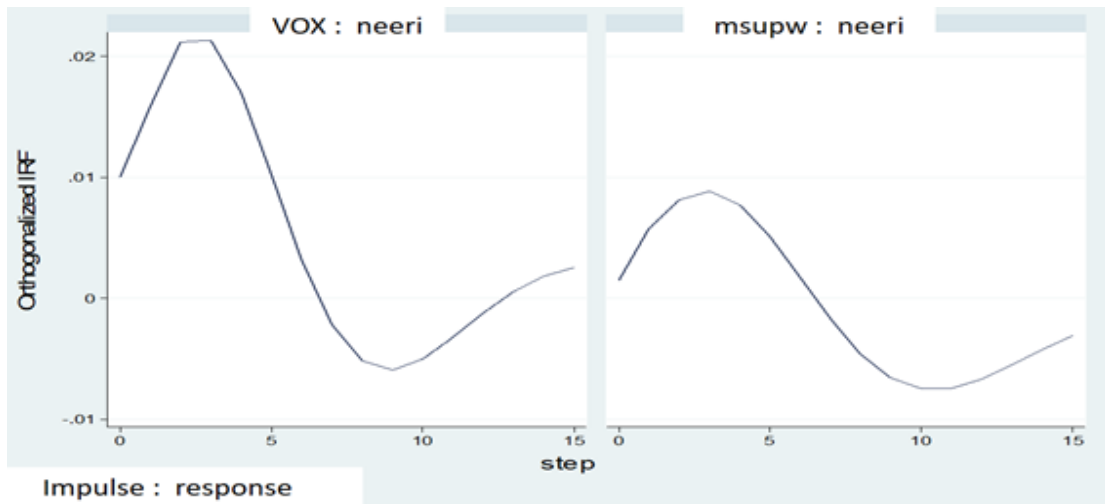


Figure 8. IRF, Response of nominal interest rate due to the Global Liquidity Indicator

the next few quarters. This difference has been accommodated in the Panel VAR model. Interest rates in all selected SEA countries rose in the medium term (after 2 - 5 quarters). Research by Tunggal et al, (2018) states that the exchange rate and interest rate of countries in selected SEA are first-order integrated. Thus the results of this study can prove the research conducted by Matsumoto (2011). Meanwhile, the nominal interest rate (ir_t^i) selected SEA countries have a fairly contrasting response to each other post-expansion of global liquidity (Table 8).

We summarize the processed results for the response Money Market Interest Rate of ASEAN (ir_t^i) due to shock to $msup_t^w$ and vox_t^w in the Table 8. The graph is depicted in Figure 9.

Table 8. IRF, Shock of Global Liquidity to Money Market Interest Rate ()

Impulse See figure 9.	Response of Indonesia, Malaysia, Philippine, Singapore		
	0 – peak	Turning	Long run
VOX Index ()	(-) 0 – 2	(-) 2 – 5	(+) 5 – 12
USD Supply ()	(-) 0 – 2	(-) 2 – 3	(-) 3 – 14

The Asian crisis period exclusion also reduces the magnitude and significance of stock and output price responses in all four countries, although its relative direction and magnitude generally remain unchanged (Figure 9). This indicates that the global liquidity crisis contributes to worsening output and stock prices in selected SEA within the period. A nominal interest rate response that tends to be neutral or positive, indicates that the liquidity effect does not play a significant role in the transmission of global liquidity spillover effects. Even so, transmission through real interest rate reductions is still made possible by rising inflation expectations, particularly in the case of global liquidity shocks in risky asset

markets (Bekaert, Hoerova and Lo Duca, 2013).

The authors also found that the exclusion of the Asian crisis period resulted in some responses not in line with previous empirical theories and findings, in particular the global dollar supply shock effect on Singapore stock prices. This, coupled with the paradox of weakening NEER above due to liquidity expansion in the global safe asset market, may suggest that data in the Asian crisis period contained important information about the global liquidity relations and macroeconomic conditions of selected SEA countries, so the exclusion of this period from estimates has the potential to generate biased inference. On the other hand, the authors should also note that extreme fluctuations in macroeconomic indicators during the Asian financial crisis, particularly in the case of Indonesia, can not be fully explained by global and domestic economic factors and are not necessarily replicated in subsequent crises. This requires researchers of future spillover effects to include additional explanatory variables, and also be careful to draw conclusions about the direction and magnitude of the effects of global liquidity shock on selected SEA countries - especially on inflation - from relatively simple models such as which is used in this study.

Overall, empirical studies have proven that increasing global liquidity has significant consequences on price stability and financial stability. The spillover effect of global liquidity shows significant heterogeneity between countries and among liquidity indicators. The responses to these various indicators may be because each represents a different aspect or segment of global liquidity. Therefore, it is interesting to examine how these segments interact, as the authors did in this study.

