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The Effect of Inflation, Economic Freedom, and Exports on Economic Growth in ASEAN Countries: An ARDL Panel Analysis

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Abstract

This study aims to analyze the short-term and long-term effects of inflation, economic freedom, and export variables on economic growth in ASEAN countries in the period 1999-2023. This study uses a quantitative approach with panel data-based Autoregressive Distributed Lag (ARDL) method. Data processing is done using Eviews 12 software in the time span of 1999 to 2023. The research data sources came from the official websites of the World Bank and Heritage Foundation. The results showed that the inflation variable in the long term has a positive and significant effect on economic growth, while in the short term in the current period and in one and two previous periods inflation has a positive and significant effect, while in the previous three periods, it has a negative and insignificant effect on economic growth. Economic freedom variables in the long term have a negative and significant effect on economic growth, while in the short term the current period and in the previous two periods have a positive and significant effect, while in the previous one and three periods economic freedom has a positive and insignificant effect on economic growth. The export variable in the long term has a positive and significant effect on economic growth, while in the short term in one and three previous periods it has a negative and insignificant effect, and in two previous periods it has a positive and insignificant effect on economic growth.

Keywords: Inflation; Economic Freedom; Export; Economic Growth and Autoregressive Distributed Lag (ARDL).

1. Introduction

Economic growth is a key indicator in assessing a country's development, including that of ASEAN member states. ASEAN, a regional organization established on August 8, 1967, now consists of eleven countries with diverse economic characteristics. The five countries with the largest Gross Domestic Product (GDP) in the region Indonesia, Malaysia, Singapore, Thailand, and the Philippines play a strategic role in driving regional economic stability and growth.

Over the past five years (2019–2023), these countries have faced complex economic challenges, including the significant impact of the COVID-19 pandemic and rising inflationary pressures due to global geopolitical conflicts. Key sectors such as tourism, trade, and manufacturing experienced contractions, particularly in countries heavily reliant on these sectors, such as Thailand and the Philippines.

Moreover, the rise in inflation since 2021 has affected purchasing power and economic growth across the region [1]. Countries with higher levels of economic freedom tend to be better at mitigating the impact of inflation and maintaining economic stability [2]. Economic freedom which includes open trade policies, regulatory efficiency, and protection of property rights contributes positively to economic growth [3].

Another crucial factor is export performance. Exports serve as a primary driver of economic growth by increasing national income and enhancing global competitiveness. However, reliance on commodity exports and global price fluctuations makes some countries, such as Indonesia and Malaysia, vulnerable to external pressures [4].

Based on the aforementioned phenomena, the author is interested in conducting a study entitled "The Effect of Inflation, Economic Freedom, and Exports on Economic Growth in ASEAN Countries: An ARDL Panel Analysis."

2. Literature Review

2.1 Economic Growth

Economic growth refers to the increase in a country's capacity to produce goods and services, which ultimately leads to a rise in people's income. According to Kuznets, as cited in Rinaldi (2017), economic growth reflects a country's long-term capacity to meet the needs of its population, thereby creating greater prosperity [5].

2.2 Calculating Economic Growth

Economic growth can be measured by calculating the annual increase in GDP or GNP (per capita). The formula is as follows [6]:

$$PE = \frac{PDBt - PDBt-1}{PDBt-1} \times 100\%$$

Where PE refers to the economic growth rate, PDBt is the gross domestic product of the current year, and PDBt-1 is the gross domestic product of the previous year.

2.3 Inflation

According to Agus and Herawati (2023), inflation is the process of a general and continuous increase in the prices of goods. This does not mean that the prices of all goods rise at the same rate. Inflation serves as an indicator of economic stability. Several empirical studies investigate the inflation growth nexus using ARDL and panel techniques [7].

2.4 Economic Freedom

The concept of economic freedom is rooted in the ideas of Adam Smith, as outlined in his book *The Wealth of Nations*. Smith argued that a nation which grants individuals the freedom to pursue their own economic interests will generate greater prosperity for society as a whole [8].

2.5 Export

In various literature, exports are defined as the process of selling goods or services from one country to another for economic, political, or social purposes. This concept plays a vital role in supporting economic growth, improving public welfare, and maintaining the stability of a country's balance of payments [9].

