



The Impact of the ASEAN-China Free Trade Area (ACFTA) on Indonesia's Coal Exports : Boost or Burden?

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ABSTRACT

Indonesia has taken an active role in regional economic integration, notably by joining the ASEAN-China Free Trade Area (ACFTA). This study investigates whether ACFTA has acted as a catalyst or constraint on Indonesia's coal export performance to its five main trading partners within the agreement. Using panel data spanning from 1990 to 2020, the analysis draws upon secondary data sourced from the World Bank, UN Comtrade, and the International Trade Center. The empirical findings reveal that Indonesia's coal export value to these key partner countries increased following the implementation of ACFTA. The results show that the GDP per capita of trading partners and economic distance had a significant positive effect on export values, while the real exchange rate exerted a negative influence. Additionally, the ACFTA dummy variable showed a statistically significant positive impact, suggesting that the agreement contributed to enhancing trade intensity, albeit not drastically. These findings underscore the dual nature of ACFTA's impact—while it provides a boost to trade flows, the overall effect remains moderate. Hence, to maximize its potential, further refinement in trade policy frameworks among member countries is necessary

INTRODUCTION

Domestic production alone is often insufficient for meeting a nation's diverse needs for goods and services. To address this gap, international trade plays a crucial role by enabling the exchange of goods and services based on specialization and comparative advantage across countries (Afin et al., 2008). In today's global economy, most nations engage in cross-border trade through international trade organizations that apply multilateral trade systems, with the World Trade Organization (WTO) being the most prominent. Indonesia is actively involved in global trade through bilateral, regional, and multilateral agreements (Ritaningsih et al., 2014).

One significant form of economic integration is the Free Trade Area (FTA), which offers preferential treatment to its members while excluding non-member countries from such benefits. Economic integration refers to collaborative arrangements among countries that align trade policies to reduce or eliminate barriers that restrict the movement of goods and services across national borders (Krugman & Obstfeld, 2005). These arrangements are designed to increase trade volume, enhance production efficiency, create job opportunities, reduce production costs, and ultimately improve the competitiveness of domestic products – contributing to broader economic welfare (Ridwan, 2009).

In practice, economic integration manifests as trade policies that selectively reduce or abolish trade restrictions among member countries committed to such cooperation. These restrictions may include tariffs and non-tariff barriers, which are deliberately lowered or eliminated within the integrated group (Salvatore, 1997).

Since the 1990s, many developing nations have participated in various regional economic cooperation frameworks. One notable example is the ASEAN-China Free Trade Area (ACFTA), a collaborative agreement between the Association of Southeast Asian Nations (ASEAN) and China that aims to promote economic liberalization by establishing a free trade zone. This initiative seeks to reduce and eventually eliminate trade barriers between the two regions to foster more efficient trade flows. The ACFTA was designed not only to support regional economic growth and improve development conditions but also to promote shared prosperity. In terms of population, ACFTA has become the world's largest free trade area and ranks third globally in trade volume, following the European Economic Area and the North American Free Trade Agreement (NAFTA) (Perundingan Perdagangan Internasional ASEAN-China, 2018).

Trade can be broadly understood as a mutual exchange process agreed upon by all parties involved (Aprita & Adhitya, 2020). In reality, a country may not be able to produce all of the goods it requires independently and often depends on imports to meet domestic demands. The advancement of technology has further facilitated trade, enabling countries to engage more actively in global markets through exports and imports.

Indonesia's non-oil and gas exports and imports have steadily increased in recent years, contributing positively to national income. These non-oil and gas commodities can be classified into primary and non-primary groups. Primary commodities include outputs from agriculture and mining, while non-primary

commodities come from the industrial sector. Among Indonesia's leading mining exports are coal, copper ore, and nickel (Suryono, 2019).