Tables 3 to 8 can be used by DPR Commission XI and economic observers as a guide for simulations

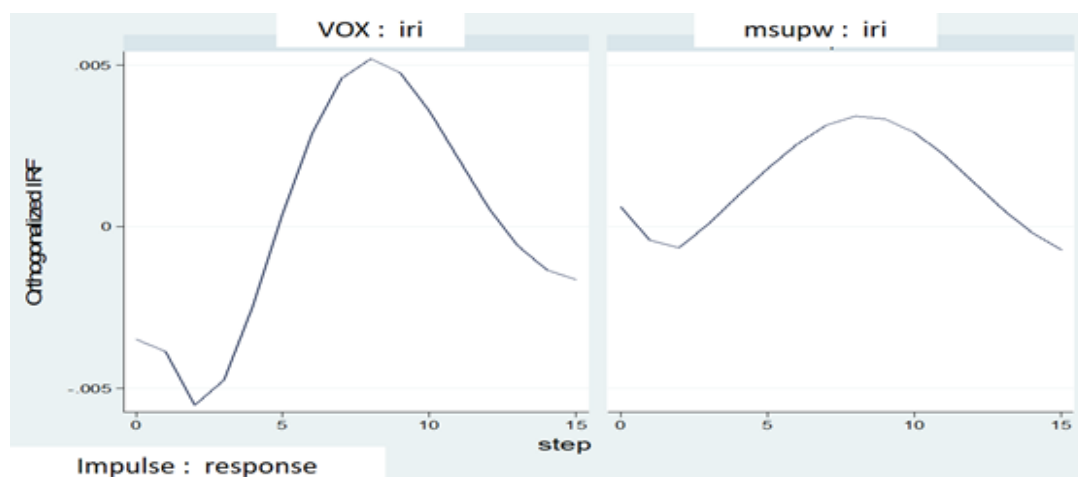


Figure 9. IRF, Cumulative Response of Average Stock Price Index and Real Output to Increase 1 S.D. Global Liquidity Indicators (without the Asian Crisis Period)

and predictions of changes in the Indonesian economy (in general, together with countries in the ASEAN region). The response simulation establishes an integrated policy between monetary policy (through exchange rates and interest rates) and fiscal through prices and financial markets (through stock prices) to maintain better economic growth.

CONCLUSIONS

Analytical methods and strategies are needed to produce relevant analyses. For this reason, we propose a dynamic analysis of the Panel VAR to estimate the response that occurs to several economic indicators for selected SEA country, namely cpi, GDP, exchange rates, and interest rates for selected SEA countries in general. The global economic changes that occurred during the study period led to significant regional economic changes, such as in selected SEA. The results of this study are relevant to the changing conditions of the global economy from 2020 to 2021. The last two years reflect an expansion of liquidity in the global market due to increased national consumption due to the pandemic disaster.

The research results show that the expansion of liquidity in global markets, namely drastic changes in the USD money supply and world financial volatility (CBOE index), resulted in a significant international financial response in selected SEA countries. The increase in global liquidity resulted in an increase in GDP and global commodity prices. Indirectly, changes in global liquidity resulted in increases GDP, interest rates, and exchange rate appreciation in selected SEA countries. Except for inflation, which decreasing at the beginning of the period, then increasing in the next period.

The VOX index as a proxy for global risk premium is a better predictor of selected SEA asset prices than the supply of US Dollars. Interestingly, this trend is found not only in assets that are generally categorized as risky, such as stocks and emerging market currencies, which is generally considered a hard currency. Since most hard currencies are insensitive to the VOX index as an indicator of global volatility.

From these findings, it is clear that fluctuations in global liquidity can predict global and domestic economic conditions, and therefore global liquidity indicators are useful as an early warning or leading indicators for market players and policy makers. This indicator is not only limited to central bank interest rates in developed countries or broad money aggregates, but also needs to consider the accumulation of foreign exchange reserves and risk appetite in global financial markets. Here, the DPR's Commission XI, which handles banking, finance, and national development planning issues, must monitor developments in the international economy and global liquidity. Global liquidity is based on inherently unstable dynamics. A coordinated countercyclical response must be carried out by the monetary authorities in the world and the ASEAN region in order to deal with more extreme fluctuations in global liquidity. In the development of the global economy, fluctuations in global liquidity are more extreme than liquidity at the domestic level. This study has presented an integrated policy between monetary (through exchange rates and interest rates) and fiscal through prices and financial markets (through stock prices) to maintain economic growth better.

There are several limitations of the PVAR method, including after the disturbance, it is assumed that there are no other economic changes in the disturbance variable. This condition is impossible to maintain for a long time. Further research is needed where the results of IRF projections are applied to dynamic simultaneous forecasts to include changes in each response variable. The response from selected SEA countries is still treated the same because the resulting coefficient is a widespread impact that applies to all countries. In our opinion, there are several further research agendas to deepen this study, including research that needs to divide responses according to regimes to produce a unique impact for each regime. We suggest using Threshold VAR. This stage composes the variable transmission sequence.

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