

THE IMPACT OF INFLATION AND INTEREST RATES ON ECONOMIC GROWTH IN SOUTHEAST ASIA: A PANEL DATA ANALYSIS

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ABSTRACT

Economic growth in Southeast Asia is influenced by a variety of macroeconomic variables, with inflation and interest rates being two of the most crucial. This study aims to examine the impact of inflation and interest rates on the economic growth (measured by GDP) of ten Southeast Asian countries from 2007 to 2023. Using a panel data regression approach, the analysis applies several econometric models including Pooled OLS, Fixed Effects Model, Random Effects Model, and spatial econometric models (Spatial Autoregressive Model/SAR and Spatial Error Model/SEM) to determine the most suitable model for the data. The results show that interest rates have a significant negative effect on GDP growth, suggesting that higher interest rates tend to reduce economic activity in the region. Inflation, while showing a weaker relationship, also negatively affects GDP in most models. Spatial analysis further reveals the presence of spatial dependence among Southeast Asia countries, indicating that the economic performance of one country is not isolated but affected by its neighbors. Among the models tested, the Spatial Error Model (SEM) is found to be the best fit based on statistical criteria, highlighting the importance of unobserved regional factors and spatial spillover effects. Policy implications include the need for coordinated regional monetary policies, maintaining inflation within manageable limits, and enhancing economic cooperation among Southeast Asia nations. While the R-squared values are relatively low, the statistical significance of the core variables underscores their relevance. This study contributes to the broader understanding of macroeconomic management and regional economic integration in Southeast Asia.

Keywords: Inflation; Interest Rate; Economic Growth; Panel Data; Southeast Asia

INTRODUCTION

Economic growth remains a primary objective for Southeast Asian nations amid rapid transformation in their economic landscapes (ASEAN Statistics, 2023). However, this pursuit is often challenged by macroeconomic variables such as inflation and interest rates. Inflation, defined as the persistent rise in the general price levels of goods and services, can reduce the purchasing power of consumers, create uncertainty for investors, and disrupt the broader financial system (Sari et al., 2023). On the other hand, interest rates serve as a key instrument of monetary policy, influencing borrowing costs, consumer spending, and overall investment behavior. Adjustments in interest rates can either stimulate economic activity or help temper inflationary pressures, but finding the right balance is critical to avoid adverse side effects (Tang et al., 2023). In the context of ASEAN, these variables have shown significant impacts on GDP growth, employment, and foreign investment flows, particularly in countries like Indonesia (Sitompul & Simangunsong, 2019). The interconnectedness of ASEAN economies further amplifies the regional implications of inflation and interest rate shifts, making coordinated and data-informed policymaking essential (ASEAN Statistics, 2024). As ASEAN moves toward deeper economic integration, the importance of robust monetary frameworks and collaborative strategies among member states becomes increasingly vital to ensure inclusive and resilient development.

For Southeast Asian economies, inflation and interest rates have shown varying trends over time, influenced by global economic shocks, domestic policies, and structural economic changes. Countries like Indonesia and the Philippines have historically experienced higher inflation rates, averaging 6.76% and 3.84%, respectively, whereas Singapore has maintained relatively low inflation of around 1.53%. Similarly, interest rates in ASEAN nations have fluctuated in response to crises, such as the 2008 financial crisis and the COVID-19 pandemic, impacting capital flows and investment patterns.



Figure 1. Fluctuation of Three ASEAN Countries' Inflation Rate

Given the significance of these macroeconomic factors, this study aims to analyze the impact of inflation and interest rates on economic growth in Southeast Asia using a panel data approach. This study also aims to determine whether inflation rates or interest rates or possibly other variables have a greater impact on one country's GDP growth. Despite extensive studies on Southeast Asian economies, there remains limited empirical consensus on the extent to which inflation and interest rates jointly affect economic growth in the region. Previous research has often focused on single-country analyses or broader macroeconomic determinants without isolating these two critical variables. This gap creates uncertainty for policymakers who must balance inflation control with growth-oriented interest rate policies.

For example, Akalpler and Duhok (2018) examined Malaysia and found that monetary policy instruments, particularly interest rates and inflation, significantly shape GDP growth. Their findings underscore how country-specific contexts reveal important interactions between macroeconomic variables and growth. Building on such evidence, this study extends the scope by employing a panel data approach across Southeast Asian countries to capture a more comprehensive picture of how inflation and interest rates jointly influence economic performance in the region.

