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Oil Price Shocks and GDP Performance in ASEAN: Evidence from Panel Data Models

Sereyvath Ky, Siphat Lim*

CamEd Business School, Phnom Penh, Cambodia. *Email: lsiphat@cam-ed.com

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ABSTRACT

Using balanced panel data of eight ASEAN economies for the period 2000-2024, this study investigates the determinants of economic growth in selected ASEAN economies. The analysis examines the impact of crude oil price, government spending, exchange rate, investment, inflation and trade openness on real GDP. Pooled ordinary least squares (POLS), fixed effects (FE), and random effects (RE) models are conducted as panel estimation techniques. The results from the model selection tests suggest that since some unobserved time-invariant factors persist across countries, the fixed effects specification provides the most appropriate estimation method. The negative and significant impact of crude oil prices on GDP implies that external energy price shocks can stifle economic growth through increasing costs of production, by pushing inflationary pressure. On the other hand, the significant and positive coefficient of government expenditure indicates the key role of fiscal policy for aggregate economic activity. Exchange rate dynamics are found to have positive and significant impacts, thus reinforcing the assertion that exchange rate competitiveness promotes growth via performance of exports. The investment boost results in more capital accumulation and thus increases the productive capacity of the economy, which validates a positive supply-side effect on GDP, further playing an important role for long-term economic development. While inflation has its adverse effects on GDP owing to the pernicious impact of macroeconomic instability, trade openness generates positive economic growth through market integration, export expansion and productivity improvement. The results underscore the significance of energy diversification, fiscal prudence, investment mobilization, inflation targeting and trade integration in attaining sustainable economic growth in ASEAN nations.

Keywords: Economic Growth, Oil Price Shocks, ASEAN Economies, Panel Data Analysis
JEL Classifications: O47, Q43, C23, F43

1. INTRODUCTION

Economic growth is still an important policy goal in developing and emerging economies because it captures the ability to produce goods, earn income and develop economically. Determinants of economic growth have been studied using different theoretical approaches like neoclassical and endogenous growth theories. Of these determinants, macroeconomics factors including government expenditure, investment, trade openness, inflation rate, exchange rate stability and energy market situation have most consideration for their effect on economic performance. However, empirical evidence is far from settled as they differ in both size and sign across countries, economic structure and methods applied.

Government expenditure has received widespread attention as one of the major determinants of economic growth. Early theoretical contributions, especially the endogenous growth framework of Barro (1990), emphasized that productive government expenditure can promote economic growth by improving infrastructure, public goods and services and conditions to be more conducive to private-sector productivity. Too much government expansion, on the other hand would lower growth through tax increases, increased public debt and crowding-out of private investment. This theoretical vagueness has sparked considerable empirical discussion. Wahab (2011) showed that the relationship between government expenditure and economic growth are conditional on gross expenditures and state of health, with government

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capital expenditures likely to enhance growth while unregulated expansiveness may exert negative impacts. In the same vein, Hajamini and Falahi (2018) found a nonlinear relationship between government size and economic growth for some European countries that supports the hypothesis of an optimal level of expenditure in each economy where after that the economic performance is reduced.

Seminal works commenced with a systematic analysis of the government expenditure-growth nexus in the procecive studies comparing cross-sectional and panel designs. Divino et al. (2020) argued that because productive investment expenditure and current expenditure, for example, likely have different effects on economic growth the structure of public spending is important. Their analysis indicated that the impact of fiscal policy is determined not only by the overall size of government, but by also by how such resources are appropriated. Moreover, Dinh Thanh et al. (2020) demonstrated that government spending influences private investment and institutional quality, indicating that if public spending is effective than with good governance mechanism tends to increase growth productivity in the case of most countries. Likewise, government expenditure has differential effects on economic growth in oil and non-oil economies, suggesting that country characteristics and resource dependence determine fiscal policy outcomes (Alshammary et al., 2022).

Investment is the next major driver of economic growth since capital accumulation increases productive capacity induces better technology utilization and assists in industrialization. Investment is an important control variable, absent from economic growth as previous research has, for example, as mentioned in the study by Dinh Thanh et al. (2020), private investment has a crucial role to play in economic growth, but the relationship between public spending and private investment varies with institutional conditions. Similarly, government expenditure and investment were designated as key channels via which economies increase long run productivity and growth performance (Mohd Sidek and Asutay, 2021).

Economic growth in terms of international trade and exchange rate conditions because for ASEAN member states which are open economy has entrenched roles. Trade openness could nurture growth by expanding the market opportunities, improving productivity, facilitating technology transfer and attracting foreign direct investment. On the other hand, an instability of exchange rate may increase uncertainty and damage export competitiveness or domestic investment decision. Research on the macroeconomic determinants of growth, therefore, has included trade-related factors and exchange rate conditions to reflect or account for external sector influences. Mohd Sidek and Asutay (2021) investigated investment in tandem with various macroeconomic fundamentals from an exhaustive economic growth structure while arguing that external shocks as well as institutional quality are fundamental to influencing aggregate economic performance.