Coal, in particular, offers substantial economic benefits as one of Indonesia's top foreign exchange earners, second only to oil and gas. Initially used to power steam engines in trains, ships, and steel production, coal now plays a vital role in electricity generation, accounting for nearly 40% of global power output. Asia alone accounts for approximately 65% of global coal consumption. While domestic demand remains significant, Indonesia's coal production is largely driven by international demand. The country holds a strategic position in the global coal market, supplying around 24% of global coal exports to key destinations including China, Japan, South Korea, and India. As one of the most promising export commodities in the mining sector, coal contributes significantly to Indonesia's economy. At its peak, coal accounted for approximately 85% of the total state revenue generated from mining activities (Dewi, 2018). The following section outlines the major coal exporters globally:

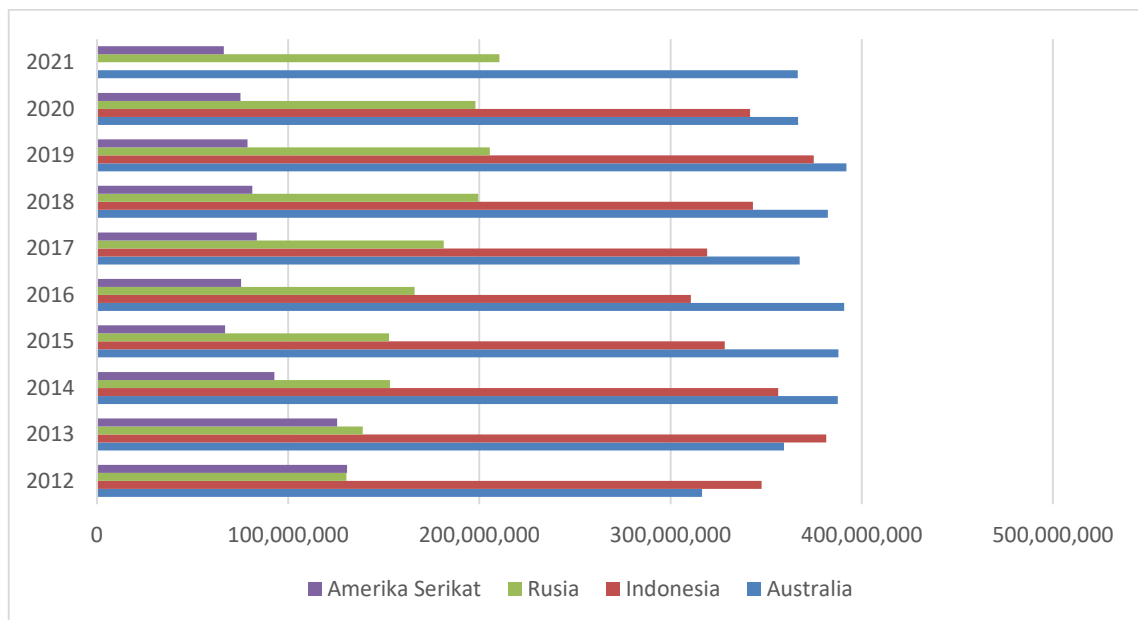


Figure 1. Chart of the World's Largest Coal Exporting Countries (Tons)

The chart above illustrates the rapid growth of Indonesia's coal industry in recent years. At its peak between 2012 and 2013, Indonesia held the position as the world's top coal exporter, reaching an impressive volume of 381 million tons. However, as production levels fluctuated over time, Indonesia's ranking shifted. The country is currently the second-largest coal exporter globally, following Australia. This change reflects the dynamic nature of global coal markets and Indonesia's continued prominence as a key player in international coal trade.

