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The Impact of Monetary and Fiscal Policies on Domestic Output: Evidence from ASEAN Economies

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ABSTRACT

This study investigates the impact of monetary and fiscal policies on domestic output in the ASEAN economies using a panel VAR approach. Among the five macroeconomic variables: Gross domestic product (GDP), consumer price index (CPI), exchange rate (EXC), money supply (MS), and government expenditure (GEXP), two variables, such as MS and GEXP, are defined as policy variables. The CPI and EXC played as target variables for displaying external macroeconomic impacts. The model is estimated by the Generalized Method of Moments (GMM), where Helmert (forward mean-differencing) transformation is deployed to resolve individual heterogeneity and endogeneity problems. MS and GEXP (one lag) were positive and statistically significant, influencing GDP. On the other hand, higher CPI and EXC showed a negative effect on output, but a positive impact on GDP. Over 10 periods in advance, the explainable variance of GDP was 12.44% explained by government spending and 5.88% by money supply. By comparison, CPI and exchange rate effects supplied 39.05% and 12.40%, respectively. The results suggest that domestic policy actions as well as external macroeconomic conditions significantly influence economic performance among ASEAN countries.

Keywords: Association of Southeast Asian Nations, Economic Growth, Panel VAR, Monetary Policy, Fiscal Policy, Generalized Method of Moments
JEL Classifications: E44, F4, F32, G15

1. INTRODUCTION

Fiscal and monetary policies are crucial for countries to stabilize their economies, achieve sustainable growth, and ensure effective macroeconomic management. While budgetary policy through taxation and public expenditure influences the level of consumption, investment, and income distribution in the economy and thereby affects the aggregate demand, in contrast, the central bank's monetary policy through its regulation of interest rates and money supply attempts to control the inflationary pressure in the economy and stabilize the exchange rate. Although the effectiveness of these policies depends on several factors, including the phase of the business cycle the economy is in, effective macroeconomic policies are essential for ensuring stable economic growth and equitable income distribution (Lim and Dash, 2021).

As the effectiveness of macroeconomic policies is mixed and varies across developed and developing countries, as well as different economic contexts, economists have extensively engaged in debates about the relationship between fiscal and monetary policies and domestic output. According to Auerbach and Gorodnichenko (2012), in developed economies with strong institutional frameworks, monetary policy plays a dominant role in stabilizing output, while fiscal policy is constrained by political and debt sustainability considerations. In contrast, Ilzetzki et al. (2013) noted that, as financial markets are shallow and monetary transmission mechanisms are often weak, fiscal policy remains the primary tool for stimulating domestic output in emerging and developing economies. Thus, empirical literature has widely acknowledged the effectiveness of macroeconomic policies in stimulating economic activity and domestic output.

In the Association of Southeast Asian Nations (ASEAN) context, Han and Ng (2011) study analyzed the interrelationships among gross domestic product (GDP), consumer price index (CPI), exchange rate, stock price index, short-term interest rate, and the world commodity price index using a Vector Autoregressive model with exogenous variables (VARX) for five ASEAN member countries: Malaysia, Indonesia, the Philippines, Singapore, and Thailand. In addition to estimating country-specific VARX models, the study developed a Global Vector Autoregressive (GVAR) model to generate macroeconomic forecasts that incorporate international linkages. The study compared the forecasting performance of the VARX model with and without a deterministic trend component. The empirical findings of the study highlighted that the GVAR model, in terms of out-of-sample forecasting, outperforms the VARX model, suggesting that the level of forecast accuracy improves by incorporating global interdependencies.

By employing a Panel Vector Autoregressive (PVAR) model, Marasanti and Verico (2024) investigated the relationship between the Consumer Price Index (CPI) and industrial production across five ASEAN countries: Malaysia, Indonesia, the Philippines, Singapore, and Thailand. Before estimating the model and interpreting the dynamic interaction of variables, a Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model was applied to measure the volatility of the inflation rate and output, which represent the uncertainty of the two variables. The predicted inflation and output uncertainty derived from the GARCH model were incorporated in the PVAR model to assess the dynamic relationship between the two variables. The specific feature of the model was the control for unobserved heterogeneity among the five member states of ASEAN through country-specific dummy variables. The empirical findings of the study highlight the macroeconomic volatility and policy dynamics in the ASEAN region. Also, considering five ASEAN member countries: Malaysia, Indonesia, the Philippines, Singapore, and Thailand, Hidthiir et al. (2024) used a panel autoregressive distributed lag (ARDL) model, a single-equation approach, to examine the effects of financial development, oil prices, investment, and inflation on economic growth. The empirical findings revealed that financial development and oil prices had a positive long-run impact on economic output, though this influence was not observed in the short term.