Energy markets are another crucial area of economic growth, especially for some ASEAN economies where industries and transportation systems still depend heavily on fossil fuels. The transmission channels of oil price fluctuations to economic activity are the production cost through inflationary pressures, government revenues and external balances. The rise in energy prices may hurt growth in oil-importing economies, whereas it will benefit oil-exporting economies through petroleum revenues. Recent empirical literature has increasingly documented the asymmetric and non-linear nature of the response of economic variables to external shocks. In a study by Budiharseno and Kim (2025), they differentiated the macroeconomic variable interactions as cases of both good and bad economic states are distinct, thus illustrating how nonlinear dynamics should be reflected upon while studying the impact of fiscal policies on economic growth.

Inflation is also registered as an important macroeconomic determinant of economic growth. Moderate inflation can underpin economic activity as it signals increasing demand but sustained high inflation reduces purchasing power, increases uncertainty and also discourages investment. Newer studies argue that without macroeconomic stability, fiscal policy and investment cannot make a significant impact on economic growth. Lhajhouji et al. (2025) stressed that government spending, investment and macro-economic situation together determine the economic growth especially in developing economics.

While previous research has significantly advanced understanding of the individual drivers of economic growth, there are several shortcomings. Partly, many previous researchers use only the government expenditure as an explanatory variable, whereas few studies have considered a wide-ranging framework by including government expenditure, oil price, exchange rate, capital investment and trade along with inflation. Second, previous studies have largely focused on single countries or attained a regional scope broader than ASEAN, undermining the utility of inter-country heterogeneities in accounting for economic structures within ASEAN economies. Finally, methodological dissimilarities among the literature, including nonlinear models, ARDL approach and dynamic estimations have reported inconclusive results for which panel-data methodologies are required to be further investigated. Recent works continue to recognise variation in the linkages between macroeconomic variables and growth, across countries or institutional systems (Sosvilla-Rivero et al., 2025).

Therefore, this research will contribute to the existing literature by exploring the effect of oil price, government expenditure, exchange rate, investment, inflation, and trade openness on real GDP using a panel-data model, which consist of pooled OLS (POLS), fixed effects (FE), and random effects (RE) with ASEAN countries. This study fills the gap in literature by integrating multiple macroeconomic determinants into a single empirical framework and therefore offers additional evidence surrounding macroeconomic determinants influencing economic growth among ASEAN economies, while also overcoming shortcomings found within previous studies examining the same relationships individually.

2. LITERATURE REVIEW

2.1. Oil Price

The literature on oil prices and economic growth has evolved from focusing on the short-run effects of oil price changes to examining

asymmetric responses and cross-country differentials. Tang et al. (2010) analyzed the effect of oil price shocks on China economy under a structural vector autoregressive framework. They found that rising oil prices harmed GDP and investment but had a positive effect on inflation and interest rates. The latter study also suggested that the long-run impact of oil shocks was mainly mediates through the investment channel. Moreover, Raghavan (2015) analyzed oil supply, global activity, and oil-specific demand shocks in terms of their impact on the ASEAN-5 economies. The results reveal the varying impacts of oil price shocks across ASEAN economies based on oil dependence, trade intensity and whether countries are net oil exporters or importers. The economic growth effects were muted by the relatively modest role of oil prices in its production structure, and so higher oil prices had proportionally larger inflationary than economic growth effects.

The recent literature also has focus on asymmetric relationship between oil prices and economic growth instead of assuming the positive and negative oil price shocks have the same impact. Using a nonlinear autoregressive distributed lag (NARDL) framework, Nusair and Olson (2021) examined economic structure of ASEAN-5, Japan and Korea and showed oil price movements drive performance both in the short run as well as long term and that an increase of oil price has a stronger effect than a decrease. Similarly, Rosnawintang et al. (2021) further investigated ASEAN-5 countries using a panel ARDL model and found that crude oil price volatility influenced economic growth, particularly in the short run. When looking on the ASEAN+3 economies, Sanusi et al. (2021) proved that inflation and economic growth in the order of importance are influenced by key oil price shocks with the most important channel being energy prices fluctuations.

2.2. Government Expenditure

The relationship between the amount of government expense and economic growth has been well studied through fiscal policy to enhance economic activities. Theoretical reasoning in the early literature indicates that productive public expenditure can facilitate economic performance by increasing productive infrastructure and human capital development as well as offering public services that complement private sector activity. Using literature that demonstrates the relationship of government size to economic performance, Ferris and Voia (2015) highlight how in the early stages of development, government expenditure may provide useful complements to private sector activities and thus support economic growth but excessive expansion of the public sector will hold back economic performance due to rising costs and inefficiencies.

