

KEY FACTORS ANALYSIS IN OPTIMIZING INDONESIAN COCOA EXPORTS

Devi Andriyani^{1*}, Mutiah Septiani²

^{1,2}Economic Development, Universitas Malikussaleh, Indonesia

*Corresponding Author: deviandriyani@unimal.ac.id

ABSTRACT

Cocoa is one of Indonesia's essential export commodities and is the highest foreign exchange contributor in the plantation sector. Increasing export performance is crucial because it reflects increased competitiveness and the business sector. The increase in cocoa exports is ideally supported by increased domestic cocoa production. However, an increase in cocoa production is not necessarily meaningful if other factors, such as inflation and exchange rate stability, do not complement it. However, inflation and exchange rates in Indonesia are highly volatile. This study aims to analyze the role of inflation and fluctuations in the exchange rate of cocoa exports to optimize cocoa exports in the global market. The analysis method used is the Auto Regressive Distributed Lag (ARDL) model. Research findings show that the variable that most affect cocoa exports in the short and long term is the exchange rate. The author's recommendations to achieve cocoa optimization include strengthening exchange rates and exchange rate risk management and changing marketing strategies and partnerships.

Keywords: Cocoa exports, inflation, exchange rate

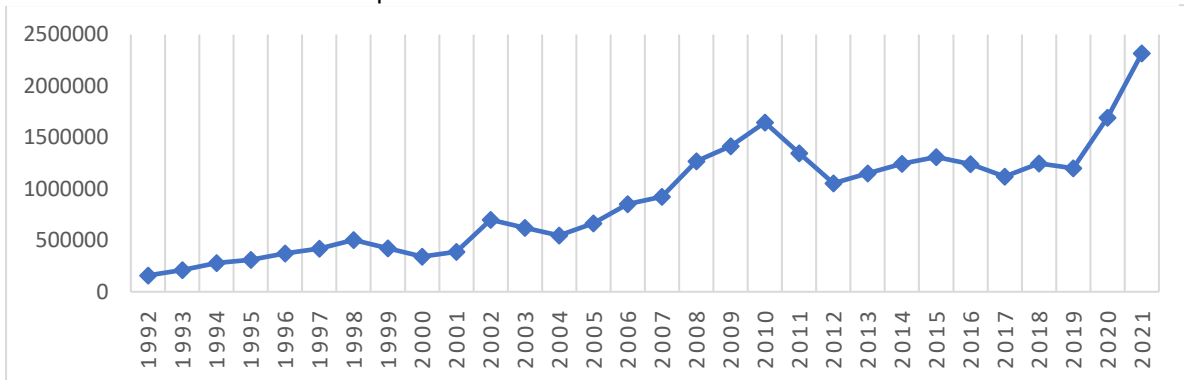
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INTRODUCTION

The agricultural sector holds a significant position in Indonesia's economic landscape, exemplified by its substantial contribution to the Gross Domestic Product (GDP), accounting for approximately 13.28% in 2021. This is second only to the Manufacturing sector, which comprises 19.25% of the GDP. One of the substantial sub-sectors with promising potential is the plantation sub-sector. In 2021, this sub-sector contributed 3.94% to the total GDP and an impressive 29.67% to the Agriculture, Forestry, and Fisheries sector, ranking it first within this sector. A key product within the plantation sub-sector that significantly bolsters the nation's income through its export value is cocoa. Indonesia stands as the 6th largest cocoa producer globally. Cocoa, alongside oil and gas, are among Indonesia's top three export commodities. The export potential of cocoa in tropical countries like Indonesia is highly promising. According to Databoks, in 2020 Indonesia was the world's third-largest cocoa producer, following Ivory Coast and Ghana, with Nigeria and Cameroon in the 4th and 5th positions, respectively. This ranking establishes Indonesia as the sole Southeast Asian country and one outside of Africa among the world's top five largest chocolate-producing nations. The primary destinations for cocoa exports include Malaysia, Singapore, the United States, China, Brazil, India, Thailand, the Netherlands, Italy, and Germany. Germany controls 98.63% of Indonesia's cocoa exports (Bisnis et al., 2020). The graph below illustrates Indonesia's cocoa export values over the past 30 years.

