

Journal of Economics and Business

<https://jurnal.unikal.ac.id/index.php/jebi>

Global Economic Policy Uncertainty and Export Performance Across Indonesian Provinces: Evidence from Panel Data Analysis

Hotsawadi^{1*}, Nuzulia², Rian Hilmawan³, Yesi Aprianti⁴

^{1,3,4} Development Economics Study Program, Faculty of Economics and Business, Mulawarman University

² Sharia Economics Study Program, Faculty of Economics and Business, Mulawarman University

*Corresponding author: hotsawadi@feb.unmul.ac.id

ARTICLE INFO

ABSTRACT

Article history:

Submitted: 22 June 2026

Revised: 23 July 2026

Accepted: 10 October 2026

Keywords: Global Economic Policy Uncertainty, Export Performance, Trade Openness, Exchange Rate, Human Development Index, Panel Data, Indonesia.

Purpose – This study examines the effect of Global Economic Policy Uncertainty (GEPU) on export performance across Indonesian provinces.

Design/methodology/approach – The study uses a quantitative approach, drawing on panel data from 32 Indonesian provinces covering 2000–2025, and applies panel data regression analysis.

Findings – The results show that GEPU has a positive and significant effect on export performance. Trade openness, logistics performance, and the Human Development Index (HDI) also have positive, significant effects, while the exchange rate has a negative, significant effect. The findings also reveal heterogeneous provincial responses to global economic uncertainty.

Research limitations/implications – This study is limited to provincial-level data and selected macroeconomic variables. The results offer policy implications for strengthening export resilience through trade facilitation, improved logistics, human capital development, and export diversification.

Originality/value – This study contributes to the literature by providing empirical evidence on the heterogeneous impact of global economic policy uncertainty on export performance across Indonesian provinces, offering a regional perspective that remains underexplored in previous studies.

INTRODUCTION

Global uncertainty has become a real challenge for a country's economy, including Indonesia's. Increased global economic policy uncertainty can hinder investment, reduce output, limit employment opportunities, and heighten volatility in financial markets and international trade (Baker et al., 2016; Jawadi et al., 2024; Liao et al., 2022). For developing countries and open economies such as Indonesia, global uncertainty shocks have also been shown to affect economic growth, interest rates, inflation, and the trade balance (Nguyen, 2025; Hotsawadi et al., 2025). Trade performance can be disrupted by shifting global political and economic conditions. This situation stems from policy uncertainty, geopolitical conflicts, and a global economic slowdown, which increase trade risks and reduce export and import activity (Baker et al., 2016; Osano & Koine, 2016; Harahap & Widyastutik, 2020). In this context, rising and constantly shifting global economic policy uncertainty calls for closer empirical study

of how its effects are transmitted to strategic sectors, particularly trade performance as reflected in export figures.

Several previous studies have presented differing views on the impact of global economic policy uncertainty on a country's macroeconomic performance indicators, including exports. Several studies find that increased global economic policy uncertainty tends to suppress export performance through higher transaction costs, delayed investment decisions, and weaker external demand (Handley, 2014; Jia et al., 2020; Gignarta et al., 2024; Chakradhar et al., 2025). Conversely, some studies indicate that the impact of uncertainty is not always uniform across countries or industries, as it is influenced by the level of export diversification, the quality of institutions, and the ability of businesses to adapt to changes in global policies (Aslan & Senay, 2023; Carballo et al., 2022). These mixed findings indicate that the relationship between global economic policy uncertainty and export performance remains an open empirical issue for further research, particularly in the context of developing countries and subnational regions such as the provinces of Indonesia.

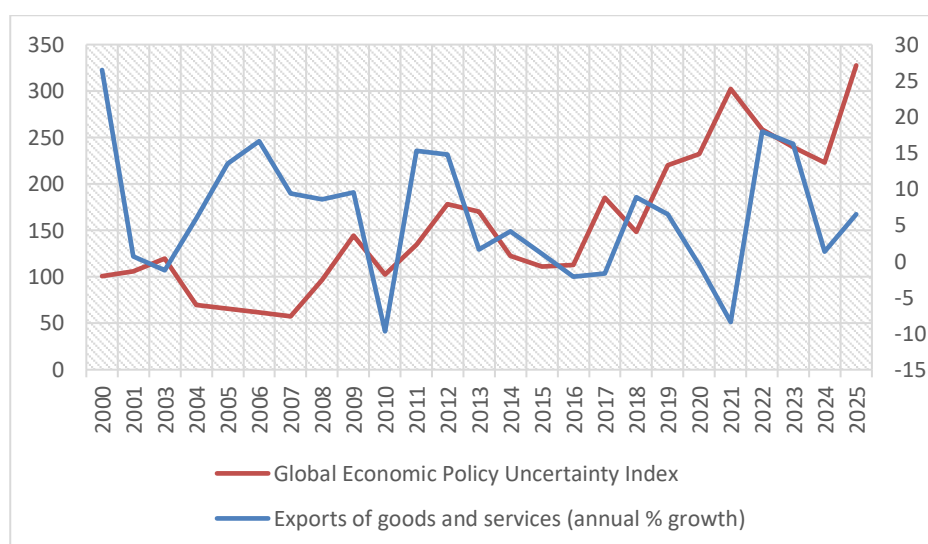


Figure 1. Trends in the Global Economic Policy Uncertainty Index and Indonesia's Exports of Goods and Services, 2000–2025

Source: World Bank (2026) and Economic Policy Uncertainty (2026)

Looking more closely at Indonesia's situation, Figure 1 shows that the relationship between the global economic policy uncertainty and the growth of Indonesia's exports of goods and services during the 2000–2025 period does not follow a consistent pattern. In some periods, increases in global economic policy uncertainty were followed by a slowdown in export growth, as seen during 2018–2021. However, in other periods, exports continued to grow despite rising global uncertainty, such as during 2022–2025. Conversely, there were also instances where a decline in global uncertainty was not always accompanied by improved export performance. These contradictory patterns suggest that the impact of global economic policy uncertainty on Indonesia's exports is not uniform and is likely influenced by the economic characteristics of each region, the structure of export commodities, and the provinces' ability to respond to external shocks. Therefore, a more in-depth analysis at the provincial level is needed to understand how global economic uncertainty affects export performance across various regions of Indonesia.