By examining historical data and economic trends, the study will provide insights into how these variables interact and influence the broader economic environment in the region. This research contributes to the ongoing discourse on economic stability, offering policy recommendations for mitigating inflationary pressures while fostering sustainable economic growth. This research would also be an understanding of what components of economics to give more attention to support the economic growth of one country typically in Southeast Asia.

LITERATURE REVIEW

Economic Growth in Southeast Asia has been widely studied through various lenses, with many scholars emphasizing the role of macroeconomic variables such as foreign direct investment (FDI), trade openness, capital formation, inflation, and interest rates. According to Adnani (2022), Keynesian theory highlights that inflation often arises when aggregate demand exceeds the productive capacity of the economy, suggesting that demand-driven pressures are a critical factor in shaping macroeconomic stability. This view is consistent with demand-pull theory, which similarly stresses the impact of excessive aggregate demand on rising prices. By linking these perspectives, the literature underscores the importance of understanding inflation dynamics when examining economic growth in Southeast Asia.

Jackson (2024) for instance, underscores the Phillips Curve's depiction of a trade-off between inflation and unemployment: "The inverse relationship between inflation and unemployment depicted by the Phillips Curve implies that efforts to lower one of these variables may lead to an increase in the other". This framing spotlights the intricate policy dilemmas at the intersection of stabilization goals. By aligning Keynesian aggregate-demand frameworks with Phillips Curve trade-offs, the literature paints a richer picture of inflation dynamics, policy levers, and the complex balancing act faced by policymakers.

An investigation conducted the determinants of economic growth in the ASEAN-4 countries (Malaysia, Indonesia, Thailand, and the Philippines) using panel data analysis. Their findings indicate that FDI, openness, and gross fixed capital formation (GFCF) have a positive relationship with GDP, though only GFCF was consistently significant across all four countries (Hussin & Saidin, 2012). Interestingly, FDI and openness showed mixed results, being more impactful in some countries than others. While this study did not focus specifically on interest rates and inflation, it provides a foundational understanding of how capital formation and

investment—which are influenced by inflation and interest rates policies—contribute to economic growth.

In a more recent study, an approach to directly explored the relationship between inflation and several macroeconomic variables in ASEAN countries, including interest rates. Using panel data from 2006 to 2020, their analysis found that crude oil prices, interest rates, and nominal wages significantly influence inflation (Tang et al., 2021). Specifically, the interest rate exhibited a significant negative relationship with inflation, supporting the classical monetary theory that raising interest rates helps to contain inflation by reducing borrowing and consumption. Additionally, crude oil prices had a positive and significant impact on inflation, which reflects the vulnerability of ASEAN economies to global commodity price shocks. Nominal wages also had a negative relationship with inflation, which may suggest that wage growth has not kept up with price increases in the region. On the other hand, money supply and unemployment were found to be statically insignificant in influencing inflation.

Beyond domestic macroeconomic factors, regional economic collaboration within ASEAN has also been recognized as an important driver of growth of the economy. Studies on trade and financial integration highlight that deeper cooperation among Southeast Asia Country members can reduce barriers, enhance market efficiency, and promote greater openness to global capital flow. Regional initiatives such as the ASEAN Economic Community (AEC) aim to create a single market and production base, which may not only stimulate intra-regional trade but also attract more FDI by offering a larger and more stable economic conditions. Moreover, financial integration programs—such as cross-border trades and investments help strengthen resilience against external economic problems. While integration can amplify the benefits of globalization, it may also expose member countries to synchronized risks during global crises, underscoring the need for coordinated monetary and fiscal policies across the region.

Combining insight from both studies provides a broader picture of the macroeconomic environment in Southeast Asia. Inflation and interest rates, though not always directly addressed in growth models, play crucial roles in shaping the investment climate and consumption patterns, which are central to GDP growth. High inflation erodes purchasing power and deters investment, while stable inflation—achieved through prudent interest rate policies—can enhance economic stability and promote growth. Conversely, excessively high interest rates may suppress borrowing and investment. Potentially slowing growth in the short term. Therefore, policymakers in Southeast Asia face the ongoing challenge of balancing inflation control and interest rate management to sustain long-term economic development.