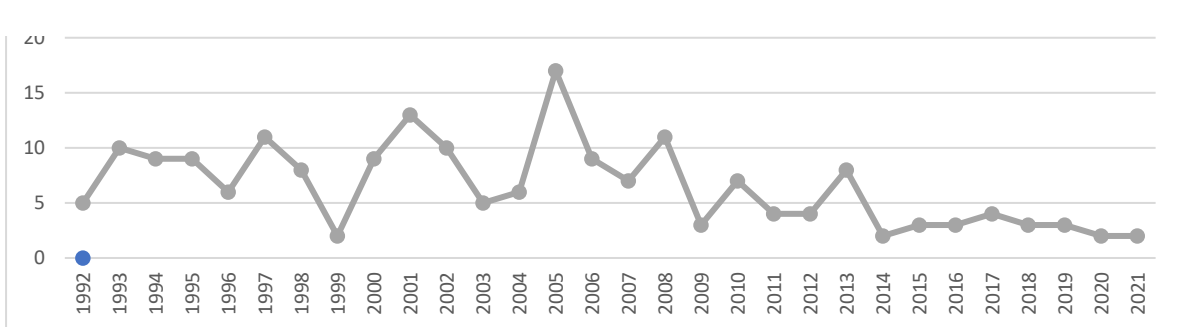
Based on the chart above, it is evident that the export value of cocoa has shown fluctuations over the last three decades. Despite Indonesia's position as the world's third-largest cocoa supplier, the consistent variability in export value highlights the instability of cocoa export performance. A consistent improvement in export performance indicates enhanced competitiveness, which is crucial for a prosperous business sector within a country.

Figure 1.
 Cocoa Export Growth in Indonesia from 1992 to 2021



Therefore, ensuring the enhancement and stability of exports is of utmost importance, especially for developing nations like Indonesia, as international trade, particularly exports, plays a pivotal role in boosting Indonesia's economic productivity (Nasrullah, 2014). When export

Figure 2.
 Inflation in Indonesia from 1992 to 2021



performance is unstable, it can potentially reduce the country's foreign exchange revenue and hinder economic growth. The fluctuation in cocoa export value is influenced by various factors, with inflation being one of the key contributors.

In Figure 2, it is evident that inflation has also displayed fluctuations over the past three decades. Notably, in 2020, there was a significant decrease, falling to 1.68%. Figure 1 and Figure 2 seem to suggest that when domestic inflation decreases (indicating a drop in cocoa prices), cocoa exports should logically increase. However, as indicated in Figure 1, a reduction in inflation does not necessarily translate to higher cocoa exports; cocoa exports tend to decline. Conversely, when inflation increases, theoretically causing production costs and prices to escalate, cocoa exports do not necessarily decrease. For instance, in 2005 and 2013, when inflation increased, cocoa exports also increased. This situation contradicts the findings of Wardana (2012), who posited that increased inflation in a country would make domestically produced goods more competitive, decreasing exports.

Bustari, as cited in Priyono (2019), suggests that one of the effects of inflation is changes in output. Inflation leads to fluctuations in the prices of production factors. Increasing inflation affects the higher production costs of cocoa, making it challenging for producers to maximize their production, ultimately reducing the volume of cocoa produced. This decrease in cocoa production directly impacts the ability to export since exporting commodities requires substantial costs. Therefore, a negative relationship exists between inflation and cocoa exports.

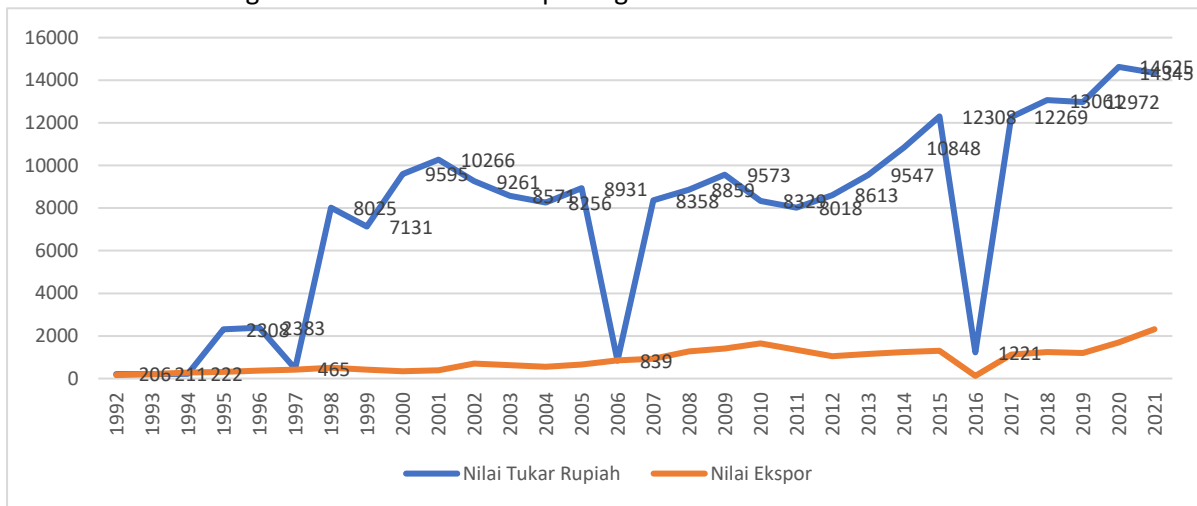
In line with the research of Priyono (2019), a study conducted by Berata & Setiawina (2017) also concludes that inflation has a negative and significant impact on Indonesia's cocoa exports. This aligns

with the theory that lower inflation is conducive to enthusiasm for cocoa purchases (Berata & Setiawina, 2017). However, research by Yatik (2018) suggests that inflation in Indonesia has a positive relationship with cocoa exports. The positive influence of inflation on cocoa bean exports occurs because rising inflation escalates cocoa processing production costs, causing the cocoa processing industry to stagnate. This, in turn, leads to decreased domestic demand for cocoa, resulting in increased cocoa exports. These varying results underscore a phenomenon that necessitates further research on the impact of inflation on cocoa exports using dynamic models and ARDL approaches.