Empirical work has pushed this analysis further by treating government spending as a component of aggregate demand via its contributions to GDP. Nusair and Olson (2021), who introduced real government expenditure into a short-run output model for the ASEAN-5 countries, Japan, and Korea provided fiscal expenditure as one of the channels through which aggregate demand can influence domestic output. The paper revealed, government expenditures could raise output by boosting demand but when excessive may create negative crowding-out effects through reduced private investment. Moreover, a panel autoregressive distributed lag approach was used to carry out an examination on influence of government indicator macroeconomic factors in economic growth among ASEAN-5 countries. The results of the work showed that short-run economic growth is driven by some macroeconomic elements such as fiscal conditions, while long-run growth depends primarily on structural factors (Rosnawintang et al., 2021). Sethi et al. (2024) also noted that productive government expenditure such as on healthcare, education and infrastructure can raise economic growth through an increase in productivity and human capital development.

2.3. Exchange Rate

The empirical work on the link from exchange rates to economic growth has largely focused on the way that exchange rate movements affect trade competitiveness, inflation and investment behaviour as well as macroeconomic stability. The consequences of exchange rate changes for economic activity through export competitiveness and balance of payments channels were highlighted in the earliest empirical studies. Just as Raghavan (2015) analysed 5 ASEAN economies and showed that exchange rate responses differ across economic structures, oil dependency and trade intensity. The presence of external shocks in the study is said to cause fluctuations in exchange rates, which then affect the trade performance and subsequently economic growth potentials among ASEAN economies. In addition, using a structural vector autoregression framework, Pham and Sala (2020) also investigated Vietnam where external price shocks play a role in the determination of international competitiveness, trade balance, inflation and exchange rate dynamics. The article emphasizes the role of proper exchange rate management in ensuring the overall macroeconomic stability in an open economy.

Nusair and Olson (2021) incorporated the real exchange rate into an aggregate output model for the ASEAN-5 economies, Japan and Korea. What they found was that variations of exchange rates were one of the most important transmission mechanisms affecting GDP performance through demand and international competitiveness. Similarly, Sanusi et al. (2021) examined the transmission of external global shocks, through several macroeconomic channels to affect inflation dynamics and growth in ASEAN+3 countries, and concluded that exchange rate movements are significant.

2.4. Investment

Investment is a primary, and conventional determinant of economic growth because capital accumulation increases productive capacity, raises productivity, and dovetails into long-run output development. Early empirical research showed how investment is important for economic development when it increases both capital stock and efficiency. Additionally, more liquid financial markets provide better access to capital that supports investment in productive activities which thus allows for a higher growth rate through a better allocation of resources and an increase in the economy's productive capacity (Mtar and Belazreg, 2023). Moreover, Tang et al. (2010) examined China and found that oil price shocks negatively affected output and investment, with reductions in investment creating persistent long-term effects on economic performance. The study emphasizes the crucial role of investment as a primary channel transmission through which

macroeconomic shocks affect growth. Likewise, Maghyereh and Abdoh (2020) showed that uncertainty decreases corporate investment when firms are confronted with worse economic uncertainties, thus delaying the decision to invest which influences future economic developments.

Empirical evidence has provided further clarity on the proximate determinants of economic growth in developing and ASEAN-related economies. According to Sothan (2017) the most important way that is contribute to take Cambodia economic grow up which is direct foreign investment, manage external capital flows into countries and the contribution of these inflows on GDP growth. In ASEAN countries, Pradhan et al. (2017), as cited in Mtar and Belazreg (2023), identified linkages between financial development and economic growth through investment-related channels. Sethi et al. (2024) included gross fixed capital formation in their growth model, noting that domestic investment in productive capital is an important determinant of economic performance.

2.5. Inflation

Mohseni and Jouzaryan (2016) provided evidence that inflation has a negative impact on the economy and Karahan and Çolak (2020) concluded, the relations between inflation rates are different. Moderate inflation is thus likely not to limit growth, but high inflation may create macroeconomic instability and reduce incentives for investment. In addition, Rosnawintang et al. (2021) examined the ASEAN-5 countries through panel autoregressive distributed lag model and results of their study indicated that inflation in the short run impacts on economic growth for Indonesia, Philippines, Singapore and Thailand. Similarly, Sanusi et al. (2021) studied the economies of ASEAN+3 countries and found that increase in inflation is associated with a decrease in GDP growth, suggesting price stability as a principal condition of sustainable economic development. The results imply that inflation is still an important macroeconomic determinant of GDP performance in ASEAN economies.

2.6. Trade

The intensity of intra-regional trade and engagement in global production networks made trade integration a central characteristic of economic development within ASEAN economies. The report prepared by Raghavan (2015) pointed out that the ASEAN-5 economies have an open trade environment and including Singapore, Malaysia and Thailand even has a high volume of trade shares than GDP, which means their economy is more integrated into global value chain. In addition, the study showed that external shocks could affect ASEAN economies through trade as well as economic features.