3. Research Method

This study employs a quantitative approach, as explained by Sugiyono in Suparman et al. (2022), which is a method used to examine a specific population or sample through data collection using research instruments [10]. The study aims to analyze the impact of inflation, economic freedom, and exports on economic growth in five ASEAN countries Indonesia, Malaysia, Singapore, Thailand, and the Philippines over the period from 1999 to 2023. The research utilizes annual secondary data in a panel time series format spanning 25 years, obtained from the World Bank and the Heritage Foundation.

The dependent variable in this study is economic growth, measured by the percentage change in Gross Domestic Product (GDP). The independent variables include inflation, measured using the Consumer Price Index (CPI); economic freedom, measured using index scores from the Heritage Foundation; and exports, measured as the percentage of exports of goods and services to GDP. The data were sourced from reputable institutions namely, the World Bank for economic growth, inflation, and exports, and the Heritage Foundation for economic freedom.

Data analysis is conducted using the Panel Autoregressive Distributed Lag (Panel ARDL) method, estimated through the Pooled Mean Group (PMG) approach using EViews 12 software. The ARDL method is chosen for its advantage in handling variables with different levels of integration (I(0) and I(1)) and does not require all variables to be stationary at the same level, as long as they are not integrated at the second difference level (I(2)). The analysis stages begin with stationarity tests to ensure all variables meet the integration requirements allowed in ARDL, followed by optimal lag selection using the Akaike Information Criterion (AIC), and cointegration testing to examine the long-run relationships between variables.

The Panel ARDL model estimates both short-run and long-run relationships between the independent and dependent variables. The model is expressed in terms of the first difference and lag of each variable, including an error correction term (ECT) as an indicator of long-run equilibrium. A significant and negative ECT suggests the existence of cointegration in the model. The estimation results of this model are expected to provide a comprehensive understanding of the short-run and long-run dynamics of the effects of inflation, economic freedom, and exports on the economic growth of ASEAN countries over the observation period. The Autoregressive Distributed Lag (ARDL) model can be expressed in the following equation:

$$GDP_{i,t} = \alpha_0 + \sum_{i=1}^n \alpha_1 \Delta GDP_{i,t-1} + \sum_{i=1}^n \alpha_2 \Delta INF_{i,t-1} + \sum_{i=1}^n \alpha_3 \Delta EF_{i,t-1} + \sum_{i=1}^n \alpha_4 \Delta EKS_{i,t-1} + \beta_1 GDP_{i,t-1} + \beta_2 INF_{i,t-1} + \beta_3 EF_{i,t-1} + \beta_4 EKS_{i,t-1} + e_t$$

Where GDP represents Economic Growth, INF is Inflation, EF stands for Economic Freedom, EXP denotes Exports, α_1 – α_4 are the long-run estimated coefficients, β_1 – β_3 are the short-run estimated coefficients, i refers to the five ASEAN countries, t indicates the time period, and e is the error term.

4. Results and Discussion

In this study, the stationarity test was conducted using the Augmented Dickey-Fuller (ADF) test by examining the resulting probability values.

Table 1. Result Stasioneritas Test

| Variabel | Level & First Diff | Prob. ADF-Fisher Chi-square | Decision |
|------------------|--------------------|-----------------------------|----------------------------|
| Economic Growth | Level | 0.0000 | Level |
| | First Diff | 0.0000 | I(0) |
| Inflation | Level | 0.0211 | Level |
| | First Diff | 0.0000 | I(0) |
| Economic Freedom | Level | 0.3351 | 1 st Difference |
| | First Diff | 0.0003 | I(1) |
| Exports | Level | 0.3667 | 1 st Difference |
| | First Diff | 0.0000 | I(1) |

Source: Data processed by the researcher using E-Views 12.

Table 1 above shows that the economic growth variable, with a probability value of 0.0000 (< 0.05), and inflation, with a probability value of 0.0000 (< 0.05), are stationary at the level (I(0)). Meanwhile, the economic freedom variable, with a probability value of 0.0003 (< 0.05), and exports, with a probability value of 0.0000 (< 0.05), are stationary at the first difference (I(1)). The probability values for each variable indicate a significance level of 5%. The unit root test results in Table 1 indicate a combination of I(0) and I(1), which supports that the panel ARDL model is an appropriate approach for this study.