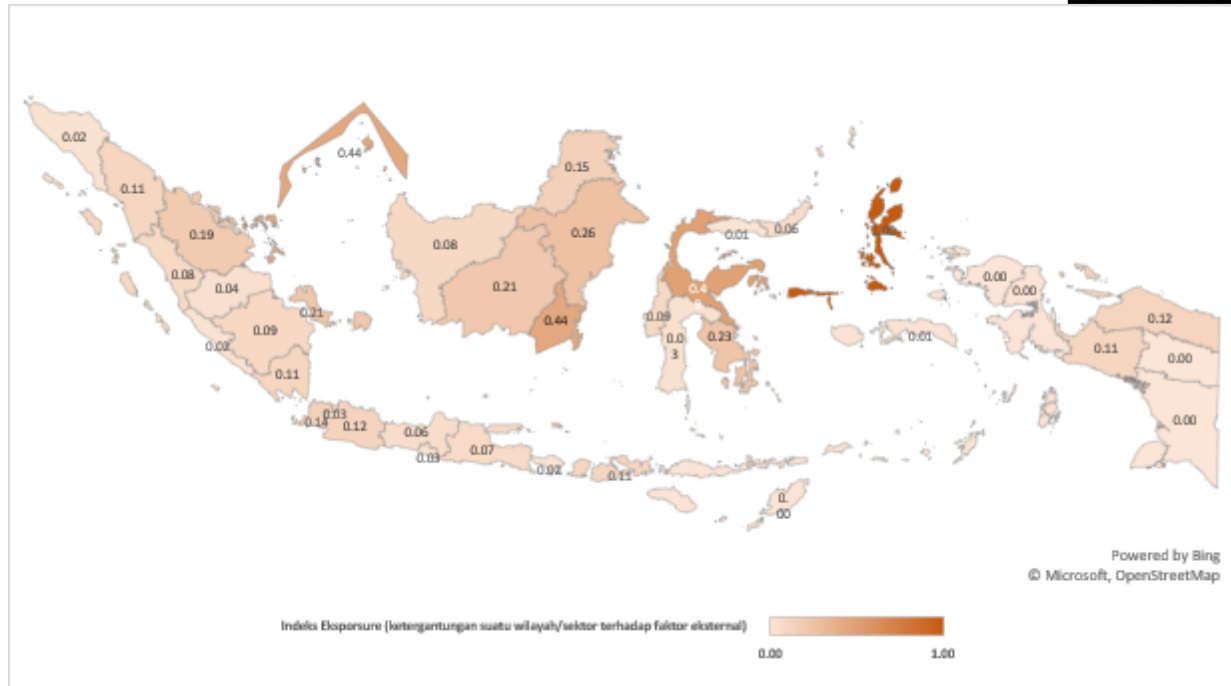


Figure 2. Regional Dependence on Exports by Province in Indonesia in 2025

Source: Ministry of Trade of the Republic of Indonesia (2026), processed

Figure 2 shows that there is considerable heterogeneity in the level of exposure of Indonesian provinces to export activities. A higher index value indicates that a province's economy is more dependent on international market demand and is therefore more vulnerable to changes in global economic conditions. Conversely, provinces with low index values tend to have economic structures more oriented towards the domestic market or more diversified sources of economic growth. The map shows that several provinces in the Sulawesi and Kalimantan regions have relatively high levels of export dependence compared to other regions. In contrast, most provinces in Java, Nusa Tenggara, and Papua show lower dependence. This pattern reflects the concentration of Indonesia's export activities in regions that produce primary commodities and natural resources, such as mining, plantations, and other resource-based products.

In trade theory, uncertainty in global economic policy can affect export performance by changing business expectations, transaction costs, and cross-border trade risks. Most studies report that increased economic policy uncertainty tends to reduce international trade activity because exporters postpone investment decisions and market expansion as business risks rise. For example, Carballo et al. (2022) and Handley (2014) found that trade policy uncertainty hinders export expansion and reduces firms' participation in international markets, while Caldara et al. (2020) showed that global trade policy uncertainty has a negative impact on international trade and investment flows.

However, empirical findings in the literature remain mixed. Some studies find that global economic uncertainty can drive export growth in certain countries or regions through market diversification, exchange rate adjustments, and risk-mitigation strategies used by exporters (Nguyen, 2025). Meanwhile, other studies have found that the impact of economic policy uncertainty on exports is either insignificant or varies across countries and economic sectors due to differences in industrial structure, the composition of export commodities, and the level

of trade openness. (Aslan & Senay, 2023). These differing findings indicate that the relationship between global economic policy uncertainty and export performance remains inconclusive and is highly dependent on the economic characteristics of each region. Therefore, the spatial distribution of the export dependence index in Figure 2 provides a useful empirical rationale for analysing the impact of global economic policy uncertainty at the provincial level in Indonesia. Provinces with high export dependence are expected to be more sensitive to changes in global economic conditions than provinces more oriented towards the domestic market. However, the direction and magnitude of this effect remain empirically uncertain, given differences in economic structure, export commodity specialisation, and the level of interprovincial trade integration.

Addressing this gap in the literature, this study aims to analyse the impact of global economic policy uncertainty on export performance across all Indonesian provinces using a panel data approach. The novelty of this study lies in the use of Indonesian provincial panel data to identify regional export responses to global economic policy uncertainty, thereby providing more disaggregated empirical evidence compared to previous studies that generally focused on the national level. The findings of this study are expected to enrich the literature on economic uncertainty and international trade and inform regional export policies that better adapt to global economic dynamics.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Global Economic Policy Uncertainty and Export Performance

Economic policy uncertainty (EPU) refers to a situation in which economic actors struggle to predict the direction of government policy, with implications for investment, production, and trade decisions. The EPU index developed by Baker et al. (2016) measures the level of uncertainty based on the frequency of media reports related to the economy, policy, and uncertainty. Furthermore, Davis (2016) developed the global economic policy uncertainty index, which represents the level of economic policy uncertainty on a global scale. An increase in global economic policy uncertainty is generally associated with a decline in international economic activity, investment, and trade due to the rising risks faced by businesses.

From a real-options perspective, policy uncertainty increases the value of the option to postpone investment decisions and foreign market expansion. When exporters face uncertainty regarding tariffs, trade regulations, or global economic conditions, firms tend to delay entering export markets or reduce the intensity of international trade. Handley (2014) shows that trade policy uncertainty reduces exporters' entry into international markets and diminishes firms' response to emerging trade opportunities. Similar findings are also reported by Nguyen (2025) and Hotsawadi et al. (2025), who consistently report that trade policy uncertainty hinders firms' investment and expansion into export markets.

Several empirical studies have found that economic policy uncertainty negatively affects international trade. Dai et al. (2021) show that higher trade policy uncertainty reduces investment and international trade-related economic activity. High uncertainty leads businesses to reduce productive investment and postpone export decisions because of increased global market risks. However, the evidence is not uniform. Several studies have found that the impact of economic uncertainty on exports varies across countries and industries, depending on economic structure, the degree of product diversification, and exporters' ability to adapt to changing global conditions (Benlaria, 2026; Qu et al., 2025; Zhu & Ye, 2024). Therefore, analysis

at the provincial level is crucial for understanding how differences in regional economic structures influence the sensitivity of exports to global uncertainty shocks.