RESEARCH METHOD

This study employs a quantitative approach using panel data analysis to analyze the relationship between interest rates, inflation, and economic growth in Southeast Asian countries from 2007 to 2023. Panel data time series methods are especially appropriate for this study because they address the challenges of "long" panels of potentially nonstationary macroeconomic data by pooling multiple time series across countries over an extended period, allowing for robust and insightful empirical research (Croissant & Millo, 2018). Using real-world data from the World Bank, analyzation including ten dynamic countries that includes Indonesia, Malaysia, Thailand, the Philippines, Vietnam, Singapore, Brunei, Laos, Cambodia, and Myanmar. Through panel data analysis, the measurement of GDP growth is the key indicator of economic performance, while exploring how changes in interest rates and inflation levels influence this growth.

Panel data before were once relatively used in applied economic practice but now, they are a strong feature of applied research (Hansen, 2022). In panel data analysis, the Pooled Ordinary Least Squares (OLS) model implies homogeneity across all entities (e.g., countries), suggesting no unobserved heterogeneity while ignoring country specific features such as population, policy, or geography. To overcome this constraint and improve model realism, Fixed Effects (FE) and Random Effects (RE) models are used. The FE model accounts for all unobserved, time-invariant variations between nations by assigning each country its interception, thus controlling country-specific effects and isolating within-country variation over time. It is particularly appropriate when unobserved heterogeneity is believed to correlate with the explanatory variables.

On the other hand, the RE model considers country-specific effects to be random and uncorrelated with the regressors. This approach provides greater efficacy because of the reduced number of parameters, but it may result in biased estimates if its assumptions are not met, and this model is usually considered the special case of FE model. Typically, the Hausman test is used to determine the optimal choice between FE and RE (Hansen, 2022). A statistically significant p-value indicates that FE is the preferred option due to RE's inconsistency, whereas a non-significant result indicates that both models are consistent, rendering RE the more efficient choice.

The analysis begins with a correlation test to detect early correlations between variables. A panel regression model is then performed using both the Fixed Effects and Random Effects approaches, with the Hausman test used to pick the optimal model. This test assumes the null hypothesis (H_0) that the Random Effects model is more efficient (no correlation between individual effects and independent variables), and the alternative hypothesis (H_a) shows that the Fixed Effects model is more consistent. All of this follows a 95% significance level to determine the results of each test.

Several diagnostic tests are performed to validate the model's validity and determine the applicability of various estimation methodologies. The Breusch-Pagan test is used to determine heteroskedasticity, with the null hypothesis assuming constant variance in the error terms. Pesaran's Cross-sectional Dependence Test is used to discover potential interdependence between countries on the given panel of data. If the data shows cross-sectional dependency or spatial autocorrelation, it shows that typical panel models are insufficient and that spatial effects somehow need to be considered. In a particular circumstance, spatial econometric tools, including the Spatial Autoregressive Model (SAR) and the Spatial Error Model (SEM), are used to resolve geographical dependencies and strengthen the analysis.

Additionally, this study considers spatial interdependence among countries using the Spatial Lag Model (SAR) and the Spatial Error Model (SEM). The SAR test compares the hypothesis of no geographical dependency in GDP ($\rho = 0$) to the hypothesis of spatial spillover effects ($\rho \neq 0$). The SEM test compares the hypothesis of no spatial correlation in errors ($\lambda = 0$) to the hypothesis of spatial correlation ($\lambda \neq 0$). These tests employ a spatial weight matrix based on geographical proximity or economic links between countries. If SEM provides a better fit (as evidenced by a lower AIC threshold than SAR), it is used for the final estimation. This comprehensive approach should give a clearer picture of how these key economic factors interact across Southeast Asia, capturing not just domestic trends but also the ripple effects between neighboring countries.

RESULTS AND DISCUSSION

The data observed for this research come from 10 South East Asian countries, covering yearly interest rates, inflation rates, and nominal GDP from 2007 to 2023.