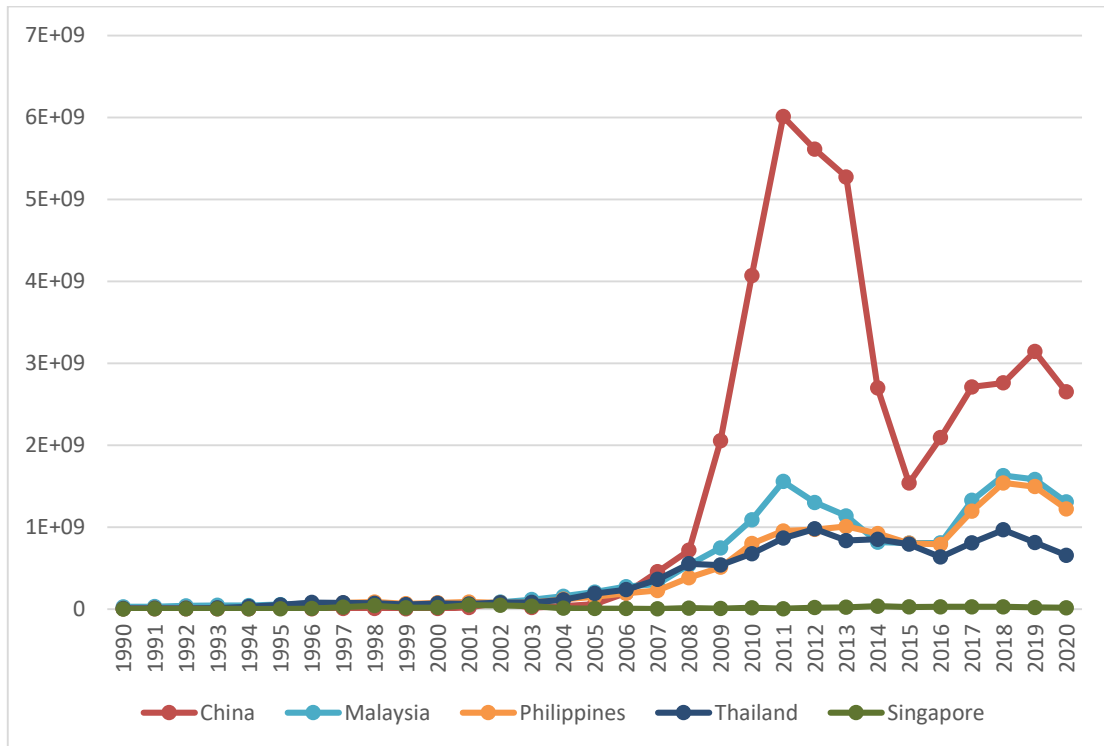


Figure 2. Graph of Indonesia's Coal Export Value to Major ACFTA Trading Partner Countries, 1990–2020

Indonesia’s coal exports are predominantly directed toward countries in the Asian region. Major importers include China, Japan, South Korea, Taiwan, Malaysia, the Philippines, Thailand, Hong Kong, and India. Among these, China stands out as the largest consumer, utilizing coal primarily as a source of energy for electricity generation. Compared to other nations, China remains the world’s leading coal consumer due to its reliance on coal-fired power plants. To meet this increasing demand, China has consistently expanded its coal imports from Indonesia. According to the Directorate General of Mineral and Coal under Indonesia’s Ministry of Energy and Mineral Resources, China is one of the largest coal importers globally. In addition to importing coal, China has also invested significantly in Indonesia’s coal mining sector. Within Southeast Asia, Indonesia serves as China’s primary coal supplier. Since the early 2000s, Indonesia’s coal exports to China have surged, accounting for approximately one-quarter of China’s total coal demand.

However, economic integration does not always yield benefits for all member countries. Viner (1950) explained that economic integration can generate two opposing effects: trade creation and trade diversion. Trade creation tends to enhance international trade and national income, while trade diversion may shift trade flows in ways that reduce a country's economic gains (Octaviani, 2018).

To assess the impact of such economic integration, international economics offers several analytical approaches. As noted by Shepherd (2013), three widely recognized methods include the Computable General Equilibrium (CGE) model, the Factor Proportion model, and the Gravity model.

Among these, the Gravity model stands out for its ability to capture both short-term and long-term effects of Free Trade Agreements (FTAs), as well as their dynamic aspects. This model is particularly effective for estimating how variables such as Gross Domestic Product (GDP), geographical distance between countries, and population sizes influence trade flows. Compared to other trade models, the Gravity model is considered more empirically robust (Soraya, 2013).