Indonesia is characterised by diverse regional economies. Some provinces depend heavily on exports of primary commodities such as coal, palm oil, and minerals, while others are more oriented towards the domestic market. These differences mean that the impact of global economic policy uncertainty on exports may vary across regions. However, studies specifically analysing the impact of global economic policy uncertainty on export performance at the provincial level in Indonesia remain limited. This gap provides a key basis for this study to examine the relationship between global economic policy uncertainty and exports using Indonesian provincial panel data. Although most studies report a negative association, evidence from developing economies suggests that exporters may redirect trade towards new markets and commodities when uncertainty rises (Benlaria, 2026; Qu et al., 2025; Zhu & Ye, 2024). This study therefore tests whether the net effect on provincial exports is positive. Based on the theoretical framework and previous empirical findings, this study proposes the following hypothesis:

- H1 : Global economic policy uncertainty has a positive effect on provincial export performance in Indonesia.

Export Performance and Other Determinants

A region's export performance is influenced not only by the dynamics of global economic uncertainty but also by various domestic factors that reflect the degree of economic openness, the quality of trade-supporting infrastructure, macroeconomic conditions, and the quality of human resources (Zhang et al., 2025; Hotsawadi & Widyastutik, 2023; Al-Majali et al., 2026). One factor frequently cited in the literature is trade openness, which describes the extent to which an economy integrates with international markets. The higher the trade openness, the greater the opportunities for domestic producers to access global markets, acquire new technologies, and enhance the competitiveness of export products (Hotsawadi & Widyastutik, 2023). Several other studies also indicate that greater trade openness can boost export performance by expanding markets while reducing trade barriers such as tariffs and non-tariff measures (Hotsawadi & Widyastutik, 2023; Muchopa, 2025).

Indicators of logistics system quality, as reflected in the Logistics Performance Index (LPI), also help improve export performance. Adequate transportation infrastructure, efficient customs services, easy goods tracking, and on-time delivery can reduce trade costs and boost product competitiveness in international markets. Countries or regions with better logistics performance tend to have higher export volumes and values because they can facilitate the flow of goods from producers to global consumers (Al-Majali et al., 2026; Gani, 2017).

Another factor influencing exports is the exchange rate. In international trade theory, a depreciation of the domestic currency can enhance the price competitiveness of export products in the global market because the price of goods becomes relatively cheaper for foreign buyers (Hotsawadi & Gea, 2024; Sinukaban & Karmini, 2026). Conversely, an appreciation in the exchange rate can reduce export competitiveness due to the relative increase in the price of domestic products. However, the effect of the exchange rate on exports is not always linear because it is also influenced by the structure of raw material imports, demand elasticity, and the characteristics of the traded commodities (Nejati & Bahmani, 2020; Widyastutik et al., 2023).

In addition to economic and logistical factors, the quality of human resources as measured by the Human Development Index also plays a role in enhancing a region's export capacity. This is because higher levels of education, adequate health care, and a higher standard of living, all of which are indicators included in the Human Development Index, are believed to enhance labour productivity, the ability to adopt technology, and the quality of the products produced (Yumashev et al., 2020). These conditions ultimately strengthen a region's competitiveness in producing goods and services that meet international market standards. Several studies indicate that improvements in human capital quality are positively associated with trade growth and export performance, particularly in developing countries (Li, 2025; Choi et al., 2024; Teixeira & Fortuna, 2010).

Drawing on this framework and the empirical findings, this study includes trade openness, logistics performance, exchange rates, and the Human Development Index as control variables to explain variation in export performance across Indonesian provinces. These variables are expected to make a significant contribution to enhancing regional export capacity through improved market access, distribution efficiency, price competitiveness, and the quality of human resources.

- H2 : Trade openness has a positive effect on provincial export performance in Indonesia.
- H3 : Logistics performance has a positive effect on provincial export performance in Indonesia.
- H4 : The exchange rate has a negative effect on provincial export performance in Indonesia.
- H5 : The Human Development Index has a positive effect on provincial export performance in Indonesia.

RESEARCH METHODOLOGY

This study employs a quantitative approach with an explanatory research design to analyse the impact of global economic policy uncertainty on the export performance of provinces in Indonesia. Specifically, this study has two main objectives: first, to identify the impact of global economic policy uncertainty on aggregate export performance using panel data from all provinces in Indonesia; second, to examine differences or heterogeneity in the impact of global economic policy uncertainty across provinces, as reflected through regional characteristics, economic structure, and the level of dependence on international trade. This approach was chosen because it allows the relationship between the independent and dependent variables to be tested through panel data analysis that combines time-series and cross-sectional dimensions, thereby capturing both the general impact of global economic policy uncertainty on exports and the specific effects that differ across provinces. The data and analytical methods used to achieve these objectives are described below.

Data

The data used are secondary data obtained from various official and reliable sources. Provincial export value data were obtained from the Central Statistics Agency (BPS), while global economic policy uncertainty data were obtained from the Economic Policy Uncertainty (2026). Control variable data, including trade openness, exchange rates, Human Development Index, and logistics performance, came from official publications by Bank Indonesia, the World Bank, and the Central Statistics Agency (BPS). The observation period covers the years 2000–2025, with the unit of analysis comprising all provinces in Indonesia for which data were available

during the study period. The dependent and independent variables used in this study are listed in Table 1.

Table 1. Types and Sources of Research Data

No	Variable	Symbol	Unit	Time Period	Data Source	Reference
Dependent Variable						
1	Export Values by Province in Indonesia	Exp	USD	2000–2025	Ministry of Trade of the Republic of Indonesia	(Hotsawadi & Widyastutik, 2023)
Main Independent Variable						
2	Global Economic Policy Uncertainty Index	GEPU	Index	2000–2025	Economic Policy Uncertainty Index	(Handley, 2014; Jia et al., 2020; Gignarta et al., 2024; Chakradhar et al., 2025)
Control Variables						
3	Trade Openness	TO	Per cent	2000–2025	World Bank	(Zhang et al., 2025; Hotsawadi & Widyastutik, 2023; Al-Majali et al., 2026)
4	Logistics Performance	LP	Index	2000–2025	World Bank	(Al-Majali et al., 2026; Gani, 2017)
5	Exchange Rate	NT	Rp/USD	2000–2025	World Bank	(Nejati & Bahmani, 2020; Widyastutik et al., 2023)
6	Human Development Index	HDI	Index	2000–2025	Central Statistics Agency (BPS)	(Li, 2025; Choi et al., 2024; Teixeira & Fortuna, 2010)

The dependent variable in this study is provincial export performance, measured by the total export value of each region in Indonesia. The main independent variable is global economic policy uncertainty, which represents the level of uncertainty in global economic policy. In addition, this study includes several control variables: trade openness, measured as the ratio of total trade to Gross Regional Domestic Product (GRDP); the exchange rate of the rupiah against the US dollar; the Human Development Index; and logistics performance, which describes the efficiency of the logistics system in supporting trade activities. The entire data processing and analysis process was performed using StataSE 17.

