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The effect of exchange rate, inflation, interest rate and import on exports in ASEAN countries

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Abstract: Export is one sector of the economy with a major role through market expansion between several countries, where it can carry out an expansion in an industry, thereby encouraging other industries and further encouraging other sectors of the economy. This study aims to analyze the effect of exchange rates, inflation, interest rates, and imports on exports in ASEAN countries. The data used in this study were annual data for the 2015-2019 period sourced from the World Bank. This research model employed a panel data method with a fixed-effect model, combining time series and cross section data with the help of EViews 7. The results revealed that exchange rates and imports had a positive and significant effect on exports. In addition, inflation and interest rates had a positive and insignificant effect on exports. Therefore, the governments of the ASEAN countries must monitor the stability of exchange rates, inflation, interest rates, and imports to increase exports from year to year so that the economy in ASEAN countries remains stable.

Keywords: Export; Gains From Trade; Competitiveness
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Introduction

Exports are an important component in forming the national income of an economy. International trade transactions will encourage the utilization of potential economic resources more efficiently. Specifically, ASEAN, an economic and political organization in the Southeast Asia region, has a strategic role in the global economic constellation from natural resource potential, population, and geostrategic position (Alstadheim, R., et al.,2010 ; Baldwin & Yan, 2012) International trade will also encourage increased economic efficiency and productivity of related economic sectors. In this case, exporting goods and services to ASEAN countries will create job opportunities, economic innovation, technology transfer, and economic growth (Brinkmeyer, 2014). The export performance will also increase foreign exchange earnings for the country and can increase the ability to finance development, especially to finance imports and foreign debt. In addition, exports are influenced by monetary indicators, such as inflation rates, interest rates, and currency exchange rates, so monetary policy to control monetary stability is part of a strategy to increase the

competitiveness of a country's export commodities in the global market (Amighini & Sanfilippo, 2014; Christensen et al., 2016).

The novelty of this research on exports in ASEAN countries is to include imports as one of the independent variables affecting exports. It departs from the reality that most export commodities are still mostly imported, especially for the manufacturing industry (Darrat, 2000; Yuliadi, 2020). The following table shows the export performance of ASEAN countries from 2011 to 2020, which includes Indonesia, Singapore, Malaysia, Thailand, Brunei Darussalam, Philippines, Laos, Vietnam, Cambodia, and Myanmar: The export performance of the ASEAN economic community countries showed dynamics between one country and another, influenced by economic and non-economic factors regarding the economic potential and economic resources owned, trade policies, currency exchange rate systems, and bureaucratic systems (ur Rehmen 2020 ; Gaiotti & Secchi, 2004). Exports are the components that make up aggregate income. The more goods exported, the greater the national income of a country. Exporting is also a phenomenon of international trade, showing the flow of goods and services from countries that experience a surplus to countries in need (Galí, 2015 ; Ogwang, Kamuganga, & Odongo, 2019). Several other economic factors influence exports: production capacity, world demand, competitiveness, political relations between countries, trade politics, and the exchange rate system applied. Thus, exports are affected by differences in supply and demand, i.e., differences in prices, tastes, currency exchange rates, transportation costs, and trade policies applied between countries (He, 2017; Ifada et al., 2019).

As part of trade transactions, exports arise because of a country's comparative advantage on a commodity compared to that produced by other countries. The figure above depicts that exports as a form of national income are theoretically influenced by the exchange rate of trade between one country and another trading partner country (Lubik & Matthes, 2016; Makun, 2018). The initial trade balance is at point E, which is the intersection of the export supply curve of country 1 and the export supply curve of country 2 when the trade exchange rate is P. However, when the trade exchange rate decreases (depreciates) to P', the trade balance shifts from point E to point E', affecting the volume of export and import trade between country 1 and country 2. In addition, the production capacity of a commodity is influenced by the availability of inputs, input prices, technological factors, and the quality of a country's human resources (Kia, 2002; Maier, 2010). Moreover, the export of a new commodity will be realized when the country experiences a production surplus after domestic needs are met. The price gap of a commodity in the domestic market with the international market will also determine the value of export transactions, where producers will make decisions based on a higher profit motive. Besides, exports arise as a result of differences in demand for a commodity between countries due to differences in tastes and income (Vacu & Odhiambo, 2017 ; Bakari et al., 2018) . In this case, differences in tastes in agricultural commodities, trade, industry, and services encourage trade transactions. The distance factor between regions also determines commodity exports between countries. Specifically, Southeast Asia is a potential area to develop trade cooperation among the ASEAN economic community member countries because of its relatively close distance, so transportation costs are relatively cheaper (Bakari & Mabrouki, 2017 ; Abumdallala, 2019).