The volume of Indonesia's coal exports to its trading partners is influenced by several key factors, including the GDP of destination countries, the distance between Indonesia and its export markets, and the population size of importing countries. Additionally, exchange rates play a significant role in shaping export trends (Tarigan, 2005). The steady year-on-year growth in Indonesia's coal exports suggests that there is still considerable market potential in the international arena. Therefore, identifying the key determinants of coal export performance is essential to maximize Indonesia's competitiveness in global markets.

Given this context, the present study aims to examine the impact of ACFTA economic integration on Indonesia's coal export values from 1990 to 2020, focusing on both the increase and decline in exports before and after the implementation of ACFTA. It is anticipated that this research will contribute to academic literature and provide valuable insights for shaping Indonesia's international trade policy.

LITERATURE REVIEW

Economic Integration Theory

Economic integration refers to the process of creating a more open international economic structure by removing all barriers to free trade and introducing various forms of cooperation among countries (Salvatore, 1997). The United Nations Conference on Trade and Development (UNCTAD) defines economic integration as an agreement among several countries to facilitate international trade and the movement of production factors within member states.

According to Salvatore (2004), there are Several Stages of Economic Integration:

1. **Preferential Trade Area (PTA):** Two or more countries agree to grant preferential treatment to certain products from specific countries by reducing tariffs, though not completely eliminating them.
2. **Free Trade Area (FTA):** Member countries remove tariffs and quotas among themselves, while each country maintains its own tariff policies toward non-members.
3. **Customs Union (CU):** Member countries remove internal trade barriers and adopt a common external tariff for non-member countries.
4. **Common Market (CM):** Member countries eliminate barriers to the movement of goods, services, and factors of production, aiming for efficient resource allocation.
5. **Economic Union:** Member countries harmonize national economic policies, including structural policies.

6. **Total Economic Integration:** Member countries agree to unify monetary and fiscal policies.

Export Determinants

International trade involves cross-border transactions, including exports and imports (Tambunan, 2001). According to Indonesian Customs Law, export is the activity of sending goods out of the customs area. The export value is calculated as the transaction value of goods delivered on board at the port of shipment (Free on Board/FOB). Export activities generate foreign exchange earnings, which are critical sources of national income and can stimulate domestic demand.

Countries engage in international trade mainly for two reasons (Krugman & Obstfeld, 2005): first, due to differences among countries; second, to achieve economies of scale in production. Specialization in producing specific goods allows countries to produce more efficiently at larger scales.

Key Variables Influencing Exports Include:

1. **Gross Domestic Product (GDP):** GDP reflects a country's capacity to produce goods and services, including exports. A higher GDP indicates a stronger economy and greater domestic demand, which can lead to increased imports from other countries.
2. **Geographical Distance:** Physical distance between countries affects transportation costs, which can hinder international trade. The greater the distance, the higher the transaction costs, reducing trade volume (Mankiw, 2006). This study uses economic distance, which combines geographical distance and nominal GDP of trading partners, converted to natural logarithms to account for temporal dynamics.
3. **Exchange Rate:** Exchange rates influence export and import growth. Currency appreciation tends to make domestic goods more expensive internationally, reducing exports, while imports become cheaper, increasing import volumes (Setyorani, 2018). This study considers the exchange rate of trading partner countries relative to Indonesia's coal exports.
4. Economic integration, such as ACFTA, lowers tariffs among members, expanding market size and enabling producers to benefit from economies of scale. Lower production costs arise from larger output for bigger markets, known as internal economies of scale. Reduced tariffs and non-tariff barriers lower trade costs and enhance exports. Shared membership in Regional Trade Arrangements (RTAs) reduces tariff barriers, thereby boosting bilateral trade.

Gravity Model Theory

This study employs an adapted Gravity Model originally introduced by Sir Isaac Newton. The theory describes spatial interactions between two or more entities exhibiting physical phenomena (Nijkamp & Reggiani, 1992). The Gravity Model is an equation used to analyze flows between geographically separated entities.