ANALYSIS METHOD

Data analysis was conducted using a panel data regression model. Panel data regression is well suited to data with both time-series and cross-sectional dimensions, capturing intertemporal dynamics and differences across provinces (Gujarati & Porter, 2013; Wooldridge, 2010; Blackburne & Frank, 2007). Furthermore, the use of panel data can increase the number of observations, reduce the potential for omitted variable bias, and produce more efficient and consistent parameter estimates compared to the separate use of cross-sectional or time-series

data (Gujarati & Porter, 2013; Wooldridge, 2010). Thus, the panel data regression model is well-suited to analysing the impact of global economic policy uncertainty on the export performance of Indonesian provinces, which exhibit heterogeneous characteristics and evolve dynamically over time. The empirical equation used in this study is specified as follows:

$$\text{Exp}_{it} = \beta_0 + \beta_1 \text{GEPU}_t + \beta_2 \text{TO}_{it} + \beta_3 \text{LP}_{it} + \beta_4 \text{NT}_{it} + \beta_5 \text{HDI}_{it} + \varepsilon_{it}$$

In the above equation, the variable Exp_{it} represents the provincial export value of province i in period t , GEPU_t is the Global Economic Policy Uncertainty Index, TO_{it} is trade openness, LP_{it} is logistics performance, NT_{it} is the exchange rate, HDI_{it} is the Human Development Index, and ε_{it} is the error term. This method was chosen because it can capture interprovincial heterogeneity while more comprehensively identifying the impact of global economic uncertainty dynamics on regional export performance in Indonesia.

Given that the variables used in this study have different units of measurement, such as export value (USD), the Global Economic Policy Uncertainty Index, the exchange rate, the Human Development Index, and indicators of logistics and trade openness, some variables were transformed into natural logarithms (ln). This transformation aims to standardise the measurement scales across variables, reduce potential heteroscedasticity, improve the distribution of data that tend to be non-normal, and facilitate the interpretation of regression coefficients as elasticities (Gujarati & Porter, 2013; Wooldridge, 2010; Hotsawadi et al., 2025). As a result, the estimates are likely to be more stable and easier to interpret when explaining how changes in the independent variables relate to provincial export performance in Indonesia.

The study used panel data regression models in several stages to identify the best model, or, in other words, a BLUE (Best Linear Unbiased Estimator) model. The Chow test, Hausman test, and Breusch–Pagan Lagrange Multiplier test were used to select the best model and determine whether the Common Effects (CE) Model, Fixed Effects (FE) Model, or Random Effects (RE) Model was most appropriate. Next, the study conducted classical assumption tests and statistical tests, including partial tests (t -tests), simultaneous tests (F -tests), and the coefficient of determination (R^2), to evaluate significance and the model's ability to explain variation in export performance across provinces in Indonesia. Through this series of tests and model selection, the panel data regression model used in this study is assumed to satisfy the basic assumptions of good estimation, thereby producing BLUE estimates that are efficient, consistent, and unbiased (Gujarati & Porter, 2013; Wooldridge, 2010; Blackburne & Frank, 2007).

RESULTS AND DISCUSSION

Descriptive Statistics

According to the descriptive statistics, all variables have the same number of observations, namely 832. The trade openness variable has the highest mean (42.482), with a minimum of 41.34 and a maximum of 43.20, indicating relatively little variation during the observation period. The Global Economic Policy Uncertainty Index variable has a mean of 5.536 with a standard deviation of 0.245, indicating moderate fluctuations in global economic policy uncertainty.

Table 2. Descriptive Statistics

Variable	Observations (N)	Mean	Standard Deviation	Minimum	Maximum
GEPU	832	5.536	0.245	5.35	6.00
TO	832	42.482	0.623	41.34	43.20
LP	832	3.452	0.082	3.31	3.54
NT	832	9.642	0.055	9.57	9.73
Ln (HDI)	832	4.277	0.053	4.10	4.42

Source: Authors' calculations based on secondary data.

The logistics performance variable has a mean of 3.452 and a standard deviation of 0.082, while the exchange rate variable has a mean of 9.642 with a standard deviation of 0.055. Meanwhile, the Human Development Index variable shows a mean of 4.277 with a standard deviation of 0.053. In general, the standard deviations of all variables are smaller than their respective means, indicating that the data are relatively homogeneous and do not deviate significantly from the mean.

Table 3. Results of the Chow Test, Hausman Test, and Lagrange Multiplier Test

Best Model Test	Probability Value	Conclusion
Chow Test	0.0000**	Best FE Model
Hausman Test	0.4330	Best RE Model
Lagrange Multiplier (LM) Test	0.0000**	Best RE Model

Note: ** $p < 0.01$, * $p < 0.05$.

Source: Authors' estimates, processed.

The first step in the best-model approach is to conduct Chow, Hausman, and Lagrange Multiplier tests to determine the most suitable model (Gujarati & Porter, 2013; Wooldridge, 2010; Hotsawadi et al., 2025). The Chow test yielded a p -value of 0.000 (< 0.05), indicating that the FE Model was superior to the CE Model. Furthermore, the Hausman test yielded a p -value of 0.323 (> 0.05), indicating that the RE Model was more appropriate than the FE Model. These results were supported by the Lagrange Multiplier test, which yielded a p -value of 0.000 (< 0.05), indicating that the RE Model was superior to the CE Model. Taken together, these tests led to the selection of the RE Model as the best model for the panel data regression analysis.

Table 4. Results of the Multicollinearity Test

Variable	VIF	1/VIF
GEPU	7.050	0.142
TO	5.860	0.171
LP	3.020	0.331
NT	2.550	0.392
HDI	1.060	0.943
Mean VIF	3.910	-

Source: Authors' calculations based on secondary data.

Based on the results of the multicollinearity test, all independent variables have VIF values below 10 and tolerance values (1/VIF) above 0.10. The global economic policy uncertainty variable has the highest VIF value at 7.05, followed by trade openness at 5.86, but both remain below the commonly used critical threshold (VIF < 10). Furthermore, the Mean VIF of 3.91

indicates relatively low correlation among the independent variables. Thus, it can be concluded that there are no serious multicollinearity issues in the regression model, so all independent variables are suitable for use in further estimation (Gujarati & Porter, 2013; Wooldridge, 2010; Hotsawadi et al., 2025).