The empirical investigation of the study reveals that, in both the short and long term, economic growth in the region is enhanced by investment expansion and an increase in the general price level. Despite its valuable contributions, the study had several limitations. First, the analysis was restricted to only five out of ten ASEAN countries, thereby excluding half of the region from the investigation. Second, it omitted two key variables, such as money supply and government expenditure, which are critical for policymakers at the central bank and government. Lastly, the use of a single-equation Panel ARDL model limited the capacity to assess the dynamic interrelationships among variables, suggesting the need for a system-based approach, such as Panel VAR, to capture broader macroeconomic interactions.

To address the gap in the literature, this study adopts a comprehensive approach by extending its scope beyond the commonly analyzed five countries and incorporating other ASEAN nations, including Brunei, Cambodia, Lao PDR, Myanmar, and Vietnam, to analyze the dynamic relationship between macroeconomic variables. In addition to analyzing key macroeconomic indicators such as GDP, exchange rate, and CPI, this study expands the analysis by incorporating two policy variables: Government spending and the money supply. These variables are analyzed using a Panel Vector Autoregressive (Panel VAR) model, which captures the dynamic interdependencies among the variables across both cross-sectional units and time periods. The main objective of the study is to investigate the impact of monetary and fiscal policies on economic growth across the entire ASEAN region.

To deal with endogeneity and heteroskedasticity in panel data applications, the Generalized Method of Moments (GMM) is applied to estimate all parameters of the PVAR model. The critical features of the model are the estimation of forecast error variance decomposition (FEVD) and impulse response functions (IRFs). The FEVD provides the assessment of the variation of an endogenous variable, which may be caused by the variation of other variables in the system. In addition, the IRFs show the dynamic effects of shocks on macroeconomic variables on output growth. These approaches signify a dynamic transmission mechanism for monetary and fiscal policy shocks, specifically through policy variables, money supply, and government spending, on economic growth within the ASEAN region.

This study contributes to the ongoing debate by examining the relationship between fiscal and monetary policies and domestic output across various economic contexts in the ASEAN region, and thereby exploring the relative effectiveness of these instruments. The study also provides evidence-based insights on how to coordinate these policies better to achieve sound macroeconomic management. In the ASEAN context of developing and emerging economies, examining the conditions under which fiscal or monetary policies are more effective can help governments design appropriate countercyclical measures.

2. LITERATURE REVIEW

The effectiveness of fiscal policy in stimulating economic activity during downturns has been widely supported in recent empirical literature. Bouakez et al. (2014) used a structural vector autoregressive (SVAR) model to suggest that governments in Asia should consider implementing deficit-financed tax cuts and deficit spending as effective tools for countercyclical intervention. Building on this insight, Sjöberg (2023) conducted a threshold VAR (TVAR) analysis across G7 economies (excluding Italy), which confirmed that fiscal stimulus has a significant impact on output across business cycle phases, reinforcing the value of proactive fiscal responses.

In a different context, Hussain et al. (2016) used an ordinary least squares (OLS) regression model with monthly data to investigate the behavior of GDP growth in Pakistan. Their study revealed that macroeconomic variables, such as the money supply, interest rates, exchange rates, and inflation, collectively influence GDP growth, further supporting the argument that policy tools play

a vital role in managing economic performance. Tang et al. (2013), through the SVAR analysis of five ASEAN countries, reported that while fiscal expansion had a limited overall impact, government spending emerged as the most effective instrument for countercyclical policy, particularly during economic downturns. Taken together, these studies highlight the nuanced but crucial role of fiscal strategies in sustaining output during periods of economic instability.