In 1962, Jan Tinbergen introduced the Gravity Model for international trade flows, formulated as:

$$F_{ij} = G \frac{M_a^i M_j^b}{D_{ij}^\theta}$$

Where:

- F_{ij} is the flow (trade volume) from origin i to destination j ,
- M_i and M_j represent the economic sizes (e.g., GDP or GNI) of the respective countries,
- D_{ij} is the geographic distance between the countries,
- G is a constant depending on the units used.

The Gravity Model has been further developed by scholars such as Linnemann (1966), Bergstrand (1985, 1989, 1990), Deardorff (1995, 1998), Evenett and Keller (1998), and Mathur (1999). Its strength lies in capturing both short-term and long-term trade dynamics and providing an empirical framework for analyzing determinants of trade flows.

The gravity model has become a widely accepted empirical tool in international trade research, as it effectively captures the influence of economic size and geographical distance on bilateral trade flows (Anderson, 2015; Head & Mayer, 2014).

METHODOLOGY

This study utilizes secondary data arranged in a panel dataset format, combining both cross-sectional and time series data spanning from 1990 to 2020. The cross-sectional data cover six major trading partner countries that represent the largest coal trade volumes with Indonesia among other countries. These six partner countries include China, Malaysia, Singapore, Thailand, the Philippines, and Hong Kong. The data sources for this study include reputable international databases such as UN Comtrade, the International Trade Center, the World Bank, and CEPII.

The analysis employs panel data econometrics using the gravity model framework. The gravity model is a well-established empirical tool frequently used to examine bilateral trade flows, assess the effects of trade liberalization, and analyze trade agreements. Compared to prior studies using the gravity model, this research introduces several modifications, including updated export values, a longer observation period, an expanded number of observations, and refined classification of product codes.

In this study, the gravity model serves to evaluate the impact of trade creation and trade diversion effects arising from the implementation of the ASEAN-China Free Trade Agreement (ACFTA) on Indonesia's coal export trade.

The econometric model is expressed as follows:

$$y_{it} = \alpha + a_1x_{1it} + a_2x_{2it} + a_3x_{3it} + a_4x_{4it} + \varepsilon$$

Where:

- y_{it} = Total coal exports (in current US dollars) from Indonesia to country i at year t
- $x_{(1_{it})}$ = GDP per capita of trade partner country i at year t (in current US dollars)
- $x_{(2_{it})}$ = Real exchange rate of trade partner country i at year t
- $x_{(3_{it})}$ = Economic distance between Indonesia and country i at year t
- $x_{(4_{it})}$ = Dummy variable indicating ACFTA implementation status (1 if ACFTA is in effect, 0 otherwise)

The dependent variable y represents Indonesia's total coal export value to the six primary trading partners in US dollars, which minimizes distortions caused by transportation cost effects. The GDP per capita of the trade partner serves as a proxy for their export demand potential, economic strength, and income level. Thus, it is expected that the coefficient a_1 will be positive, indicating that countries with higher income levels tend to import more coal.

The real exchange rate variable represents the currency valuation of the trade partner country relative to Indonesia. A depreciation of the partner's currency (a higher real exchange rate) generally makes Indonesian coal exports more expensive for the importing country, potentially reducing demand. Conversely, an appreciation (a lower real exchange rate) could make imports cheaper and boost trade. Therefore, the coefficient a_2 is expected to be negative, indicating that a stronger partner currency relative to Indonesia reduces Indonesia's export competitiveness.

Economic distance acts as a proxy for transportation costs. Greater distances generally increase trade costs; therefore, it is hypothesized that the coefficient a_3 will carry a negative sign, reflecting the inverse relationship between distance and trade volume.

The ACFTA dummy variable captures the effect of the trade agreement's enforcement on Indonesia's coal exports. It is anticipated that this coefficient a_4 will be positive, suggesting that ACFTA implementation has a significant and favorable impact on bilateral trade flows.

RESULTS AND DISCUSSION

Each ACFTA member country has distinct economic characteristics. Economic growth is a crucial indicator for analyzing the development of a country's economy. Economic growth results in an increase in public income over a certain period. Fundamentally, economic activity is a process of utilizing production factors to generate output, which in turn creates a flow of returns to the production factors owned by the community (Mankiw, 2006).