Results of the Panel Data Regression Analysis on Global Economic Policy Uncertainty and Export Performance at the Aggregate Level

The estimation results indicate that the model is highly significant, as evidenced by an *F*-statistic probability of 0.0000, which is less than the 1% significance level. These findings indicate that the independent variables comprising the Global Economic Policy Uncertainty Index, trade openness, logistics performance, exchange rate, and Human Development Index simultaneously have a significant impact on provincial export performance in Indonesia. Thus, the empirical model constructed is deemed statistically adequate for explaining the relationship between global economic policy uncertainty and export performance at the provincial level.

Table 5. Results of the Random Effects Model Estimation

Variables	Coefficient	Std. Error	t-Statistic	Probability
GEPU	0.5220	0.0180	29.3172	0.0000**
TO	0.8418	0.0065	129.9850	0.0000**
LP	0.6285	0.0074	85.4192	0.0000**
NT	-1.5096	0.4733	-3.1894	0.0332*
HDI	4.2540	0.8122	5.238	0.0064**
C	14.6569	0.1048	139.9018	0.0000**
<i>F</i> -Statistic (prob.)			0.0000**	
<i>R</i> ²			0.9915	

Note: ** $p < 0.01$, * $p < 0.05$.

Source: Authors' estimation, processed.

Furthermore, the coefficient of determination (R^2) of 0.9915 indicates that approximately 99.15% of the variation in provincial export performance in Indonesia can be explained by the variables included in the model, while the remaining 0.85% is influenced by other factors outside the research model. This high coefficient of determination suggests the model has strong explanatory power in capturing interprovincial export variation during the observation period. These findings also suggest that the combination of global economic policy uncertainty and domestic economic characteristics used in this study explains a large share of regional export dynamics.

The Effect of the Global Economic Policy Uncertainty Variable on Provincial Export Performance in Indonesia

Based on the panel data regression results in Table 5, the global economic policy uncertainty variable has a positive and significant effect on Indonesia's export performance, with a coefficient of 0.5220 at the 1% significance level. These results indicate that a 1% increase in global economic policy uncertainty is associated with a 0.522% increase in exports. The analysis supports the hypothesis that global economic policy uncertainty has a positive and significant effect on export performance (H1). This finding suggests that under certain conditions, Indonesian exporters can capitalise on shifts in the configuration of international trade resulting from rising global uncertainty. When global economic turmoil occurs, some countries tend to reallocate import sources and diversify global supply chains, opening new

market opportunities for developing countries, including Indonesia (Benlaria, 2026; Qu et al., 2025; Zhu & Ye, 2024).

These findings are consistent with the research by Aslan and Senay (2023), which shows that the impact of global economic policy uncertainty on developing countries' exports is heterogeneous and strongly influenced by each country's export structure and level of trade diversification. Countries with strong trade adaptability tend to maintain or even increase exports amid global uncertainty. Carballo et al. (2022) likewise show that the effect of uncertainty depends on export diversification, institutional quality, and firms' capacity to adapt to policy changes, in line with Benlaria (2026), Qu et al. (2025), and Zhu and Ye (2024).

The Effect of the Trade Openness Variable on Provincial Export Performance in Indonesia

The trade openness variable shows a positive and significant effect on exports with a coefficient of 0.8418. These findings indicate that the more open an economy is to international trade activities, the higher its export performance. This is because greater and more liberal integration into international trade can expand market access, reduce trade barriers, and strengthen the competitiveness of domestic products in global markets. These findings align with studies by Hotsawadi and Widyastutik (2023) and Muchopa (2025), which found that deeper trade openness, pursued through regional and multilateral trade cooperation, gives domestic producers better access to global markets and new technologies, improving product competitiveness. Increased market access and technology adoption strengthen competitiveness and can raise export performance (Widyastutik et al., 2015; Oktaviani & Drynan, 2000).

The Effect of Logistics Performance Variable on Provincial Export Performance in Indonesia

The logistics performance variable has a positive coefficient of 0.6285 and is significant at the 1% level. This finding indicates that a 1% increase in logistics performance has the potential to boost Indonesia's exports, as reflected in a 0.6285% increase in regional exports, *ceteris paribus*. This suggests that improved infrastructure quality and logistics efficiency can reduce transaction costs, speed up delivery times, and enhance the reliability of exporting goods, thereby improving overall export performance (Al-Majali et al., 2026; Gani, 2017). These findings align with Al-Majali et al. (2026) and Gani (2017), which collectively indicate that countries or regions with higher logistics performance generally have larger export volumes and values.

The Effect of the Exchange Rate Variable on Provincial Export Performance in Indonesia

The exchange rate variable has a negative and significant effect on exports, with a coefficient of -1.5096. This result indicates that a 1% appreciation in the exchange rate is associated with a 1.51% decline in exports. Theoretically, the strengthening of the domestic currency makes export product prices relatively more expensive in international markets, thereby reducing export competitiveness. This finding is consistent with international trade theory, which states that the exchange rate is one of the main determinants of exports through the relative price mechanism. When the rupiah appreciates, demand for Indonesian exports tends to decline because importing countries can obtain substitute goods from other countries at more competitive prices. These results are in line with studies conducted by Meliany et al. (2022) and Akbar and Widyastutik (2022), which show that changes in the exchange rate are closely linked to the dynamics of Indonesia's exports and economic growth.

The Effect of the Human Development Index on Provincial Export Performance in Indonesia

The Human Development Index variable shows a positive and significant effect on exports with a coefficient of 4.2540. This finding suggests that improvements in the quality of education,

health, and living standards enhance labour productivity, innovation, and technological adaptability, thereby strengthening regional export competitiveness. In elasticity terms, a 1% improvement in human capital quality, as measured by the Human Development Index, is associated with a 4.2540% increase in provincial export performance. These findings are consistent with studies conducted by Yumashev et al. (2020), Li (2025), Choi et al. (2024), and Teixeira and Fortuna (2010), which report that higher levels of education, adequate health, and higher living standards, all of which are captured by the Human Development Index, can enhance labour productivity, the ability to adopt technology, and the quality of products produced. Ultimately, improvements in these indicators drive market expansion and accelerate Indonesia's export performance.

Results of the Panel Data Regression Analysis on Global Economic Policy Uncertainty and Export Performance Across Indonesian Provinces

The results of the RE Model estimates indicate that the impact of global economic policy uncertainty on export performance is not uniform across provinces in Indonesia. This points to heterogeneity in regional export responses to global economic uncertainty, influenced by differences in economic structure, the composition of export commodities, the level of trade openness, industrial capacity, and each province's integration into global value chains. Theoretically, regions with high dependence on primary commodity exports tend to be more vulnerable to the volatility of global uncertainty than regions with more diversified export structures supported by a strong manufacturing sector. These findings align with research by Benlaria (2026), Qu et al. (2025), and Zhu and Ye (2024), which explain that differences in regional economic structures lead to different responses to macroeconomic shocks and international trade.