The transmission mechanisms of macroeconomic policy vary significantly across countries, as evidenced by a range of empirical analyzes. In Sri Lanka, Musthafa et al. (2024) employed a SVAR framework using monthly data from 1978 to 2011 to assess the effectiveness of monetary policy. The study revealed that interest rates were the most influential variable affecting economic activity, emphasizing the critical role of monetary policy in shaping Sri Lanka's economic outcomes. In contrast, applying a recursive VAR model in Kenya, Cyrus and Elias (2014) found that fiscal stimulus had a substantial impact on real economic growth, while both expansionary and contractionary monetary policies had insignificant effects. This suggests a greater reliance on fiscal instruments in driving Kenya's economic performance. Rukelj (2009) employed the SVAR model to investigate the impact of fiscal and monetary policies on economic growth. The FEVD and IRFs analyzes demonstrated that the implementation of monetary and fiscal expansionary policies depreciated the exchange rate and increased output. These studies emphasize the context-specific efficacy of fiscal and monetary policy, illustrating that the institutional and economic framework of each country dictates the influence of macroeconomic instruments on growth.

The role of fiscal and monetary policy in promoting economic growth has been examined across various Southeast Asian economies, with findings highlighting the crucial role of fiscal policy, particularly in managing public investment. In Malaysia, Mohd Zulkifli et al. (2022) conducted an OLS analysis and found that economic growth had less impact when operational costs increased. The expansion of economic activities was achieved through long-term investment projects undertaken by the government, with a focus on development and housing projects. Echoing this conclusion, Nursini (2017) analyzed fiscal policy in Indonesia using multiple regression models and demonstrated that public spending, especially in infrastructure and human resource development, aimed at promoting economic growth, regardless of the funding of investment derived from public debt finance or tax revenues. Using the SVAR model, Koh (2018) explored Brunei Darussalam's response to external shocks. It was found that domestic output was more explained by production shock, while less influenced by changes in the oil price. More importantly, domestic shock to supply generated more impact on economic growth than external shock. The findings reveal that Brunei's government employed two critical policies: monetary policy tools were implemented to stabilize the price level, and fiscal policy was used to ensure foreign exchange stability.

The effectiveness of fiscal and monetary policy on economic growth varies across countries, as reflected in a range of empirical studies. In Nigeria, Ufoeze (2018) employed a multiple regression analysis to evaluate the impact of key monetary variables, including the central bank rate, monetary aggregate, exchange rate, interest rate, and investment spending, on GDP. With the aim of evaluating the role of monetary policy in stimulating economic growth, their results indicated that monetary policy and lending interest rates had no significant effect on output. In contrast, the exchange rate had a strong negative influence, underscoring Nigeria's vulnerability to exchange rate volatility. The study highlights the significance of monetary policy in driving economic growth within Nigeria's economic framework. In contrast, using the OLS-based regression model, Oo (2019) investigated the role of fiscal policy in Myanmar and suggested that to achieve sustainable long-term economic growth, the government budget needs to be under considerable care to ensure efficiency of budget implementation and fiscal discipline due to the significant relationship between fiscal balance and economic growth. This contrasts with the Nigerian case, where monetary policy variables had high explanatory power despite weak individual effects.

Adding a regional comparative dimension, Tan et al. (2020) applied the ARDL model to quarterly data from 1980 to 2017 for Malaysia, Singapore, and Thailand to evaluate how the collaboration between fiscal and monetary policies works. Their study incorporated interest rates and public spending to assess the joint influence of monetary and fiscal policy. The findings revealed that government spending had a positive impact on growth in Thailand, but had an insignificant influence on growth in Malaysia and Singapore. Further, it was highlighted that the increase in interest rate produced an adverse shock on output in the three countries under study. While monetary policy outperformed fiscal policy in promoting economic growth in Malaysia and Singapore, the opposite was true in Thailand.

Recently, researchers have sought to identify which macroeconomic indicators, such as inflation, money supply, and unemployment rate, have a significant impact on the GDP of the ten ASEAN countries. Retnasih and Herdianti (2023) conducted the PVAR model and included panel co-integration and causality tests, and revealed that the response of GDP shocks to all endogenous variables was high compared to the shocks that other indicators in the system absorbed from the GDP shocks, as suggested by IRFs. The results have further shown that, in both the short and long term, the variation in GDP derived from the FEVD is mainly explained by changes in all other indicators in the model. Yang et al. (2023) conducted a systematic review to identify the key features of the PVAR model. The review included 292 research articles from the Web of Science, in which the state of the research and descriptive statistics were presented for discussion. The primary topics related to the application of the PVAR model focused on macroeconomic effects, economic growth, and environmental protection, which were categorized into three distinct areas and summarized using four estimation methods. This categorization promotes the use of the PVAR model in practice.