Gross Domestic Product (GDP) measures a country's capacity to produce export commodities (Salvatore, 2004). The greater a country's production capacity, the more it influences the country's economic development. A positive GDP growth rate indicates an increase in the capacity to produce export commodities. In this study, the GDP variable represents both Indonesia's GDP

and the GDP of export destination countries, calculated as the natural logarithm of the product of GDP_i and GDP_j. The value and growth of Indonesia's GDP per capita are illustrated in the following figure:

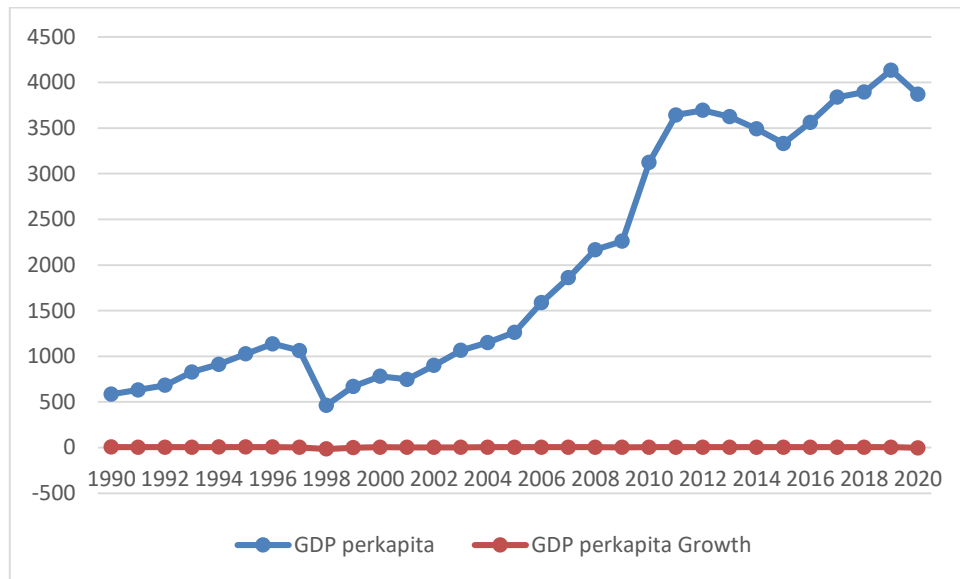


Figure 3. Development of Indonesia's GDP Per Capita Value from 1990 to 2020

Based on the figure, the average GDP per capita of Indonesia from 1990 to 2020 was approximately USD 1,999.7 billion, with an average growth rate of 3.27 percent over the same period. The highest GDP per capita growth rate occurred in 1995, reaching 6.5 percent, while the lowest growth rate was recorded in 1998. The development of GDP per capita for the export destination countries can be seen in the following table:

| Country | GDP Per Capita of Trade Partner Country | | | | | | Coal Export Growth |
|-------------|---|----------|----------|----------|----------|------------|--------------------|
| | Standard Deviation | Mean | Median | Max | Min | GDP growth | |
| China | 3486.204 | 3613.23 | 1753.418 | 10434.78 | 317.8847 | 8.496452 | 0.689575125 |
| Malaysia | 3182.202 | 6710.97 | 5587.025 | 11432.82 | 2441.742 | 3.268754 | 0.171465725 |
| Philippines | 914.1666 | 1824.296 | 1325.571 | 3485.341 | 816.0295 | 2.201981 | 0.280485042 |
| Thailand | 1978.346 | 3910.152 | 3043.98 | 7817.01 | 1508.942 | 3.085642 | 0.209819578 |
| Singapore | 17387.74 | 36826.9 | 29961.26 | 66679.05 | 11861.76 | 3.177242 | 1.199924555 |

Based on the table above, it can be seen that the growth of coal export values tends to increase to export destination countries that have relatively high GDP per capita growth. The hypothesis in this study states that the GDP variable has a positive and significant influence on the value of coal exports. This is consistent with the research findings, where the GDP variable shows a significant effect on Indonesia's coal export value, meaning that the size of Indonesia's GDP determines the value of its coal exports at a 5 percent significance level. GDP shows a positive influence.