Table 6. Results of Province-Specific Effects of Global Economic Policy Uncertainty on Export Performance

Province	Interaction Coefficient	Std. Error	z	Prob.
Bangka Belitung	-0.1194	0.0034	-34.72	0.000**
Banten	0.1725	0.0056	30.88	0.000**
Bengkulu	-1.0299	0.0051	-200.32	0.000**
DI Yogyakarta	0.0047	0.0034	1.37	0.171
DKI Jakarta	0.7164	0.0056	128.28	0.000**
Gorontalo	1.1695	0.0114	102.66	0.000**
Jambi	0.2034	0.0051	39.56	0.000**
West Java	0.2566	0.0051	49.91	0.000**
Central Java	0.2726	0.0000	990.000	0.000**
East Java	0.5707	0.0086	66.51	0.000**
West Kalimantan	0.2137	0.0086	24.91	0.000**
South Kalimantan	0.0475	0.0056	8.50	0.000**
Central Kalimantan	0.0344	0.0056	6.17	0.000**
East Kalimantan	-0.0711	0.0086	-8.29	0.000**
North Kalimantan	-0.1721	0.0056	-30.81	0.000**
Riau Islands	0.6838	0.0051	133.00	0.000**
Lampung	0.5918	0.0056	105.96	0.000**
Maluku	0.6289	0.0051	122.33	0.000**
North Maluku	1.2082	0.0051	235.01	0.000**
Aceh	0.0447	0.0034	13.01	0.000**

East Nusa Tenggara	0.4379	0.0051	85.18	0.000**
West Nusa Tenggara	0.1021	0.0051	19.85	0.000**
Papua	-2.4837	0.0531	-46.80	0.000**
West Papua	-0.2401	0.0021	-111.92	0.000**
Riau	0.2421	0.0002	1309.24	0.000**
West Sulawesi	0.4312	0.0056	77.21	0.000**
South Sulawesi	-0.1318	0.0034	-38.31	0.000**
Central Sulawesi	0.6392	0.0056	114.45	0.000**
Southeast Sulawesi	-0.0307	0.0051	-5.97	0.000**
North Sulawesi	0.5518	0.0051	107.33	0.000**
West Sumatra	0.2878	0.0056	51.53	0.000**
South Sumatra	0.1801	0.0051	35.04	0.000**
North Sumatra	0.2346	0.0000	850.000+	0.000**

Note: ** $p < 0.01$, * $p < 0.05$.

Source: Authors' estimates, processed.

Table 6 presents the heterogeneous impacts of global uncertainty on the export performance of each province in Indonesia. The provinces with the highest positive impact are North Maluku (1.280), Gorontalo (1.241), Jakarta (0.788), Riau Islands (0.755), and Central Sulawesi (0.711). This indicates that increased global economic uncertainty is followed by improved export performance in these regions. This phenomenon can be explained by the trade diversion effect, namely a shift in international trade destinations resulting from global policy changes that open up new market opportunities for specific regions (Hotsawadi, 2021; Puspitawati & Oktaviani, 2017). North Maluku, for example, has seen a strong increase in exports in recent years, driven by nickel-based commodities and mineral downstream industries. As global uncertainty rises, demand for strategic raw materials for the electric vehicle and renewable energy industries remains high, making the region's exports relatively more resilient (Karhu et al., 2024).

Meanwhile, the Riau Islands and Jakarta benefit from their roles as manufacturing, international trade, and national logistics centres, giving them broader access to global trade networks. The literature indicates that regions more integrated into international supply chains tend to adapt better to external uncertainty (Li et al., 2025). Gorontalo and Central Sulawesi also demonstrated relatively high positive responses. One relevant explanation is the increase in exports of agricultural, fishery, and mineral commodities, which have specific export markets and are not entirely dependent on any particular destination country. When global economic uncertainty arises, exporters in these regions can diversify their markets, thereby minimising negative impacts. Studies on export resilience indicate that export market flexibility and product diversification are key factors in maintaining export performance during periods of global economic uncertainty (Wang & Wang, 2025).

Conversely, Papua, Bengkulu, West Papua, North Kalimantan, East Kalimantan, and South Sulawesi experienced greater negative impacts compared to other provinces. Papua had the largest negative coefficient, indicating that an increase in the global economic policy uncertainty significantly reduced the region's export performance. Economically, this situation can be explained by Papua's high dependence on exports of specific mining commodities that are highly sensitive to fluctuations in global prices and demand. When uncertainty rises, investors and international traders tend to postpone trade contracts, reduce investment, and curb demand for high-risk commodities (Laubsch et al., 2024). As a result, regions with less diversified export structures face greater export pressures. These findings align with research

showing that economic policy uncertainty increases trade costs and reduces export activity, particularly in regions with a high concentration of export commodities (Liu et al., 2024).

Bengkulu also exhibits a significant negative impact. Bengkulu's export structure remains dominated by primary commodities such as coal, palm oil, and plantation products, leading to high dependence on international price dynamics. When global uncertainty rises, primary commodity prices tend to become more volatile, thereby depressing the region's export value (Zakry, 2026). Similar conditions are observed in West Papua and North Kalimantan, which rely heavily on the extractive sector and lack a strong processing industry base. The international trade literature indicates that regions with low product and export market diversification tend to be more vulnerable to external shocks compared to regions with more complex economic structures (Barbieri et al., 2024).

Overall, the results suggest that the impact of global economic policy uncertainty on Indonesia's exports varies across provinces. Regions with more diversified economic structures, high trade openness, good logistical access, and strong integration into global supply chains tend to be better able to maintain or even improve export performance when global uncertainty increases (Aslan & Senay, 2023; Carballo et al., 2022; Benlaria, 2026; Qu et al., 2025; Zhu & Ye, 2024). Conversely, provinces heavily dependent on primary commodities and with low market diversification tend to experience greater export declines (Baker et al., 2016; Jawadi et al., 2024; Liao et al., 2022). Therefore, policies to enhance national export competitiveness should focus on diversifying export products, strengthening downstream industrialisation, expanding export markets, and improving interregional trade connectivity to strengthen regional export resilience against global shocks.

CONCLUSION

Based on the panel data regression results, this study concludes that global economic policy uncertainty, trade openness, logistics performance, and the Human Development Index have a positive and significant effect on provincial export performance in Indonesia. Meanwhile, the exchange rate has a negative and significant effect on provincial export performance in Indonesia. These findings indicate that increased international trade integration, the quality of the logistics system, and the quality of human resources are important factors in boosting regional export competitiveness. On the other hand, unfavourable exchange rate fluctuations can hinder export growth, particularly in sectors that remain dependent on imported inputs.