Research Method

Research on exports was conducted in selected ASEAN countries, including Indonesia, Malaysia, Singapore, Thailand, and the Philippines, from 2015 to 2019. The research model applied panel data regression analysis with the following formula (Intriligator et al., 1996 ; Gujarati, 2022):

LOG (EXPORTS) = β0 + β1*LOG(ER) + β2*LOG(INFLATION) +β3* (IR) + β4*LOG (IMPORTS) + et

Where: EXPORTS representan Exports, ER representan Exchange rate, INFLATION representan Inflation, IR representan Interest rate, IMPORTS representan Imports, β0 representan Constant, β1… 4 representan Parameter coefficient and et representan Disturbance error,

The data in the research on the ASEAN export determinants were panel data from 2015 to 2019 in Indonesia, Malaysia, Thailand, Singapore, and the Philippines, and the data were obtained from publications from the World Bank. The analysis model of panel data regression was applied to obtain the estimation results of the independent variable regression coefficients on the dependent variable that met the econometric efficiency criteria. In this regard, the steps that must be passed in the panel data regression model are conducting the Chow test and Hausman test to determine which model to use, whether the fixed effect model (FEM), common effect model (CEM), and random effect model (REM). First, the Chow test determined whether the analytical model applied was the common effect model (CEM) or the fixed effect model (FEM). In this Chow test, the following hypothesis was used (Intriligator et al., 1996 ; Gujarati, 2022).

H_0: Common Effect Model (CEM)
H_1: Fixed effect model (FEM)

If the probability value is < 0.000 at the value of α = 0.05, the fixed-effect model (FEM) is applied. Conversely, in the Chow test, if the probability value is > 0.000 at a value of α = 0.05, the common effect model (CEM) is used. Furthermore, the Hausman test was to determine the application of the regression analysis model by applying the fixed effect model (FEM) or the random effect model (REM). Diagnostic tests were also carried out through the t-test to determine the significance of the effect of the independent variables on changes in the dependent variable individually. Meanwhile, the F-test was to determine the joint significance of the independent variables on changes in the dependent variable. The next stage was to carry out the Hausman test with the following hypothesis (Intriligator et al., 1996 ; Gujarati, 2022).

H_0: Random effect model
H_1: Fixed effect model

If the probability of a random cross-section is more significant than α = 5%, H0 is accepted, and H1 is rejected. Thus, it can be concluded that the model uses a fixed effect. Vice versa,

if the probability of random cross-sections is less than α = 5%, H0 is rejected. In addition, if the Hausman test results have a probability value < 0.000 at a value of = 0.05, the fixed-effect model (FEM) is applied. Finding the basis for rejecting the hypothesis was done by comparing the calculation of the F-statistics with the F-table. If the results of F-statistics > F-table (F-statistics is greater than F-table), H0 is rejected. It means that the most appropriate model to be used in estimating panel data is the fixed effect model. On the other hand, if F-statistics < F-table (F-statistics is smaller than F-table), H0 is accepted. This indicates that the right model to be used in estimating panel data is the common effect model. The next diagnostic test was to do a heteroscedasticity test to determine whether there were differences in variance from the residuals and from one observation to another. Then, statistical testing of the multicollinearity test was carried out to determine whether there was a multicollinearity problem between the independent variables (Intriligator et al., 1996 ; Gujarati, 2022).

Result and Discussion

The descriptive statistics reveal significant insights into the economic variables of ASEAN countries. The mean exchange rate being much higher than the median indicates the presence of extremely high values, suggesting a right-skewed distribution. The maximum and minimum values show substantial variability across all variables, particularly in exports and imports, highlighting significant economic disparities among the ASEAN countries. High standard deviations for exports and imports further emphasize this variability, indicating considerable differences in trade volumes and economic conditions. Overall, these statistics underscore the diverse economic performance and conditions within the ASEAN region.