Panel Data Model Estimation Results

This study uses a panel data model with a Fixed Effect Model (FEM) weighted by Generalized Least Squares (GLS) Cross Section Weights. The model choice is based on the Chow test results showing a probability of 0.00, so if the p-value is less than the significance level used, there is sufficient evidence that the FEM is the appropriate model. Meanwhile, the Cross Section Weights weighting is applied to address heteroskedasticity and autocorrelation among cross-sectional units.

The estimation results meet the model feasibility test, with the probability value (F-Statistic) of the model used being 0.00, indicating that at least one independent variable influences the dependent variable. The goodness of fit test is shown by the coefficient of determination (R^2). The model shows an R^2 value of 0.91, meaning that the variation in the independent variables explains 91% of the variation in the dependent variable, while the remaining 9% is explained by other variables outside the model.

Normality testing was conducted by examining the probability value in the normality test, which is greater than the 5 percent significance level. The normality test results show a probability value of 0.14, which is greater than the 5 percent significance level. This condition indicates sufficient evidence to accept, or in other words, that the errors in the model are normally distributed.

| Variable | Coefficient | Probability |
|--------------------|--------------------|--------------------|
| X1 | 2.433017 | 0.0000 |
| X2 | -1.379392 | 0.0006 |
| X3 | -0.873982 | 0.0001 |
| X4 | 0.410650 | 0.0338 |
| C | 12.09157 | 0.0000 |
| R-squared | 0.913343 | |
| Adjusted R-squared | 0.908594 | |

The estimation results presented in Table 1 show that four independent variables significantly influence export flows at a 5% significance level: the trading partner's GDP per capita, the trading partner's real exchange rate, economic distance, and the policy dummy variable. These findings align with previous studies. For example, Setyorani (2018) found that exchange rates have a negative relationship with exports, while Pratama (2019) demonstrated that GDP per capita positively influences exports. This relationship makes sense because exports are a critical factor in increasing a country's foreign exchange

earnings. When a country's national income (GDP) rises, it indicates improved welfare and economic capacity, which positively impacts its international trade activities.

GDP Per Capita of Trading Partner Countries

An increase in the GDP per capita of Indonesia's main ACFTA trading partners significantly boosts Indonesia's coal export value to those countries. Specifically, a 1% increase in GDP per capita of these trading partners leads to a 2.43% increase in Indonesian coal exports, holding other factors constant. GDP per capita reflects a country's economic capacity and purchasing power. According to Fitzsimons et al. (1999), a rise in the exporter's GDP per capita improves production capacity, while an increase in the importer's GDP per capita enhances consumption, driving higher import demand. Advanced countries typically have much higher GDP per capita than developing countries, indicating stronger purchasing power.

Similarly, Dewi et al. (2019) emphasize that rising GDP per capita signals increasing income and economic capability due to enhanced production in partner countries, which, in turn, elevates their demand for imported goods. Therefore, the GDP per capita of major ACFTA trading partners represents their consumption level and purchasing power for goods and services, reinforcing its critical role in shaping export activity. This is consistent with findings by Lembang & Pratomo (2013), who identify GDP per capita as a proxy for purchasing power that positively affects exporter countries' exports. Wahyudi & Anggita (2015) also found that higher per capita income increases a country's capacity to trade, particularly to import. For Indonesia, rising GDP per capita in trading partners creates greater opportunities to expand exports.

Real Exchange Rate

The real exchange rate of major trading partners exhibits fluctuating values and plays a crucial role in international trade by affecting relative prices. If the domestic real exchange rate appreciates, foreign goods become relatively cheaper than domestic products, causing exports to decline, and vice versa. Wahyudi & Anggita (2015) also note that the real exchange rate reflects the purchasing power of a trading partner's domestic output.