A further notable finding is the positive impact of global economic policy uncertainty on Indonesia's export performance. This result suggests that Indonesia's provinces can leverage global economic dynamics and uncertainty as opportunities to boost export activity, particularly through the export of commodities with a comparative advantage in international markets. The provincial results point in the same direction. Regions with diversified economic structures and strong integration into global supply chains appear better able to sustain exports as uncertainty rises. In contrast, those that depend heavily on primary commodities face greater exposure. Policy should therefore prioritise export diversification, downstream industrialisation, new export markets, and stronger interregional trade connectivity. This study has several limitations. It relies on provincial-level data and a limited set of macroeconomic variables, and the Global Economic Policy Uncertainty Index varies only over time rather than across provinces. Future research could add commodity-level export data, province-specific exposure measures, and dynamic or time-effects specifications to examine the transmission mechanisms more directly.

REFERENCES

- Akbar, F. M., & Widyastutik, W. (2022). Analisis daya saing, dinamika, dan determinan penawaran ekspor komoditas unggulan Indonesia ke United Kingdom. *Jurnal Ekonomi dan Kebijakan Pembangunan*, 11(2), 108–131.
- Al-Majali, A., Alsarayreh, A., & Alqaralleh, H. (2026). Beyond average effects: Performance-dependent logistics challenges in emerging Asian transportation trade. *Logistics*, 10(1), 2. <https://doi.org/10.3390/logistics10010002>
- Aslan, C., & Senay, A. (2023). Are the global economic policy uncertainties blocking the export flows of emerging markets? A heterogeneous panel SVAR analysis. *Economic Journal of Emerging Markets*, 15(1), 87–100. <https://doi.org/10.20885/ejem.vol15.iss1.art7>
- Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring economic policy uncertainty. *The Quarterly Journal of Economics*, 131(4), 1593–1636. <https://doi.org/10.1093/qje/qjw024>
- Barbieri, E., Capoani, L., Cattaruzzo, S., & Cor, G. (2024). Export diversification dimensions and performance: Analysis and industrial policy insights from Italian territories over Covid-19 shocks. *Socio-Economic Planning Sciences*, 94, Article 101923. <https://doi.org/10.1016/j.seps.2024.101923>
- Benlaria, H. (2026). The impact of economic factors on Saudi Arabia's foreign trade with BRICS countries: A gravity model approach. *Economies*, 14(3), 99. <https://doi.org/10.3390/economies14030099>
- Blackburne, E. F., & Frank, M. W. (2007). Estimation of nonstationary heterogeneous panels. *Stata Journal*, 7(2), 197–208. <https://doi.org/10.1177/1536867x0700700204>
- Caldara, D., Iacoviello, M., Molligo, P., Prestipino, A., & Raffo, A. (2020). The economic effects of trade policy uncertainty. *Journal of Monetary Economics*, 109, 38–59. <https://doi.org/10.1016/j.jmoneco.2019.11.002>
- Carballo, J., Handley, K., & Limão, N. (2022). Economic and policy uncertainty: Aggregate export dynamics and the value of agreements. *Journal of International Economics*, 139, Article 103661. <https://doi.org/10.1016/j.jinteco.2022.103661>
- Chakradhar, J., Ganguly, A., Nath, R., & Jadhav, P. (2025). Trade policy uncertainty and agricultural exports: The mitigating roles of RTA and liberal democracies. *Transnational Corporations Review*, 17(4), 200160. <https://doi.org/10.1016/j.tncr.2025.200160>
- Choi, C., Zhou, X., & Ko, J. (2024). Can human capital drive sustainable international trade? Evidence from BRICS countries. *Sustainability*, 16(1), 135. <https://doi.org/10.3390/su16010135>
- Dai, P., Xiong, X., & Zhou, W. (2021). A global economic policy uncertainty index from principal component analysis. *Finance Research Letters*, 40, 101686. <https://doi.org/10.1016/j.frl.2020.101686>
- Davis, S. J. (2016). An index of global economic policy uncertainty. *NBER Working Paper No 22740*. National Bureau of Economic Research. <https://doi.org/10.3386/w22740>
- Economic Policy Uncertainty. (2026). *Global economic policy uncertainty index* [Data set]. https://www.policyuncertainty.com/global_epu_index.html
- Gani, A. (2017). The logistics performance effect in international trade. *The Asian Journal of Shipping and Logistics*, 33(4), 279–288. <https://doi.org/10.1016/j.ajsl.2017.12.012>
- Gignarta, T. S., Borojo, D. G., & Guan, Z. (2024). The impacts of economic policy uncertainties on agriculture export. *Cogent Economics & Finance*, 12(1), 2382359. <https://doi.org/10.1080/23322039.2024.2382359>

- Gujarati, D. N., & Porter, D. C. (2013).
- Handley, K. (2014). Exporting under trade policy uncertainty: Theory and evidence. *Journal of International Economics*, 94(1), 50–66. <https://doi.org/10.1016/j.jinteco.2014.05.005>
- Harahap, H., & Widyastutik, W. (2020). Diversifikasi ekspor non migas Indonesia ke pasar non tradisional. *Buletin Ilmiah Litbang Perdagangan*, 14(2), 215–238. <https://doi.org/10.30908/bilp.v14i2.442>
- Hotsawadi. (2021). Analisis potensi dan dampak perdagangan Indonesia ke pasar non tradisional: Model GTAP [Master's thesis, IPB University]. IPB University Repository. <https://repository.ipb.ac.id/handle/123456789/109751>
- Hotsawadi, & Gea, I. V. (2024). Measuring the competitiveness and efficiency of Indonesian non-oil and gas exports to non-traditional markets. *Jurnal Hubungan Luar Negeri*, 9(2), 239–259. <https://doi.org/10.70836/jh.v9i2.58>
- Hotsawadi, & Gea, I. V. (2025). Menembus pasar global: Performa dan dampak keterbukaan perdagangan terhadap ekspor manufaktur Indonesia (Penetrating the global market: Performance and impact of trade openness on Indonesian manufacturing exports). *Jurnal Ekonomi Sakti*, 14(1), 106–127. <https://doi.org/10.36272/jes.v14i1.403>
- Hotsawadi, Gea, I. V., & Nuzulia. (2025). War shocks on export lanes: Is world trade performance slowing down? *Perspektif: Jurnal Ekonomi & Manajemen Universitas Bina Sarana Informatika*, 23(2), 32–42. <https://doi.org/10.31294/perspektif.v23i2.12323>
- Hotsawadi, & Widyastutik, W. (2023). Menavigasi daya saing dan determinan ekspor unggulan Indonesia di kawasan Caribbean Community (CARICOM). *Buletin Ilmiah Litbang Perdagangan*, 17(2), 203–224. <https://doi.org/10.55981/bilp.2023.224>
- Jawadi, F., Rozin, P., Gnegne, Y., & Idi, A. (2024). Geopolitical risks and business fluctuations in Europe: A sectorial analysis. *European Journal of Political Economy*, 85, 102585. <https://doi.org/10.1016/j.ejpoleco.2024.102585>
- Jia, F., Huang, X., Xu, X., & Sun, X. (2020). The effects of economic policy uncertainty on export: A gravity model approach. *Prague Economic Papers*, 29(5), 600–622. <https://doi.org/10.18267/j.pep.754>
- Karhu, M., Kotilainen, J. M., Sairinen, R., Jokilaakso, A., Lehtimäki, H., Lassi, U., & Huttunen-Saarivirta, E. (2024). Sustainability of the use of critical raw materials in electric vehicle batteries: A transdisciplinary review. *Environmental Challenges*, 16, Article 100966. <https://doi.org/10.1016/j.envc.2024.100966>
- Laubsch, J., Smales, L. A., & Vo, D. (2024). The influence of uncertainty on commodity futures returns and trading behaviour. *Quarterly Review of Economics and Finance*, 98, 101915. <https://doi.org/10.1016/j.qref.2024.101915>
- Li, M. (2025). Exploring how human capital development promotes economic transformation: The comparative analysis of emerging economies. *Journal of Organizational and End User Computing*, 37(1), 1–22. <https://doi.org/10.4018/JOEUC.388939>
- Li, P., Chen, Y., & Guo, X. (2025). Digital transformation and supply chain resilience. *International Review of Economics and Finance*, 99, Article 104033. <https://doi.org/10.1016/j.iref.2025.104033>
- Liao, J., Luo, L., Xu, X., & Wang, A. (2022). Perceived macroeconomic uncertainty and export: Evidence from cross-country data. *Economic Research-Ekonomska Istraživanja*, 35(1), 213–229. <https://doi.org/10.1080/1331677X.2021.1890176>
- Liu, Q., Li, Z., & Wang, Y. (2024). The heterogeneous impact of economic policy uncertainty on export recovery of firms: The role of the regional digital economy. *Regional Science Policy*