Through various empirical approaches across ASEAN countries, the effectiveness of macroeconomic policy instruments in promoting economic stability and growth has been explored.

Hidthiir et al. (2024) examined the impact of fiscal and monetary policy tools during the 1997 Asian financial crisis across five ASEAN nations: Indonesia, Malaysia, the Philippines, Singapore, and Thailand. Covering a period of 10 years, the study indicated that before and after the financial crisis, monetary expansionary policies boosted the price level. Surprisingly, it revealed that the implementation of fiscal and monetary policies aimed at stimulating economic growth during the crisis period had no significant influence on economic expansion. Findings of other studies based on independent variables, such as inflation, exchange rate, non-performing loans, interest rate, and foreign direct investment (FDI), assessed the indicators that had a significant effect on GDP. The findings revealed that to boost economic growth, it is necessary to strike a balance between global financial integration and the government's macroeconomic policies (Utami, 2021; Dua and Verma, 2024).

The literature reveals that several studies have examined the effectiveness of monetary and fiscal policies in ASEAN member states using reduced-form VAR, GVAR, and SVAR models, which utilize time series data at the country level. Further, some studies have employed panel data approaches to investigate the role of macroeconomic policies in driving economic growth. However, these studies have commonly relied on Pooled OLS, which are limited in their ability to capture the dynamic interrelationships among macroeconomic variables. Specifically, such models do not adequately reflect how aggregate output responds to shocks originating from other economic indicators within the system. To overcome these methodological shortcomings, this study adopts a dynamic Panel Vector Autoregression (PVAR) model to evaluate the dynamic impact of fiscal and monetary policy shocks on output across all ASEAN economies.

Following the introductory section, the paper presents a comprehensive conceptual and empirical literature review of the subject. The next section of the paper presents the methodology adopted in the study, followed by empirical results and discussions. Finally, the concluding section serves as a culmination of the entire study, summarizing the key findings that have emerged from the research, including a deeper understanding of the implications and significance of the findings. This section also includes the directions for future research.

3. METHODOLOGY

The VAR model is one of the most famous advanced econometric models, which provides an in-depth analysis of the interaction among endogenous variables under investigation. However, a key limitation of the model is that it only works with time series data. The expansion of the VAR model, which aims to analyze panel data, is known as the Panel VAR (PVAR) model, first established by Love and Zicchino (2006). This study employs the PVAR technique to examine the effectiveness of fiscal and monetary policies on real economic growth across ASEAN member countries by combining time series and cross-sectional data. The PVAR is considered to be the most appropriate model, since it takes into account unobserved heterogeneity across cross-sectional units. The general specification of the Panel VAR model used in this study is as follows:

$$y_{it} = \Pi_0 + \Pi_1 y_{it-1} + f_i + d_{c,t} + \varepsilon_t$$

In this model specification, y_{it} represents a vector of endogenous variables, including gross domestic product (GDP), consumer price index (CPI), exchange rate (EXC), money supply (MS), and government expenditure (GEXP). It is worth highlighting that it indicates the one-lag of the vector of dependent variables. All parameters of the model are denoted as Π_0 and Π_1, indicating a vector of intercept coefficients and a matrix of coefficients of lagged endogenous variables. To preserve the loss of degrees of freedom, the estimated model is at one lag only. It is important to note that the monetary aggregate and government spending are determined to be policy variables, which are controlled by policymakers at the central bank and the government, respectively. The changes in these variables will have a significant impact on target variables: Exchange rate and price level, where the effects are expected to be transmitted to GDP. The residual terms, ε_t, are assumed to be independent and identically distributed (*i.i.d.*).