This study determines the optimal lag using the Akaike Information Criterion (AIC) method. The lag selection is done by identifying the lag with the lowest AIC value. The following are the results of the analysis to determine the optimal lag:

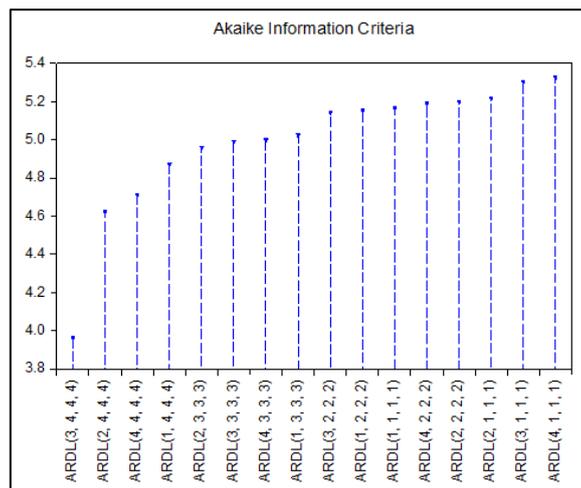


Figure 1. Lag Optimum Test

Source: Data processed by the researcher using E-Views 12.

Based on Figure 1, the analysis to determine the optimal lag length was conducted by referring to the smallest Akaike Information Criterion (AIC) value among 16 best models. The selected best model is ARDL (3,4,4,4), indicating that the respective variables have lags as follows: Economic Growth with 3 lags, Inflation with 4 lags, Economic Freedom with 4 lags,

and Exports with 4 lags.

In this study, the cointegration test method used is the Kao Test. The Panel ARDL model is considered acceptable if it shows cointegrated lags, provided that the slope coefficient is negative and significant at the 1%, 5%, and 10% significance levels.

Table 2. Result of Kointegrasi (Kao) Test

| ADF | t-Statistik | Probability |
|-------------------|-------------|-------------|
| | -3.161770 | 0.0008 |
| Residual variance | 17.78296 | |
| HAC variance | 4.338772 | |

Source: Data processed by the researcher using E-Views 12.

Table 2 presents the results of the cointegration test using the Kao method, which yields a probability value of 0.0008. This value is significant at the 5% level. Given that the slope coefficient is negative, at -3.161770, the data are considered to have cointegration, indicating the existence of a long-term relationship. Therefore, it can be concluded that all variables used in this study are cointegrated. Thus, there is cointegration between inflation, economic freedom, and exports in the five ASEAN countries in the long run.

The estimation results of the Panel ARDL (Autoregressive Distributed Lag) model are used to analyze both short-term and long-term relationships between the dependent and independent variables in the panel data. Below are the results of the Panel ARDL test for each independent variable against the dependent variable:

Table 3. Result of Estimation Panel ARDL

| Variabel | Coefficien | Std.Error | t-Statistic | Probability |
|---------------------------|------------|-----------|-------------|-------------|
| Long-Run Equation | | | | |
| INF | -0.693845 | 0.028842 | -24.05652 | 0.0000 |
| EF | -0.278220 | 0.002349 | -118.4475 | 0.0000 |
| EKS | 0.190371 | 0.013267 | 14.34905 | 0.0000 |
| Short-Run Equation | | | | |
| COINTEQ01 | -2.517646 | 1.177593 | -2.137960 | 0.0384 |
| D(GDP(-1)) | 0.969207 | 0.587187 | 1.650592 | 0.1063 |
| D(GDP(-2)) | -0.024934 | 0.302521 | -0.082422 | 0.9347 |
| D(INF) | 2.120952 | 0.648075 | 3.272695 | 0.0021 |
| D(INF(-1)) | 1.262615 | 0.498623 | 2.532205 | 0.0152 |
| D(INF(-2)) | 1.566353 | 0.175978 | 8.900860 | 0.0000 |
| D(INF(-3)) | -0.043378 | 0.541006 | -0.080180 | 0.9365 |
| D(EF) | 1.957954 | 0.777586 | 2.517990 | 0.0157 |
| D(EF(-1)) | 0.566115 | 0.542093 | 1.044314 | 0.3023 |
| D(EF(-2)) | 1.392303 | 0.529961 | 2.627178 | 0.0120 |
| D(EF(-3)) | 0.704424 | 0.592798 | 1.188304 | 0.2414 |
| D(EKS) | -0.394988 | 0.683092 | -0.578235 | 0.5662 |
| D(EKS(-1)) | 0.174473 | 0.154079 | 1.132358 | 0.2639 |
| D(EKS(-2)) | -0.028170 | 0.174298 | -0.161621 | 0.8724 |
| D(EKS(-3)) | 0.069663 | 0.322971 | 0.215695 | 0.8303 |
| C | 38.59488 | 27.38201 | 1.409498 | 0.1661 |