Tabel 1 Dercriptive Stats

Variables	Mean	Median	Maximum	Minimum	Std. Dev.
EXPORTS	1.39E+16	2.80E+15	6.66E+16	4.89E+09	1.89E+16
ER	4623.221	52.66000	23050.24	1.348842	6940.209
INF	2.520540	2.104390	9.454172	-1.260506	2.298787
IR	5.345018	4.226493	28.05388	0.500000	4.613666
IMPORTS	1.38E+16	1.27E+16	5.58E+16	4.30E+09	1.60E+16

The regression of research panel data on the export determinants of selected ASEAN countries covering Indonesia, Thailand, Malaysia, Singapore, and the Philippines from 2015 to 2019, with the application of the fixed-effect model (FEM), common effect model (CEM), and random effect model (REM) obtained the estimation results as follows:

Table 2 Result of The Regression

Independent Variables	*Model*		
	Common Effects	*Fixed Effect*	*Random Effect*
Exchange Rate (X1)	-0.014	0.479***	-0.019***
	(0.271)	(1.048)	(0.343)
Inflation (X2)	-0.007***	-0.0002***	-0.006***
	(0.005)	(0.163)	(0.006)
Interest Rate (X3)	0.001	-0.0001	4.810
	(0.008)	(0.006)	(0.006)
Imports (X3)	0.423	0.093	0.347
	(0.003)	(0.002)	(0.002)
Dependent Variables (Exports)	Common Effects	Fixed Effect	Random Effect
Standard error	0.010	0.026	0.013
R^2	0.976	0.996	0.813
F-Statistic	32.62004***	188.6287***	3.676225***
Prob (F-statistics)	0.000000	0.000000	0.000000
Durbin-Watson stat	1.981678	1.611924	0.601173

Model selection through the Chow test determined the correct estimation of the panel data regression model, whether the common effect model (CEM) or the fixed effect model (FEM). Meanwhile, the Hausman test was carried out to determine the fixed effect model (FEM) or random effect model (REM) for panel data estimation. In this study on the export determinants in ASEAN countries, the Chow test results showed that the appropriate model was the fixed effect model (FEM), better indicated by a significance value of <0.05 on the probability of the chi-square value. Furthermore, the Hausman test results revealed that this model's redundant fixed-effect value or likelihood ratio produced an F-Test probability value of 0.0000, smaller than the α value of 0.05. Thus, H0 was rejected and H1 was accepted, indicating that the model was appropriate. From these results, the fixed effects model was used. Then, the heteroscedasticity testing results on all independent variables uncovered that the probability value at the 5% level was not significant, meaning that there was no heteroscedasticity problem. In other words, the multicollinearity test results suggested no multicollinearity problem among the independent variables. This was evidenced by the absence of a correlation coefficient greater than 0.9 (Intriligator et al., 1996 ; Gujarati, 2022).

Based on the model specification test, the regression model used in this study was a fixed-effect model, with the results of the panel data regression equation as follows:

Tabel 3 panel data regression equation

Negara	Territorial influence	Konstanta	ER coefficient	Inflation Coefficient	IR coefficient	Import Coefficient
Filipinas	1.225.608	5.921.842	-0.479406	-0.000243	-0.000180	0.093626
Vietnam	-1.846.733	5.921.842	-0.479406	-0.000243	-0.000180	0.093626
Malaysia	2.339.464	5.921.842	-0.479406	-0.000243	-0.000180	0.093626
Singapura	3.179.968	5.921.842	-0.479406	-0.000243	-0.000180	0.093626
Thailand	1.418.048	5.921.842	-0.479406	-0.000243	-0.000180	0.093626
Laos	-2.623.179	5.921.842	-0.479406	-0.000243	-0.000180	0.093626
Kamboja	-1.960.354	5.921.842	-0.479406	-0.000243	-0.000180	0.093626
Indonesia	-1.624.529	5.921.842	-0.479406	-0.000243	-0.000180	0.093626
Brunei	1.656.363	4.257.004	-0.479406	-0.000243	-0.000180	0.093626
Myanmar	-1.332.762	5.921.842	-0.479406	-0.000243	-0.000180	0.093626