Presentation of Regression Analysis Results

The regression analysis was conducted to evaluate the impact of inflation and interest rates on GDP growth across ten Southeast Asian countries from 2007 to 2023. Various econometric models were tested to identify the most appropriate specification and hence obtaining results as follows:

Pooled OLS Model Results

Setting GDP value as dependent variable and Annual Inflation with Annual Interest Rate as independent variables resulting with the rough estimation in the Pooled OLS Model Analysis:

Table 1. Pooled Ols Model Analysis Result

Variable	Estimated	Std. Error	t-value	p-value	Significance
Intercept	3.6253e+11	3.2857e+10	11.03	< 2e-16	Yes
Inflation	-4.0622e+09	4.0518e+09	-1.00	0.318	No
Interest Rate	-1.4185e+10	3.9956e+09	-3.55	0.0005	Yes

The intercept is highly significant in this data, meaning the baseline level of the GDP value when Annual Inflation and Annual Interest Rate set to 0 is not zero or it's significantly different from zero. Following that, Interest Rate has a negative and statistically significant effect on GDP hence obtained that increasing interest rates by 1% is associated with a reduction of approximately \$14.2 billion in GDP value. Lastly, Inflation Rate is not significant, so its effect on GDP value is statistically inconclusive in this model. But on the other hand, the obtained R-squared value is 0.087 meaning this model only represents about 8.7% variation in GDP value. The F-statistics also show a nominal of 7.99 with p-value of 0.00048 which indicating significancy in statistics on the overall model, so at least one predictor is useful.

Fixed vs Random Effects Result (Hausman Test)

Continuing the analysis of Pooled OLS Model, introducing Fixed Effects and Random Effects on this analysis are necessary to obtain a more realistic interpretation of the data. Hence the obtained value compared as follows:

Table 2. Fixed Effects and Random Effects Result Comparison

Aspect	Fixed Effects (FE)	Random Effects (RE)
Intercept	Null (country-specific)	4.17e+11 (significant)
Inflation Coef.	-3.69e+09 (p = 0.030)	-3.74e+09 (p = 0.026)
Interest Coef.	-2.97e+10 (p = 0.031)	-2.39e+10 (p = 0.027)
R-squared	6.18%	6.03%
Significance	F = 5.20, p = 0.006	Chi-square = 10.73, p = 0.0047

Both models show a consistent result of negative effects of inflation and interest rates on GDP value. For obtaining the optimal model, the Hausman Test is used in this case and resulting a p-value of 0.7872. It is clear that the Hausman Test favored the Random Effects model, indicating that no evidence that unobserved country-level effects are correlated in the regressors. From now on, the Random Effects model will be used for the main model in the analysis.

The Diagnostic Tests Result

Diagnostic tests are needed to support the reliability and dependability of this model that will be analyzed. The first diagnostic will be proven using the F-test and the test itself generates a p-value so small (less than $2.2e-16$) meaning a rejection of Pooled OLS model is a must. This also strengthens the use of Random Effects model to continue the analysis. Continuing the second diagnostic test using Lagrange Multiplier (Breusch-Pagan) test on the Random Effects resulting also in a tiny p-value (less than $2.2e-16$). This also means that the Pooled OLS Model is inappropriate to this analysis, and the use of Random Effects is recommended.

From now on a diagnostic on Random Effects will be done firstly using Studentized Breusch-Pagan Test to test for heteroskedasticity (non-constant variance of residuals). This test produces a p-value of 0.3732 meaning there is no significant evidence of heteroskedasticity in the Random Effects Model. Another diagnostic is done using Pesaran CD Test and this test results in an interesting p-value of less than $2.2e-16$. Meaning that there is a strong cross-sectional dependence in the given panel of data, which is a problem in the analysis. Lastly, using Baltagi and Li LM Test also results in a small p-value of less than $2.2e-16$, meaning that a serial correlation exists in the Random Effects Model, like the result of Pesaran CD Test.

Spatial Dependence Analysis

Putting aside the diagnostic tests, geographical dependence and correlation are economically justified in Southeast Asia. Countries in this region are deeply interconnected through trade, investment, labor mobility and coordinated regional policies. Singapore for example, is a key financial and investment hub, attracting significant capital flows into Indonesia and Malaysia. Similarly, Thailand's manufacturing sector is strongly connected to supplier chains in Cambodia, Laos, and Vietnam. This shows that Southeast Asia or countries in the ASEAN have economic dependencies on one or more countries bordering or its neighbor, hence involving the geographical variable into this study.