Source: Data processed by the researcher using E-Views 12.

Based on Table 3, the results of the panel ARDL estimation are as follows:

1. CointEq (Error Correction Term - ECT)

CointEq01, also known as the Error Correction Term (ECT), is used to analyze the long-term and short-term relationships. One of the conditions in the panel ARDL model is that CointEq01 must be significant with a probability value below 0.05 (<0.05) and have a negative sign. Based on the table above, the CointEq01 value is -2.517646, which meets the condition since it is negative and has a probability of 0.0384, which is significant and below 0.05 (0.0384 < 0.05). This indicates that the Panel ARDL model is acceptable, allowing for separate panel tests for each country. The ECT value of -2.517646 means that when a shock occurs, it takes approximately 2.51 years to adjust and return to equilibrium before another shock happens.

2. Inflation

a. Long Term Inflation

In the long term, the inflation variable has a significant negative effect on economic growth, with a probability value of 0.0000 which is less than the 5% significance level, and a coefficient of -0.693845. This means that inflation significantly negatively impacts economic growth in Indonesia, Malaysia, Singapore, Thailand, and the Philippines. Based on these results, a 1% increase in inflation causes a 0.693845% decrease in economic growth in the long term.

b. Short Term Inflation

In the short term, inflation has a significant positive effect on economic growth in the current period, with a probability value of 0.0021, which is less than 5%, and a coefficient of 2.120952. This shows a significant positive trend, meaning that if inflation increases by 1%, economic growth will increase by 2.120952%. Furthermore, inflation also has a significant positive effect on economic growth at lag 1 and lag 2: At lag 1 (INF(-1)), the probability value is 0.0152 (< 0.05) and the coefficient is 1.262615, indicating that a 1% increase in inflation one period earlier will increase economic growth by 1.262615%, At lag 2 (INF(-2)), the probability value is 0.0000 (< 0.05) and the coefficient is 1.566353, showing that a 1% increase in inflation two periods earlier will increase economic growth by 1.566353%, At lag 3, inflation has a negative but insignificant effect on economic growth, with a probability value of 0.9365 (> 0.05) and a coefficient of -0.043378. This means that a 1% increase in inflation three periods earlier would cause a 0.043378% decrease in economic growth. However, because this effect is not significant, there is insufficient statistical evidence to conclude that changes in inflation consistently affect economic growth. In other words, the relationship is weak.

3. Economic Freedom (EF)

a. Long-Term Economic Freedom

In the long term, the economic freedom variable has a significant negative effect on economic growth, with a probability value of 0.0000 which is less than the 5% significance level, and a coefficient of -0.278220. This means that economic freedom significantly negatively impacts economic growth in Indonesia, Malaysia, Singapore, Thailand, and the Philippines. Based on these results, a 1% increase in economic freedom causes a 0.278220% decrease in economic growth in the long term.

b. Short-Term Economic Freedom

In the short term, economic freedom has a significant positive effect on economic growth in the current period, with a probability value of 0.0157 (< 0.05) and a coefficient of 1.957954. This shows a significant positive trend, meaning that if economic freedom increases by 1%, economic growth will increase by 1.957954%.

Based on the estimation results, economic freedom also has a significant positive effect on economic growth at lag 2 (EF(-2)), where the probability is 0.0120 (< 0.05) and the coefficient is 1.392303. This indicates that a 1% increase in economic freedom two periods earlier will increase economic growth by 1.392303%.