The study focuses on the ASEAN states, which consist of ten member countries: Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam. Since the study employs the PVAR model, countries with incomplete data must be excluded. Therefore, due to the limitations in data availability for Myanmar, the analysis is confined to the nine member states of ASEAN. To mitigate any correlation between f_i and the lagged dependent variables, the study employs the forward mean-differencing transformation, popularly known as the Helmert approach. Estimation is conducted utilizing the Generalized Method of Moments (GMM), which exhibits numerical similarity to the equation-by-equation Two-Stage Least Squares (2SLS) methodology introduced by Arellano and Bover (1995).

To account for country-specific effects, time dummies ($d_{c,t}$) are integrated into the model. The study spans the period from 2012 to 2023, encompassing nine ASEAN countries over 12 years, resulting in a balanced panel with a total of 108 observations (calculated as $n \times t = 9 \times 12$). Macroeconomic data for each country are sourced from the Asian Development Bank (ADB) database. In the first step, the PVAR model's parameter estimation is derived from the Generalized Method of Moments (GMM) approach, where Forecast Error Variance Decomposition (FEVD) and Impulse Response Functions (IRFs) are established in the following process. To conduct hypothesis testing and determine the significant relationship between endogenous variables, t-statistics developed from robust standard error produced via Monte Carlo simulation are used in comparison with the critical t-value.

4. EMPIRICAL RESULTS

This section is structured into three main parts: Descriptive statistics, panel unit root test, and the GMM estimation results from the PVAR model. As mentioned earlier, this study is limited

to the nine ASEAN member states. The data are generated in the form of a balanced panel with annual observations from 2012 to 2023, spanning a total of 12 years, with 108 observations.

Table 1 summarizes statistics of the five key macroeconomic variables. These statistics include the mean, standard deviation, 25th, 50th, and 75th percentiles that provide information on the location and spread of each variable. GDP has a large mean of 477,653 with a wide standard deviation (878,499), suggesting that output varies widely across countries included in this research. This discrepancy is reflected in the large spread between the 25th percentile (11,365) and the 75th percentile (447,430), demonstrating that there are countries with large economies and countries with smaller economies in terms of economic output. CPI (an indication of the level of inflation) takes on average value 110.18 and has a relatively small standard deviation equal to 20.50, while values for its 25th, 50th, and 75th percentiles lie at around 110.18. This suggests that the majority of countries in our sample exhibit moderate and similar price levels, as well as relatively mild inflation volatility.

EXC exhibits an average of 4,945 but with a high standard deviation of about 6,939, suggesting wide variation in currency valuation toward the US Dollar. The percentiles, 3 (25th), 45 (50th), and 8,456 (75th), indicate that some countries are essentially exchange-rate-managed (or undervalue their exchange rates significantly). In contrast, others appear to have much weaker currencies (or let their currency values float more). Average Money Supply (MS) is the highest of all variables at 823,435, but also suffers from extreme dispersion as measured by the standard deviation of 1,912,604. The difference between the 25th (11,711) and the 75th percentile (571,169) is very large, highlighting that the monetary expansion has been uneven across countries corresponding to different financial system sizes and scales of monetary policy. The GEXP is on average 150,096, and the standard deviation is 340,596, again reflecting quite a significant heterogeneity in the fiscal spending levels. The percentiles, 2,851 (25th), 6,138 (50th), and 74,835 (75th), provide a list of very few countries with high public spending and many countries residing behind much lower fiscal thresholds.

The results of the panel unit root tests used to investigate stationarity properties are provided in subsequent sections. The estimates of the PVAR model, employing the GMM, followed thereafter. This estimation methodology allows the study of inter-relationship dynamics among fiscal, monetary, and real output variables between countries. The Levin-Lin-Chu (LLC) test is used to test for the presence of a unit-root in the panel data series. The null hypothesis of the LLC test is that panels are unit root (non-stationary), and the alternative hypothesis is that the panels are stationary. As Table 2 illustrates, for the non-time trend specification, all independent variables (GDP, MS, and GEXP) are non-stationary as their P-values exceed 5% level of significance. However, for the consumer price index (CPI) and exchange rate (EXC), the null hypothesis is rejected at 1% significance level, which means that these two variables are stationary.

The forward mean-differencing transformation (a standard Helmert-type procedure) is used to remove any correlation between country-specific effects and lagged values of the dependent variables. This method for estimating multiple indices ensures consistency by addressing endogeneity problems that arise from differences in unobserved characteristics among individuals. Although the PVAR model comprises a set of five equations, one for each of the five endogenous variables, empirical investigation is primarily focused on the GDP equation, as it serves as a leading measure for examining the impacts of fiscal and monetary policy on economic performance.