Ongoing empirical research has attempted to shed more light on the trade openness-growth nexus by employing much more sophisticated econometric methodologies. Using a panel vector autoregressive (PVAR) model, Mtar and Belazreg (2021) found trade openness positively impacts economic growth but institutional quality plays an important role in ensuring that economies fully capture the benefits generated from global trade integration. Additional studies specifically on ASEAN economies and oil price shocks provide evidence for the responsiveness of trade structures again, where both total balances and GDP impact exclusively depend on the levels of export competitiveness as well as reliance upon imports and gross energy resources (Raghavan, 2015; Pham and Sala, 2020). In general, the existing literature supports the conclusion that trade openness is indeed a potent determinant of performance, yet its power varies across countries depending on their structures and exposure as well as their institutional capacity.

2.7. Research Gap

Despite the existing of extensive empirical studies on the determinants of economic growth, still few have looked at the joint impact of critical macroeconomic variables and growth performance for GDP in the member economies within ASEAN. Most thorough studies have been dimensional with respect to oil price shocks on growth, fiscal expenditure and economic decrements from globalization, defined with trade openness or exchange rate movements. Such as studies of oil prices have shown that external shocks to energy markets impact ASEAN economies through inflation, investment, exchange rate and trade channels; nevertheless they focus on the transmission mechanism related to oil alone and do not integrate other major macroeconomic determinants in a single framework.

Likewise evidence on government expenditure, investment, inflation, exchange rate and trade have offered valuable hints of each individual impact on growth yet both in relation to cross-country heterogeneity attributable to differential economic structure and policy environment and interstitial contributions through various forms of trade integration. There are also different econometric approaches and variable selections in those existing ASEAN studies, which limited comparability of findings and failed to provide sufficient evidence on the relative relevance of these factors explaining GDP variations. Moreover, ASEAN economies are deeply integrated through international trade and vulnerable to common external shocks, but heterogeneity in oil dependency, fiscal capacity exchange rate regimes and investment structure produces disparate economic outcomes across countries. Hence, a collation of the oil price, government expenditure, exchange rate, gross capital formation, inflation and trade into an empirical framework has not been investigated within ASEAN. And there are very little study use external sides where the main determinant of economic growth as ASEAN will investigate the combined impact of these macroeconomic variables on GDP, thereby offers a wider understanding of how domestic policies along with external economic conditions together affect economic growth in part full of agency in ASEAN economies.

3. METHODOLOGY

This study used a quantitative analysis with panel data estimation techniques to investigate and provide an explanation of the influence of oil price on GDP in the Association of Southeast Asian Nations. The choice of panel data analysis is that it encompasses both cross-sectional and time-series observations, so these variations occurring across countries and over the years can be expressed along with unobservable country-specific characteristics. The dependent variable is real GDP, while the

explanatory variables are crude oil price (OIL), government expenditure (GEXP), exchange rate (FX), investment that measured by gross capital formation (INVESTMENT), inflation (INF), and trade openness (TRADE). The estimation of panel data models are implemented using pooled ordinary least square, fixed effects, and random effect models, which are specified in equation (1), (2), and (3), respectively.

3.1. Pooled Ordinary Least Square (POLS) Model

$$GDP_{it} = \beta_0 + \beta_1 OIL_{it} + \beta_2 GEXP_{it} + \beta_3 FX_{it} + \beta_4 INVESTMENT_{it} + \beta_5 INF_{it} + \beta_6 TRADE_{it} + \varepsilon_{it} \quad (1)$$

Where, β_0 is a constant term, $\beta_1,\ldots \beta_6$ are estimated coefficient, ε_{it} is random error term, *i* country identifier, and *t* is time period. The pooled ordinary least squares model is initially estimated as the benchmark specification. POLS treats all observations as if they are drawn from the same population and therefore does not take into account differences across countries or over time. Assumes that intercept and slope coefficients are constant across all observations. However, POLS was straightforward estimation method, and it was important to note that this model may produce biased estimates if a time-invariant country-specific characteristic that affects the inequality successively were correlated with the explanatory variables (Wooldridge, 2020; Greene, 2020; Baltagi, 2021).

3.2. Fixed Effects (FE) Model

The fixed-effects model is employed to control for unobserved time-invariant characteristics that differ across countries. The FE approach assumes that individual effects are correlated with the independent variables and removes these effects through within-country transformation.

The FE specification is expressed as:

$$GDP_{it} = \alpha_i + \beta_1 OIL_{it} + \beta_2 GEXP_{it} + \beta_3 FX_{it} + \beta_4 INVESTMENT_{it} + \beta_5 INF_{it} + \beta_6 TRADE_{it} + \varepsilon_{it} \quad (2)$$

Where α_i captures country-specific fixed effects. This approach controls for factors that remain constant over time, such as institutional structures, geographical characteristics and historical conditions, which may influence income inequality (Wooldridge, 2020; Greene, 2020; Baltagi, 2021).