In this study, the real exchange rate of ACFTA trading partners significantly impacts Indonesian coal exports with a coefficient of -1.37. The negative sign indicates that a 1% increase in the real exchange rate of trading partners reduces Indonesia's coal exports by 1.37%, *ceteris paribus*. This finding is supported by Ritaningsih et al. (2014), who explains that depreciation of the real exchange rate in ACFTA countries increases import prices domestically, reducing demand for imports and consequently lowering Indonesia's export values. Similarly, Muharami & Novianti (2017), found that real exchange rate depreciation in exporting countries leads to increased export value and volume, while appreciation in importing countries raises foreign product prices, prompting importers to seek cheaper alternatives.

Economic Distance

Economic distance proxies the transportation cost between countries. The greater the distance, the higher the transportation costs, which increase the price of traded goods and reduce the trading partner's competitiveness (Zidi & Dhifallah, 2013). Gravity models typically assume a negative relationship between distance and exports because greater distances lead to higher logistics and transportation expenses.

The estimation confirms that economic distance negatively and significantly affects export values at a 5% significance level, with a coefficient of -0.87. This means a 1% increase in economic distance between Indonesia and a trading partner reduces coal exports by 0.87%, holding other variables constant. This aligns with studies by Beers (2002) and Paas (2000), who link increased distance with higher costs and reduced trade flows (Dewi et al., 2019).

Policy Dummy (FTA Implementation)

The dummy variable for Free Trade Agreement (FTA) implementation captures the difference between periods before and after ACFTA enforcement. The estimation shows that the policy dummy positively and significantly affects trade flows with a coefficient of 0.41. This coefficient implies that the implementation of ACFTA has, on average, increased Indonesia's coal export value by 0.41 units post-implementation.

This result concurs with Hanif (2020), who found that FTAs positively and significantly influence export values. The findings suggest that ACFTA has enhanced trade intensity among member countries, although the impact remains moderate. It indicates that further improvements are needed to optimize trade policies and enhance intra-ACFTA trade flows effectively.

CONCLUSION AND RECOMMENDATION

This study aimed to investigate whether the ASEAN-China Free Trade Agreement (ACFTA) has served as a boost or burden to Indonesia's coal exports, particularly to its top five ACFTA trading partners—China, Malaysia, the Philippines, Thailand, and Singapore. The findings reveal that ACFTA has generally boosted Indonesia's coal export performance, though the effect is statistically significant but not economically large. The dummy variable representing the ACFTA policy showed a positive and significant impact on coal export values, indicating that the trade liberalization under ACFTA has facilitated greater export flows, albeit modestly.

Among the explanatory variables, GDP per capita of trading partners has the strongest positive effect, confirming that economic growth and rising income levels in partner countries significantly drive demand for Indonesian coal. Conversely, real exchange rates exhibit a significant negative relationship with export values, suggesting that currency appreciation in partner countries tends to reduce the competitiveness of Indonesian coal exports. Additionally, economic distance negatively affects trade flow, consistent with the gravity model of trade, where transportation costs and logistics barriers reduce export intensity.

Overall, the results suggest that ACFTA acts more as a boost than a burden, supporting export growth while also highlighting areas where further policy refinement is needed. To optimize the benefits of regional integration, Indonesia

must continue strengthening trade infrastructure, diversifying export destinations, and addressing non-tariff barriers within the region. This way, the full potential of free trade agreements like ACFTA can be better realized.

FUTHER STUDY

Every research inevitably faces certain limitations. In this study, the analysis was limited to six selected ACFTA trading partner countries and covered the period from 1990 to 2020, which may not fully capture the dynamic changes in trade flows and economic relationships beyond this timeframe or with other trading partners. Additionally, while the gravity model offers valuable insights into trade determinants, it may not account for all factors such as political stability, infrastructure quality, or non-tariff barriers that could also impact coal exports. Future research could expand the scope by including more countries and a longer time series, or by integrating additional variables such as environmental regulations, tariff rates, and trade facilitation measures. Moreover, qualitative approaches or case studies could complement quantitative findings to deepen the understanding of trade dynamics under ACFTA and other regional agreements.

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