To maintain the stability of the model degrees of freedom, the estimate is based on a single lag length over 107 observations. The system comprises five endogenous variables in the following order: GDP, CPI, EXC, MS, and GEXP. In this specification, MS and GEXP were the policy instruments. The model is estimated through GMM, a methodology similar to the equation-by-equation 2SLS. To correct for potential endogeneity problems as a result of the common dependence of country-specific effects and lagged dependent variables, we use forward mean differencing (also called the Helmert transform), denoted "m." This change guarantees uniform estimation by removing unobserved fixed effects. Table 3 shows the parameter estimates of the model.

The estimations for the PVAR model support the fact that GDP in the ASEAN countries is significantly positively affected by

Table 1: Descriptive statistics

Variable	Mean	Standard deviation	25th percentile	50th percentile	75th percentile
GDP	477,653	878,499	11,365	32,027	447,430
CPI	110.18	20.50	99.02	103.25	119.02
EXC	4,945	6,939	3	45	8,456
MS	823,435	1,912,604	11,711	21,005	571,169
GEXP	150,096	340,596	2,851	6,138	74,835

Table 2: Levin-Lin-Chu unit-root test

Variable	Time trend: Not included			Time trend: Not included		
	Unadjusted t-statistic	Adjusted t-statistic	P-values	Unadjusted t-statistic	Adjusted t-statistic	P-values
GDP	1.8889	2.6244	0.9957	−22.5953	−21.8224	0.0000
CPI	−6.1305	−5.3224	0.0000	−9.2766	−5.4938	0.0000
EXC	−6.4103	−4.156	0.0000	−11.7141	−9.0139	0.0000
MS	−0.4711	0.1243	0.5495	−4.2233	−1.7342	0.0414
GEXP	−0.4467	0.5578	0.7115	−6.3956	−2.9291	0.0017

Table 3: GMM VAR estimated result

Variable	b_GMM	se_GMM	t_GMM
L.h_GDP	1.665	0.245	6.790
L.h_CPI	−5674.31	2143.23	−2.648
L.h_EXC	75.628	20.874	3.623
L.h_MS	2.027	0.409	4.950
L.h_GEXP	3.899	0.982	3.970

its own lagged values. This association is strongly significant at 1% level with a t-value of 6.790 that surpasses the critical value of 2.62 in absolute terms. This means that previous economic performance is key to shaping future output, reinforcing inertia and the persistence of growth dynamics in the region. On the other hand, the lagged CPI has a significant inverse correlation with GDP due to its coefficient value (−5674.31 and t-value −2.648), as it is more than the critical ratio limit. This implies that high inflation has a negative impact on economic growth by reducing purchasing power and increasing the cost of living. Additionally, the exchange rate has a positive and significant effect on GDP with a coefficient of 75.628 and a t-value of 3.623, which is also significant at 1% level. This implies that a depreciation of an exchange rate can make a country more competitive and thus stimulate domestic production. Similarly, the money supply is found to have a positive and significant effect on GDP, with a slope coefficient of 2.027 indicating that an expansion of the money supply leads to economic growth. Also, government expenditure has the most significant positive effect on output growth (3.899), which implies that fiscal policy is instrumental for ASEAN countries' output growth.

The PVAR model's empirical findings indicate that GDP in ASEAN countries has a highly significant and positive impact on its own lagged value. This relationship is highly significant at 1% level, with a t-value of 6.790, which vastly exceeds the critical value of 2.62 in absolute terms. This implies that past economic performance is crucial in determining future output, thereby increasing both inertia and the persistence of growth rates in the region. The inverse correlation of the lagged CPI with GDP is significant, however, because its coefficient value is −5674.31 (t-value = −2.648), which is greater than the critical ratio limit. This means that high inflation has negative consequences on the economy, most likely by reducing the purchasing power and increasing the cost of living. Additionally, the exchange rate has a positive and significant impact on GDP, with an estimated coefficient of 75.628 and a t-value of 3.623, which is also significant at 1% level. This suggests that a fall in an exchange rate may be more competitive and, therefore, stimulate domestic output. In the same way, money supply is found to have a positive and significant influence on GDP with a slope coefficient of 2.027, which implies that an increase in money supply causes economic growth. More interestingly, the estimated coefficient of GEXP is 3.899 (t-value = 3.970), which means that government spending has the highest positive impact on output growth, meaning fiscal policy is important for ASEAN countries' output growth.