3.3. Random Effects (RE) Model

The random-effects model is estimated as an alternative specification. Unlike the fixed-effects approach, RE assumes that individual-specific effects are random and uncorrelated with the explanatory variables. The model incorporates country-specific effects into the error term.

The RE model is specified as:

$$GDP_{it} = \beta_0 + \beta_1 OIL_{it} + \beta_2 GEXP_{it} + \beta_3 FX_{it} + \beta_4 INVESTMENT_{it} + \beta_5 INF_{it} + \beta_6 TRADE_{it} + u_i + \varepsilon_{it} \quad (3)$$

Where u_i represents the random individual-specific effect and $\upsilon_{it} = u_i + \varepsilon_{it}$ represents the idiosyncratic error term. The advantage of the RE model is that it allows estimation of both within-country and between-country variations (Wooldridge, 2020; Greene, 2020; Baltagi, 2021).

3.4. Model Selection Procedures

Three diagnostic tests are performed to determine the most suitable panel-data estimator. Of these, first, the Chow test is conducted to establish whether fixed-effects model outperforms POLS model. Secondly, the Breusch-Pagan Lagrangian Multiplier test is conducted to check whether a random-effects model is better than POLS. Finally, the Hausman test is applied to differentiate between fixed-effects and random-effects specifications. These are then compared using statistical significance, and the best model is selected. Selected panel-data model is the simplest model available to estimate the impact of crude oil price, government expenditure, exchange rate, investment that measured by gross capital formation, inflation, and trade openness variables on GDP controlling unobserved country specific heterogeneity.

3.5. Data

The study period spans the years from 2000 to 2024 and incorporated eight ASEAN member states: Brunei, Cambodia, Indonesia, Malaysia, the Philippines, Singapore Thailand and Vietnam. The 200 country-year observations comprise the balanced panel with eight cross-sectional units covering 25 years. Table 1 indicates that GDP, government expenditure, exchange rate, investment, inflation and trade-openness are collected from World Development Indicator of World Bank, while the data related to oil prices are collected from World Bank Commodity Price. Combining cross-country and time-series information enables the study to examine both differences among ASEAN economies and changes within each country throughout the sample period in detail.

4. EMPIRICAL RESULTS

Descriptive statistics of the variables used in Panel dataset covering eight ASEAN countries from 2000 to 2024, as indicated in Table 2. There are 200 observations for each variable, which suggests a balanced panel structure on the dataset. The GDP variable, measured as the natural logarithm of real GDP, has a mean value of 25.71 with a standard deviation of 1.39. The minimum and maximum values of 22.73 and 27.85 indicate differences in economic size among ASEAN countries. Average crude oil price is 64.22 and standard deviation of 20.26 which depicts that there have been lots of ups and downs in global oil pricing during the academic year period analyzed. The GEXP variable has an average of 11.83% of GDP, with values ranging from 4.81% to 29.58%, indicating that government consumption expenditure differs across countries. The FX variable is measured as the natural logarithm of the exchange rate ratio, with a mean of 4.63 and standard deviation of 3.75, suggesting that amount levels vary among ASEAN economies. The INVESTMENT variable averaged 26.56% of GDP over the 12 years, with a minimum of 15.17% and a maximum of 41.07%, which captures specificities in capital formation activity across countries and time series. The average of the INF variable is 3.20% with a large range from −2.32% to 24.10%, which highlights inflationary heterogeneity throughout our sample period. TRADE stands out with the largest

Table 1: Variable measurement

Variable	Description	Unit	Source
GDP	GDP (constant 2015 US$)	Natural logarithm of GDP	World Development indicator
OIL	Average price of crude oil	USD per barrel	World Bank Commodity price
GEXP	General government final consumption expenditure	% of GDP	World Development indicator
FX	Exchange rate (Domestic currency/US$)	Natural logarithm of exchange rate	World Development indicator
INVESTMENT	Investment	% of GDP	World Development indicator
INF	Inflation	%	World Development indicator
TRADE	Trade-openness	% of GDP	World Development indicator

Table 2: Descriptive statistics

Variable	Observation	Mean	Standard deviation	Minimum	Maximum
GDP	200	25.71	1.39	22.73	27.85
OIL	200	64.22	20.26	31.80	95.30
GEXP	200	11.83	5.28	4.81	29.58
FX	200	4.63	3.75	0.22	10.09
INVESTMENT	200	26.56	5.49	15.17	41.07
INF	200	3.20	3.55	-2.32	24.10
TRADE	200	141.58	91.44	32.97	437.33

dispersion, given an average of 141.58% GDP and a standard deviation of 91.44, suggesting ASEAN countries have remarkable differences in terms of trade openness. Overall, the results from the descriptive statistics indicate that there is substantial cross-country heterogeneity in aggregate macroeconomic conditions and this allows us to justify a panel data approach (for the association between oil prices and growth) across different countries.