More recently, the introduction of significant US tariffs on Southeast Asian Exports in 2025 has underlined the region's interconnectivity. Countries such as Vietnam, Thailand and Cambodia have suffered severe economic impacts, including job losses and disrupted trade, demonstrating how external shocks may have a ripple effect throughout the region. These realities highlight the need to include spatial dependence analysis into the model, as geographical proximity and economic interconnection are likely to influence the behavior of the observed variables. From this, it is shown that a geographic variable is one important thing to consider, and spatial dependence analysis is the model chosen to continue the research.

So, the use of Spatial Dependence Analysis is recommended in this particular case because location or geography is likely to influence the data. The two main keys of this analysis are Spatial Autoregressive Model (SAR) and Spatial Error Model (SEM) and considering the longitude and latitude of each country in Southeast Asia to obtain the results as follows:

Table 3. Sar and Sem Result Comparison

Metric	SAR	SEM
Rho / Lambda	0.7936	0.80185
Log-Likelihood	-125.65	-123.49
AIC	261.31	256.98
Residual Variance	0.19694	0.19026
Significance of Inflation	Yes (p = 0.03)	Yes (p = 0.01378)
Significance of Interest Rate	No (p = 0.22)	Yes (p = 0.027)
LM Test for Residual Spatial	Significant (p = 4.26e-5)	Corrects by design

By these results, Spatial Error Model (SEM) is the better model because:

1. It has better fit on AIC or Akaike Information Criterion ($256.98 < 261.31$) and log-likelihood ($-123.49 > -125.65$)
2. It removes the spatial autocorrelation in residuals which SAR didn't fully remove.
3. It suggests that unobserved spatial factors are actually affecting GDP value.

Interpretation of Coefficients and Statistical Significance

The SEM model results provide crucial insights into the macroeconomic relationships influencing GDP in Southeast Asia:

1. Interest Rate (-0.326 , $p = 0.0297$): A significant negative impact on GDP, indicating that higher interest rates deter investment and economic expansion.
2. Inflation (-0.062 , $p = 0.053$): A weak negative effect, suggesting that inflation has a limited yet present influence on GDP fluctuations.
3. Spatial Error Term ($\lambda = 0.8079$, $p < 2.22e-16$): Highly significant, confirming strong spatial dependencies where economic performance in one country is influenced by neighboring nations.

The relatively low R-squared value (< 0.2) suggests that the model explains only a small portion of GDP variations. However, the statistical significance of the coefficients ($p < 0.05$) indicates that interest rates and inflation remain meaningful determinants of GDP. This phenomenon can be explained by:

1. High Noise in the Data: The relationship between interest rates, inflation, and GDP may be substantial but is influenced by external economic shocks, policy changes, and global market conditions.
2. Multiple Contributing Factors: Other macroeconomic determinants such as foreign direct investment, trade balance, government expenditures, and political stability also affect GDP growth but are not included in this model.
3. Large Sample Size: The statistical significance of the coefficients, despite a low R-squared, suggests that the sample size is sufficiently large to detect real, albeit small, effects.

CONCLUSION

This study provides empirical evidence on the relationship between interest rates, inflation, and economic growth in Southeast Asian countries using panel data regression models. The findings indicate that interest rates have a significant negative impact on GDP value, while inflation exerts a weaker but still notable effect. Additionally, spatial dependencies suggest that regional economic conditions play an essential role in shaping national economic outcomes. One important thing about the results is the use of spatial autoregressive and spatial

error model showing the fact that the economic situation of one country also depends solely on another country bordering itself.

Despite the low R-squared value, the significance of the coefficients confirms the importance of these macroeconomic variables in influencing economic growth. The results highlight that interest rate policies should be carefully managed to sustain investment and consumption, while inflation stabilization remains crucial for maintaining economic confidence. Furthermore, strong spatial dependence underscores the necessity for regional economic cooperation and policy coordination. Therefore, a great economic workflow and collaboration between one or more neighboring countries is one of the most important things to ensure the safety of one's economic stability.

Ultimately, this research contributes to the broader discourse on economic stability in Southeast Asia, emphasizing the need for holistic policy frameworks that integrate interest rate adjustments, inflation control, and regional economic collaboration. Future research could explore additional factors, such as fiscal policies, trade dynamics, and global economic shocks, to develop a more comprehensive understanding of growth determinants in the region and how that region can withstand the global economic problems.

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