As indicated in Table 4, the result of the FEVD shows interesting sources of variation in macroeconomic variables with a ten-period forecast horizon. For the GDP, however, 39.04% of its variation is influenced by changes in the CPI, followed by 12.44% for government expenditure, 12.40% for money supply, and 5.88% for exchange rates. Particularly, its own shocks account for only 30.22% of the GDP variation in the short run, indicating that external factors significantly influence the sensitivity level of GDP in ASEAN countries to macroeconomic shocks. For CPI, its own shocks account for 77.06% of the variance of its forecast error, suggesting that prices do not adjust as easily to external events and are relatively self-determined within the region's constituents, where close neighbors adopt similar related policies. Government expenditure has a 12.85% effect on CPI changes and a relatively low impact on GDP (4.40%), exchange rate (3.21%), and money supply (2.45%). As for government spending variation, the exchange rate has a significant impact on it at 11.40%, followed by CPI at 5.85%, where GDP and money supply contribute very little at 0.83% and 0.12%, respectively. In terms of the money supply, the CPI is found to be the most influential at 43.32%, in terms of percentage changes in variability, followed by GDP (30.16%), exchange rate (12.96%), and government expenditure (10.67%). Unexpectedly, the variability of money supply is accounted for by only 2.88% of its own shocks. Finally, government expenditure has its major explanatory factors, CPI (46.48%), GDP (29.19%), exchange rate (13.21%), and money supply (3.07%), while only 8.04% is explained by their own innovations. These findings reiterate the link between fiscal and monetary variables in determining macroeconomic outcomes of ASEAN countries.

Errors are 5% on each side, generated by Monte-Carlo with 1000 reps.

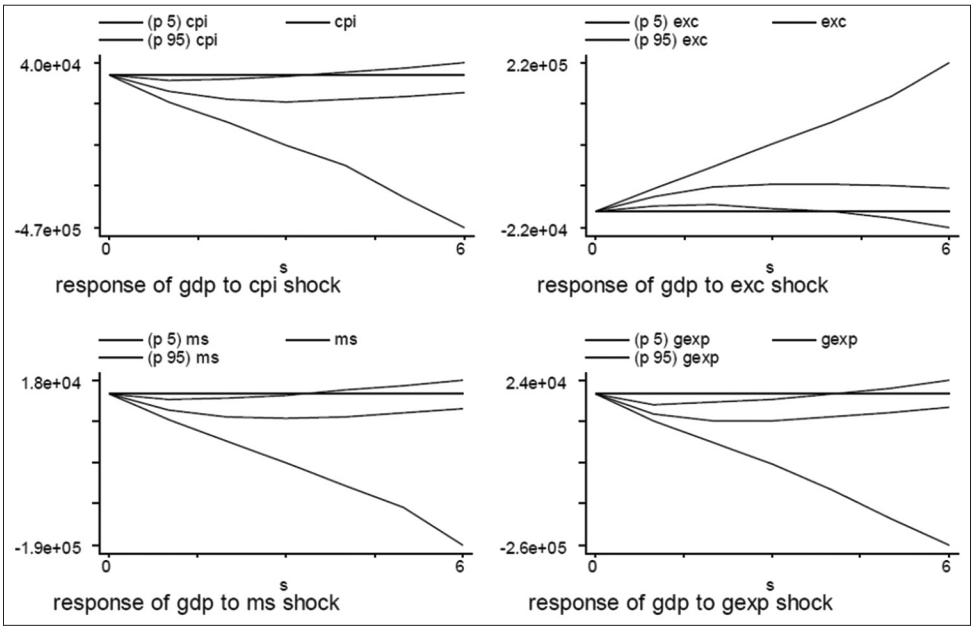
As shown in Figure 1, four IRFs describe the dynamics of GDP's response to shocks: The price level, real exchange rate, money supply, and government expenditure. Three lines are plotted in each figure: The middle line is the point-estimate of IRF, and the upper and lower bound lines represent 95% confidence intervals (CI). These visualizations offer an intriguing insight into the short-run and medium-run effects that macroeconomic shocks have on output. IRF analysis shows that the response of GDP to the consumer price index shock in periods 1 and 2 is a negative continuous fall, but it recovers slightly after the fourth period.