Correlations between explanatory variables used in panel data analyses are shown Table 3. Each value, a correlation coefficient shows how weakly or strongly variables are related to each other. The more extreme the values get, the stronger (negative correlation) or weaker (positive correlation) the linear relationship between pairs of variables; $-1 \leq r \leq 1$. Generally, OIL has weak correlation with others; the coefficient range is between −0.032 and 0.329. It means that most than OIL and INF association is 0.329 suggesting that higher crude oil price will be positively moderate influence increase on inflation. Among the control variables, GEXP and FX are also having a moderately high negative correlation (−0.640), which means that when government expenditure get higher, exchange rate will moves lower. FX and INVESTMENT have a moderate positive correlation of 0.402, while FX and TRADE have moderate negative correlation of −0.449. Another pair is FX and INF, which has a positive correlation of 0.454. The others correlations are low (<0.5) which simply shows that the most of the explanatory variables do not have high linear relationship between each other. The correlation matrix does not point to severe multicollinearity problems because none of the coefficients are greater than values conventionally believed to be problematic, such as 0.80. As a result, the explanatory variables may now be entered jointly in the regression without major issues of multicollinearity.

Table 4 reports the results of the model selection test to choose between POLS, FE and RE panel data estimation methods. The Chow Test is a comparison of the fixed effects model to that of pooled OLS. A $\chi^2 = 31.91$ with a P = 0.0000 rejects the null hypothesis that pooled OLS is adequate, implying the fixed effects model better accounts for country specific differences on impact on economic growth over time. Breusch-Pagan Lagrangian multiplier (LM) Test compares the Random effects model and pooled OLS. The null hypothesis of no panel-level random effects is rejected as suggested by the test statistic $\chi^2 = 1883.71$ with a P = 0.0000, which concluded that the analysis prefers the random effects model over pooled OLS. While the Hausman Test helps us choose between the fixed effects model and random effects model. The estimated random effects estimator with test statistic of $\chi^2 = 24.13$ and P = 0.0005 rejects the null hypothesis, which suggested that the fixed effects mode is selected as the best estimation model for examination between oil price and economic growth on ASEAN panel dataset.

The empirical estimation results of pooled ordinary least squares, fixed effects, and random effects models for the determinants of economic growth among ASEAN countries are shown in Table 5. The model comparison tests shown in Table 4 show that the FE specification is most appropriate for the panel dataset. The FE model accounts for some unobservable country-fixed characteristic that is time invariant, e.g., institutional quality, geography, and structural economic difference. The F-statistic value of 31.91 with a probability value <1% provides strong evidence to confirm the overall significance of the FE model and suggest that the explanatory variables together have statistically significant power in explaining GDP differences across ASEAN countries during the sample period.

Both the FE and RE models yield a negative and statistically significant coefficient for OIL, −0.00867 and −0.00923, respectively. The study that includes findings that higher international crude oil prices are accompanied by lower economic growth. Higher commodity prices result in higher energy costs, so production activities, transport costs and inflationary pressures are affecting the economy negatively that is another possible explanation of this negative relationship. For the majority of ASEAN economies, a more significant number being highly dependent on energy imports, oil price increases may raise operating costs to businesses and reduce household purchasing power. The result agrees with the findings of existing literature that have shown that real economic

Table 3: Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) OIL	1.000					
(2) GEXP	−0.032	1.000				
(3) FX	−0.009	−0.640	1.000			
(4) INVESTMENT	0.125	−0.052	0.402	1.000		
(5) INF	0.329	−0.399	0.454	0.133	1.000	
(6) TRADE	0.014	−0.114	−0.449	−0.043	−0.153	1.000

Table 4: Model comparison

Model	Test	Test statistic	P-value
FE versus POLS	Chow test	χ^2=31.91	0.0000
RE versus POLS	Breusch-Pagan lagrangian multiplier test	χ^2=1883.71	0.0000
FE versus RE	Hausman test	χ^2=24.13	0.0005

Table 5: Empirical results

Variable	Model 1	Model 2	Model 3
	POLS	FE	RE
	GDP	GDP	GDP
OIL	−0.00433	−0.00867***	−0.00923***
	(0.00483)	(0.00105)	(0.00101)
GEXP	0.0627**	0.0505***	0.0410***
	(0.0303)	(0.0116)	(0.0112)
FX	0.00239	0.592***	1.062***
	(0.0473)	(0.112)	(0.147)
INVESTMENT	0.0145	0.0141***	0.0157***
	(0.0236)	(0.00481)	(0.00458)
INF	−0.0286	−0.0253***	−0.0228***
	(0.0459)	(0.00688)	(0.00655)
TRADE	0.000494	0.00320***	0.00377***
	(0.00108)	(0.000901)	(0.000867)
Constant	26.38***	21.97***	19.91***
	(0.598)	(0.830)	(0.692)
N	200	200	200
F/Wald test	2.44	31.91	152.03
P-value	0.0272	0.0000	0.0000