- & Practice, 16(5), 100044. <https://doi.org/10.1016/j.rspp.2024.100044>
- Melianny, B. S., Syaikat, Y., & Widyastutik, W. (2022). The potential of diversification in the Indonesian natural rubber export market. *Buletin Ilmiah Litbang Perdagangan*, 16(1), 25–40.
- Ministry of Trade of the Republic of Indonesia. (2026).
- Muchopa, C. L. (2025). The tariff liberalisation policy nexus with non-tariff measures: Panel model evidence in the SA–EU fruit products trade. *Economies*, 13(1), 1. <https://doi.org/10.3390/economies13010001>
- Nejati, M., & Bahmani, M. (2020). The economic impacts of foreign direct investment in oil and gas sector: A CGE analysis for Iranian economy. *Energy Strategy Reviews*, 32, 100579. <https://doi.org/10.1016/j.esr.2020.100579>
- Nguyen, T. H. (2025). Interest rates and economic growth: Evidence from Southeast Asia countries. *Economies*, 13(8), 244. <https://doi.org/10.3390/economies13080244>
- Oktaviani, R., & Drynan, R. G. (2000, June 28–30). The impact of APEC trade liberalisation on the Indonesian economy and agricultural sector [Paper presentation]. Third Annual Conference on Global Economic Analysis. Melbourne, Australia.
- Osano, H. M., & Koine, P. W. (2016). Role of foreign direct investment on technology transfer and economic growth in Kenya: a case of the energy sector. *Journal of Innovation and Entrepreneurship*, 5(1), Article 31. <https://doi.org/10.1186/s13731-016-0059-3>
- Puspitawati, E., & Oktaviani, R. (2017). *Teori, Model dan Aplikasi GTAP (Global Trade Analysis Project)*. IPB Press.
- Qu, H., Ding, Z., Ahlstrom, D., Wu, C., & Helen, H. (2025). When I have to versus when I am able to: Behavioral and resource explanations for firms' international expansion via exporting. *International Business Review*, 34(1), 102358. <https://doi.org/10.1016/j.ibusrev.2024.102358>
- Sinukaban, M. G., & Karmini, N. L. (2026). Pengaruh daya saing, kurs, PDB, dan harga terhadap ekspor karet. *Jurnal Ekonomi, Manajemen Pariwisata dan Perhotelan*, 5(1), 1–18. <https://doi.org/10.55606/jempper.v5i1.5413>
- Teixeira, A. A. C., & Fortuna, N. (2010). Human capital, R&D, trade and long-run productivity. Testing the technological absorption hypothesis for the Portuguese economy, 1960–2001. *Research Policy*, 39(3), 335–350. <https://doi.org/10.1016/j.respol.2010.01.009>
- Wang, Q., & Wang, Y. (2025). What shapes export competitiveness of home country firms? Host country environmental regulations or labor standards. *International Review of Financial Analysis*, 103, Article 104243. <https://doi.org/10.1016/j.irfa.2025.104243>
- Widyastutik, W., Amaliah, S., Hotsawadi, & Firdaus, M. (2023). The impact of One Belt One Road and Indonesia–Pakistan palm oil trade liberalization. *Jurnal Manajemen dan Agribisnis*, 20(3), 466–476. <https://doi.org/10.17358/jma.20.3.466>
- Widyastutik, W., Puspitawati, E., & Fawaiq, M. (2015). Analisis dampak implementasi komitmen Indonesia di sektor jasa konstruksi dalam kerangka AFAS. *Jurnal Ekonomi dan Pembangunan Indonesia*, 15(1), 41–56. <https://doi.org/10.21002/jepi.v15i1.446>
- Wooldridge, J. M. (2010). *Econometric Analysis of Cross Section and Panel Data* (2nd Ed.). MIT Press.
- World Bank. (2026). *World development indicators* [Data set]. <https://databank.worldbank.org/source/world-development-indicators>
- Yumashev, A., Ślusarczyk, B., Kondrashev, S., & Mikhaylov, A. (2020). Global indicators of sustainable development: Evaluation of the influence of the Human Development Index on

- consumption and quality of energy. *Energies*, 13(11), 2768.
<https://doi.org/10.3390/en13112768>
- Zakry, M. (2026). Dynamic linkages between global commodity prices and stock markets in times of crisis: Evidence from a DCC-GARCH framework. *Scientific African*, 31, e03221.
<https://doi.org/10.1016/j.sciaf.2026.e03221>
- Zhang, Y., Shang, N., Liu, Y., Zhang, C., & Jin, L. (2025). Logistics scale as trade catalyst: Principal component analysis of China–Korea bilateral trade drivers. *The Asian Journal of Shipping and Logistics*, 41(4), 187–194. <https://doi.org/10.1016/j.ajsl.2025.09.001>
- Zhu, X., & Ye, Y. (2024). Economic policy uncertainty and enterprise export resilience in China: Does the digital economy matter? *Heliyon*, 10(10), e31091.
<https://doi.org/10.1016/j.heliyon.2024.e31091>