More interestingly, the response remains statistically significant; in fact, if we were to track it in terms of actual size and use its 95% confidence interval, through the horizon. In the exchange rate shock case, there is a positive GDP response during the first four subsamples from the shock, followed by a decrease that finally leads to equilibrium; this provides evidence of improvement in external competitiveness over time. Impulses to both money supply and government spending exhibit a similar pattern: in the first three periods, there is a negative effect on GDP, but from the fourth period on, positive effects of the shocks are revealed. These results suggest that expansionary monetary and fiscal policies are of limited intensity in the short term but have a significant impact on growth in ASEAN countries in the long term. In general, the IRF results reveal the sluggish yet beneficial role fiscal and monetary instruments play on output stabilization.

Table 4: Forecast error variance decomposition

Variable	Period	GDP	CPI	EXC	MS	GEXP
GDP	10	0.30228	0.39046	0.12401	0.05883	0.12441
CPI	10	0.04403	0.77063	0.03218	0.02458	0.12858
EXC	10	0.00833	0.05850	0.81791	0.00122	0.11404
MS	10	0.30166	0.43320	0.12960	0.02880	0.10674
GEXP	10	0.29196	0.46481	0.13212	0.03070	0.08042

Figure 1: Impulse response function for 1 lag VAR



5. CONCLUSION

A nation or region's economic growth, including ASEAN's, is driven by macroeconomic policies, including fiscal and monetary policies. While the central bank governs monetary policy, with the money supply being demand-determined, fiscal policy is administered by the government, using public expenditures and taxation to influence aggregate demand. The main policy variables taken in this study are money supply and government expenditure. The key is to explore which has the higher influence on domestic output and contributes more towards the variation of the domestic output among ASEAN members. To fully explore the dynamic links between these macroeconomic variables, this study employs a PVAR model. In addition to the two policy variables, we used other macroeconomic information associated with the consumer price index and the exchange rate for deriving policy targets. This method enables a more rigorous examination of the channels through which fiscal and monetary policy influence economic outcomes in the ASEAN region.

The findings of this study indicate that both fiscal and monetary expansionary policies have a positive effect on economic growth in the ASEANs, as supported by a significant relationship (at 1% level) between government expenditure, money supply, and GDP. More interestingly, the findings suggest that in terms of economic output, fiscal policy, especially government spending, is more influential than monetary policy. It is also evidenced by the better explanatory potential of government expenditure (12.44% of total GDP variance) when compared to that of money supply (5.88%). Based on these findings, the study recommends that policy-makers in ASEAN member countries emphasize strategic public spending, particularly on production-oriented sectors (i.e., infrastructure, education, and health), as a driver for sustainable economic growth. At the same time, as a complementary role to monetary policy, fiscal policy must play in macroeconomic planning. Policy makers should design clear, efficient, and focused public investment programs to ensure significant developmental return from budgetary resources. The collaboration between fiscal and monetary authorities will also be crucial in driving sustainable growth and macroeconomic stability in the region.

The panel VAR model used in the study does not incorporate the contemporaneous influence of shocks from one variable on other variables in the system. As a result, the dynamic associations may not sufficiently encapsulate the contemporaneous responses across the macroeconomic variables of interest. Additionally, the model is limited by employing a single lag length, which, although useful in conserving degrees of freedom, could oversimplify the actual economic relationships and reduce the robustness of the results. These methodological limitations nonetheless leave much room for improving the empirical approach. The directions for future research are to investigate and employ other estimation methods that can handle contemporary structural interactions, like Panel SVAR or Bayesian Panel VAR models (with richer identification schemes). The refined models are thus in need of being systematically compared with the method used in this paper

to evaluate their comparative strength in terms of explanation and forecasting ability. This comparative analysis would yield a better understanding of the transmission mechanism for fiscal and monetary policy, leading to more rational macroeconomic policymaking in ASEAN countries.

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