Standard errors in parentheses. **P<0.05, ***P<0.01

performance which is suspected be sensitive to changes in external energy price shocks has a tendency of experiencing inverse relationship whenever there are oil price shocks (Balcilar et al., 2017; Kriskkumar and Naseem, 2019). Likewise, for the ASEAN economies, crude oil price fluctuation provides a significant relationship with economic growth, but the differing effects of dependence on energy and domestic value-added structure as well as macroeconomic conditions depending on each economy played an important role (Rosnawintang et al., 2021).

FE estimates the relationship between GEXP and real GDP shows that government expenditure is directly related to economic growth whereby the coefficient is found to be a positive at 0.0505 at level of significance of 1%. This result shows that fiscal policy is a key channel of leading economic activity and growth in ASEAN economies. Government spending can be a contributing factor to GDP growth by raising aggregate demand, by developing infrastructure and improving general public services needed for productive private-sector activity. The results align with recent empirical evidence showing that government spending accelerates economic growth through fiscal stimulus and public investment channels (Nguyen and Lee, 2025).

In the fixed effects model for ASEAN economies, a strong and statistically significant positive (0.592) coefficient of FX implies that an increase in exchange rate movements is positively associated with economic growth. It therefore indicates that changes in the exchange rate have special benefits on economic performance because of why it indirectly enhances international trade in objective to improve export competitiveness, especially from economies by participating strongly within global markets and value chains. A competitive exchange rate can be a tool of export growth, where the lower relative price of domestic products encourages production, and therefore economic activity only if. This finding is in line with recent empirical works highlighting that exchange rate competitiveness fosters economic growth in emerging and developing countries. This is consistent with the findings of Habib et al. (2017), who show that real exchange rate undervaluation promotes structural change in economies where tradable sectors matter for growth.

Similarly, Rodrik (2018) explains how the competitiveness of exchange rates can foster industrial development and productivity because they boost investment in export-oriented sectors. There is also evidence in favour of a positive correlation between GDP growth and exchange rates from Asian economies. Introducing goods and services boosted the economy of emerging Asian markets due to how exchange rate dynamics affects trade competitiveness or external sector performance (Nguyen et al., 2018). Nevertheless, the effect of exchange rate variation is by no means consistent across economies. The effect on growth is based on exchange rate regimes, dependency from imports, foreign debt exposure and international trade composition. Moreover, Barguellil et al. (2018) shows that a depreciation of the exchange rate can bring positive competitiveness effects as well as negative cost effects through import prices, and whether the net effect is positive or negative depends on domestic economic structures. Intriguingly, the positivity of this coefficient for the ASEAN panel implies that during the semester under study, competitiveness-enhancing effects dominate over inflationary and import-cost factors associated with a more depreciated exchange rate.

The INVESTMENT variable has a positive and statistically significant correlation with GDP, as evidenced by the coefficient of 0.0141 (fixed effects). It is often regarded as one of the very few robust results about what determines GDP, and it highlights capital accumulation as a central input. More investment or extensive capital increases potential output by increasing the availability of infrastructure, technology adoption, and labour

productivity. This finding corroborates recent work on long-term growth stressing that investment is a key driver of economic development. Osmani (2026) shows that investment also plays a crucial role in boosting economic growth in developing economies by increasing productivity and efficiency of capital. Similarly, Dinh et al. (2019) found that investment, in particular private-sector investment and capital formation, is among the key drivers of growth in developing Asia-Pacific economies. Furthermore, Le et al. (2022) highlighted that investment is important to sustainable growth through enhancing prospective productive capacity and the resilience of economies.

The coefficient of INF is negative and significant (−0.0253). Increasing inflation could, in turn, erode the real wealth when purchasing power of money decays faster than nominal prices, higher economic uncertainty has the effect of restraining investment decisions. These findings corroborate the recent evidence from ASEAN panel data that too high inflation is detrimental to economic growth through hindering international transaction due to macroeconomic instability (Ananta and Santoso, 2025). In addition, trade has a satisfaction and statistically significant positive affiliation with GDP (0.00320), which reflects the view that higher economically friendly change openness will aid economic development. Greater trade integration is likely to contribute economic growth by stimulating exports, providing access to world markets, technology transfers and productivity gains. This result is in line with previous studies focusing on trade openness for supporting the economic growth of more ASEAN economies (Ananta and Santoso, 2025). In general, the empirical findings show that oil price shocks and inflation are growth-restrictive factors in ASEAN economies; however, fiscal spending, investment, exchange rate competitiveness and trade openness are among growth-promoting determinants.