Based on the estimation results above, exports in ASEAN countries can be explained. The independent variables with a significant effect were the currency exchange rate and imports, where the probability values were <0.05. Meanwhile, inflation and interest rate variables had no significant effect on exports in ASEAN countries since the probability values were > 0.05. Furthermore, the constant value (β0) was 5.921842, meaning that if all independent variables (exchange rate, inflation, interest rate, and imports) are held constant or unchanged, exports will increase by 5.921842%. In addition, the exchange rate coefficient (β1) was 0.479406, indicating that when the exchange rate increases by 1%, it will increase exports by 5.921842%. This empirical finding aligns with the monetary theory, which explains that the depreciation of the currency exchange rate will cause the price of domestic goods to be relatively cheaper than before, thus increasing the export of goods and services. (Bakari, et.al, 2017). Then, the empirical findings of imports showed the coefficient value (β4) of 0.093626. It denotes that if imports increase by 1%, exports will increase by 0.093626%. This empirical finding also confirms the current hypothesis that some of the content of commodity exports in ASEAN countries are products from abroad, either in raw materials, auxiliary materials, or other supporting components (Yang & Martinez-Zarzoso, 2014).

Empirical findings also disclosed that each ASEAN country produced a different constant value of the fixed-effect model. It could be concluded that each ASEAN country had different export changes if the exchange rate, inflation, interest rate, and imports variables were excluded from the model. In addition, the Philippines, Malaysia, Singapore, Thailand, and Brunei had positive export effects or cross-sectional export values, where each country had a coefficient value of 0.793713 for the Philippines, 2.339464 for Malaysia, 3.179968 for Singapore, 1.418048 for Thailand, and 1.656363 for Brunei. Meanwhile, exports from Vietnam, Laos, Cambodia, Indonesia, and Myanmar had negative regional or cross-regional influences, i.e., -1.846733 for Vietnam, -2.623179 for Laos, -1.960354 for Cambodia, -1.624529 for Indonesia, and -1.332762 for Myanmar, respectively. This empirical finding also exposed differences and varied dynamics regarding export performance among ASEAN countries (Abumdallala, 2019).

Conclusion

The findings underscore the critical role of exchange rates and imports in shaping the export landscape of ASEAN countries. The positive and significant impact of these variables suggests that maintaining a favorable exchange rate and ensuring a steady flow of imports can boost export performance. This aligns with existing economic theories that suggest a competitive exchange rate can make exports cheaper and more attractive on the global market, while imports of raw materials and intermediate goods are crucial for export-oriented industries. The lack of significant impact from inflation and interest rates on exports is intriguing, suggesting that other factors might mitigate their influence, such as fiscal policies or global economic conditions. Alstadheim et al. (2010) ; Yuliadi (2020) ; Ogwang et al. (2019) The recommendation for an integrated policy approach to stabilize exchange rates is timely and crucial. Exchange rate volatility can deter investment and disrupt trade flows, so a stable exchange rate can enhance investor confidence and create a more predictable economic environment. This stability, combined with efforts to improve economic efficiency and product competitiveness, could significantly enhance the export capabilities of ASEAN countries. Dedola & Lippi (2005) Moreover, the call for innovation and market expansion highlights the need for ASEAN countries to diversify their export markets and reduce dependency on traditional markets. By tapping into new and emerging markets, ASEAN countries can buffer against global economic shocks and ensure sustained export growth.

Finally, regional cooperation is emphasized as a key strategy. By working together, ASEAN countries can leverage their collective strengths, share best practices, and develop products with high added value and significant economic impacts. This cooperative approach can help in overcoming individual country limitations and fostering a more integrated and robust regional economy.

Author Contributions

Conceptualisation, I.Y. and N.P.S; Methodology, I.Y. and S.A.P.S; Investigation, N.P.S. and I.Y.; Analysis, I.Y., S.A.P.S and N.P.S.; Original draft preparation, I.Y. and N.P.S; Review and editing, I.Y., S.H.I. and S.A.P.S; Visualization, N.P.S and S.H.I All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

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