At lag 1 and lag 3, economic freedom has a positive but insignificant effect on economic growth. At lag 1 (EF(-1)), the probability value is 0.3023 (> 0.05) with a coefficient of 0.566115, meaning that a 1% increase in economic freedom one period earlier will increase economic growth by 0.566115%, but this effect is not statistically significant. At lag 3 (EF(-3)), the probability value is 0.2414 (> 0.05) with a coefficient of 0.704424, meaning a 1% increase in economic freedom three periods earlier will increase economic growth by 0.704424%, but again, this effect is not statistically significant.

Because the effects at lag 1 and lag 3 are not significant, there is insufficient statistical evidence to conclude that economic freedom consistently has a significant impact on economic growth. In other words, the relationship is weak.

4. Exports (EXS)

a. Long-Term Exports

In the long term, the export variable has a positive and significant effect on economic growth, with a probability value of 0.0000 which is less than the 5% significance level, and a coefficient of 0.190371. This means that exports have a significant positive impact on economic growth in Indonesia, Malaysia, Singapore, Thailand, and the Philippines. Based on these results, a 1% increase in exports causes a 0.190371% increase in economic growth in the long term.

b. Short Term Exports

In the short term, the export variable has an insignificant effect on economic growth, both in the current period and at lags 1, 2, and 3. For the current period, the export variable has a probability value greater than 5%, which is 0.5662 ($0.5662 > 0.05$), and

a coefficient of -0.394988. This indicates that a 1% increase in exports would decrease economic growth by 0.394988%, but this effect is not statistically significant.

The estimation results also show that exports at lag 2 (EKS(-2)) have an insignificant negative effect on economic growth, with a probability value of 0.8724 (> 0.05) and a coefficient of -0.028170. This means that a 1% increase in exports two periods earlier would decrease economic growth by 0.028170%, but the effect is insignificant.

At lags 1 and 3, exports have an insignificant positive effect on economic growth. At lag 1 (EKS(-1)), the probability is 0.2639 (> 0.05) with a coefficient of 0.174473, indicating that a 1% increase in exports one period earlier would increase economic growth by 0.174473%, but this is not statistically significant. At lag 3 (EKS(-3)), the probability is 0.8303 (> 0.05) with a coefficient of 0.069663, meaning a 1% increase in exports three periods earlier would increase economic growth by 0.069663%, but this effect is also insignificant.

Because the effects of exports in the short term are not significant, there is insufficient statistical evidence to conclude that exports consistently have a significant impact on economic growth. In other words, the relationship is weak.

In the long term, inflation has been shown to have a negative and significant effect on economic growth. This is due to the decline in people's purchasing power and increased economic uncertainty, which can hinder investment and the efficient allocation of resources. This finding aligns with Keynesian theory and is supported by previous studies conducted in ASEAN countries. Conversely, in the short term, inflation exhibits a positive and significant impact on economic growth, particularly within one to two previous periods. This can be explained by increased consumption and investment driven by expectations of rising prices, consistent with monetarist views.

Economic freedom, in the long run, shows a negative and significant effect on economic growth. This may be due to inadequate regulation, which leads to information asymmetry and inefficient resource allocation. However, in the short term, economic freedom has a positive and significant effect on economic growth, as businesses begin to experience benefits from more open and flexible policies.

Exports show a positive and significant influence on economic growth in the long term, supporting the export-led growth hypothesis. However, in the short term, the effect of exports on economic growth is not significant, possibly because the benefits of exports require time to spread throughout the economy and face challenges such as global demand fluctuations and high production costs.

5. Conclusions

Based on the analysis and discussion regarding the impact of Inflation, Economic Freedom, and Exports on Economic Growth in five ASEAN countries, the following conclusions can be drawn:

1. Inflation has a negative and significant effect on economic growth in the long run for the five ASEAN countries. In the short run, inflation shows a positive and significant impact on economic growth in the current period as well as one and two periods prior, while it has a negative and insignificant effect in the third prior period.
2. Economic Freedom has a negative and significant impact on economic growth in the long run for the five ASEAN countries. In the short run, Economic Freedom exhibits a positive and significant effect in the current period and two periods prior, whereas it shows a positive but insignificant impact in one and three periods prior.
3. Exports have a positive and significant influence on economic growth in the long run for the five ASEAN countries. However, in the short run, exports show a negative and insignificant effect in the current period and two periods prior, while exhibiting a positive but insignificant impact in one and three periods prior.

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