5. CONCLUSION AND POLICY IMPLICATIONS

5.1. Conclusion

This study examines the determinants of economic growth among selected ASEAN economies during the period from 2000 to 2024 using panel data estimation techniques. The empirical analysis investigates pooled OLS, fixed effects, and random effects models, where model selection tests confirm FE specification as most appropriate. The results show that external shocks, macroeconomic policies and structural growth fundamentals play a major role in determining economic performance for ASEAN economies.

The findings show that crude oil price negatively and statistically significantly affects economic growth. A negative coefficient of oil prices shows that increases in the price of international energy enhances production costs, raises inflation pressure and lowers purchasing power among family units, limits monetary action. This illustrates the high susceptibility of ASEAN economies to external movements in energy markets especially for countries with high net-fossil fuel import dependency. This finding is consistent with the existing empirical literature on oil price shocks as hindering forces to economic activity, particularly among emerging economies vulnerable to global commodity price fluctuations.

Government spend shows a positive and significant relationship with GDP, indicating that fiscal policy remains an important implement in aiding growth. Government spending can stimulate positive economic activity via aggregate demand expansion, investment in infrastructure and improved provision of public services, which raise productivity. The results suggest that good fiscal management can help ASEAN economies sustain economic development. Moreover, the economy grows when competiveness of the exchange rate increases as proved by significant and positive coefficient attached in the exchange rate variable. In export-oriented ASEAN economies, an exchange rate adjustment may strengthen external competitiveness and might lead to expanded trade and more integrated value chains. Nevertheless, exchange rate policies vary with trade structures, import dependency and the levels of exploitable external balance.

As was the case with human capital, investment is singled out as a critical driver of growth, which itself reflects the recognition that capital accumulation increases productive capacity and its improvement through better infrastructure, new technologies, etc. Investment and GDP have a positive co-movement showing that both domestic and foreign investment contributes to long-term economic growth. On the other hand, inflation has a significantly negative effect on economic growth, meaning that macroeconomic instability would degrade overall performance of the economy. Chronic inflation will eat into purchasing power, increase uncertainty and lower investment activity. The outcome shows that trade openness is positively and significantly related to GDP, suggesting the importance of international integration, export promotion and technology transfer in economic performance.

In conclusion, the empirical evidence suggests that ASEAN economic growth is driven by both external shocks as well as macroeconomic stability and growth-enhancing policy. Key results highlight that energy dependence management, price stability, productive investment, fiscal policies and trade integration should be complemented to ensure the sustainable growth of the economy across the region.

5.2. Policy Implications

The empirical results imply several significant policy suggestions for policy makers in ASEAN countries. Low oil prices are damaging to growth; hence, the need to cut exposure to external energy price shocks. ASEAN economies should also speed up and accelerate their energy diversification strategies by further developing renewable energy sources, boosting the efficiency of existing power plants, and enhancing regional cooperation across sectors. Limiting fossil fuel imports can also increase economic resilience to shocks in world commodity prices. Second, the results from economic growth model affirm that government expenditure is essential in promoting political economy. Productive government spending as part of fiscal policy includes, amongst others, infrastructure development, education and healthcare. Public spending allocation should be on areas that lead to long-term productivity, rather than short-term consumption effects.

In addition to this, reinforcing fiscal governance and ensuring better efficiency in government expenditure will be necessary for spending to be productive.

Third, the favorable impact of exchange rate competitiveness indicates a need to anchor stable and supporting exchange rate policies. ASEAN policymakers need to avoid excessive exchange rate volatility but should remain consistent in how much the exchange rate frameworks support trade competitiveness and macroeconomic stability. Exchange rate policies need to be supplemented by measures that improve productivity, including technological development, industrial upgrading and export capacity. Fourth, the massive boost from investment shows that it needs to be made profitable. Attracting domestic and foreign investments will include better infrastructure, supportive policies including regulatory transparency and quality institutions and mechanisms of investment facilitation. In particular, investments that improve productivity and access to technology transfer, as well as involvement in regional value chains and global value chains should receive special attention.

Fifth, the negative tradeoff between inflation and economic activity emphasizes a prudent monetary policy in terms of maintaining price stability. Monetary authorities need to follow through with hard-earned, proven inflation-fighting tools against supply-driven pressures from food and energy markets. Stable inflation environments can strengthen business confidence, safeguard household purchasing power and fuel investment activities. Lastly, the beneficial effect of trade openness underlines that ASEAN economies ought to further enhance regional economic integration. Trade facilitation, supply chain connectivity, digital trade and export diversification policies can amplify the benefits of international integration. In summary, a unified policy framework of energy security, fiscal management and efficiency, promotion of investment inflows to sustain long-term growth driven by the private sector with support from development banks as well as inflation control through both money and trade regimes is critical in steering ASEAN economies towards sustainable economic growth.

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