In addition to production and inflation, the exchange rate of the Indonesian Rupiah against the US Dollar also plays a pivotal role in determining the value of cocoa exports. Globalization has intensified international interactions among countries, heavily influenced by each nation's interests in catering to the needs of others. The exchange of goods between countries hinges on exports, which, in turn, depends on the choice of currency for international trade, with the US Dollar being a primary preference. Using the US Dollar leads to fluctuations in the Rupiah's exchange rate against the Dollar over time, which can entail risks associated with currency exchange rate uncertainty (Muzaky, 2018).

Figure 3.

Exchange Rate of Indonesian Rupiah against US Dollar from 1992 to 2021



Looking at Figure 3, it is evident that over the past three decades, the exchange rate of the Indonesian Rupiah has significantly depreciated on three occasions, namely in 1997, 2006, and 2016. Notably, in 1997 and 2006, when the exchange rate of the Indonesian Rupiah against the US Dollar experienced significant depreciation, there was a notable increase in cocoa exports. This observation aligns with the theory proposed by Berata and Setiawina (2021), which suggests a strong relationship between the exchange rate and exports. Depreciation in the exchange rate results in foreign currencies having a more favorable exchange rate, stimulating an increase in exports. However, a different scenario unfolded in 2016, where a decline in the exchange rate coincided with a decrease in cocoa exports. This discrepancy contradicts the theory presented by Berata and Setiawina (2021). Consequently, further comprehensive research is necessary to examine the consistency of the theory regarding the association between the exchange rate and cocoa exports, particularly for cocoa commodities, to optimize cocoa exports.

The conditions and dynamics of cocoa exports in Indonesia are intriguing subjects to explore, as cocoa is a pivotal component of Indonesia's economy. The fluctuations in cocoa export values over the years signify suboptimal export performance in the global market. Therefore, in-depth research is needed to analyze the variables responsible for these fluctuations. This research evaluates the influence of inflation and exchange rate fluctuations on cocoa exports in Indonesia in the short and long term.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Inflation Fluctuations and Cocoa Exports in Indonesia

When inflation, which denotes the increase in the prices of goods and services within a country, escalates, it typically leads to a rise in domestic supply and exports. Conversely, domestic supply and exports also tend to decrease when inflation decreases. This is because rising inflation prompts an increase in prices in the domestic market, subsequently driving up production costs (Sukirno, 2017). According to Berata and Setiawina, the impact of inflation on cocoa exports from Indonesia is both negative and significant. Consequently, an upsurge in inflation has an adverse effect on exports. When a country experiences inflation, products manufactured within that country may lose their competitive edge in international markets, resulting in a decline in exports. This is primarily due to the increasing cost of domestic goods, which, in turn, places constraints on producers, making it difficult for them to maximize their production capacity (Nurvira & Ichsan, 2021).

Moreover, inflation can create a ripple effect, extending its influence on various facets of the economy, including production and consumer behavior. When inflation is on the rise, production costs typically increase, which can reduce the quantity of goods produced, including cocoa. The escalating costs make it challenging for producers to maintain or expand their output. In the context of cocoa exports, this limitation in production may result in decreased availability for international trade, subsequently impacting the overall volume of cocoa exports from Indonesia. Furthermore, inflation can affect consumer purchasing power, which, in turn, can influence demand for cocoa products. When consumers face higher prices due to inflation, their ability to afford cocoa-based products may diminish, potentially reducing domestic and international consumption.

Exchange Rate Fluctuations and Cocoa Exports in Indonesia

The exchange rate serves as a pivotal indicator within the realm of economics, determined by the interplay of supply and demand for currency in international trade, as it essentially functions as a medium for conducting international transactions. In the context of Indonesia's cocoa exports, the exchange rate can wield a substantial influence. When the exchange rate undergoes depreciation, indicating a decrease in the value of the country's currency, foreign currencies gain strength in terms of exchange rates. This phenomenon often results in an uptick in exports (Indah et al., 2019). Thus, the exchange rate is intricately intertwined with cocoa exports in Indonesia.

A concurrent study by Berata and Setiawina (2017) substantiated the correlation between the exchange rate and exports. As mentioned by Arifin, as cited in Priyono (2019), the value of a nation's currency is a compelling factor that profoundly influences export decisions. The magnitude of a currency functions as a yardstick for comparing the prices of goods and services in the realm of international trade. Given the dynamic nature of a country's economic landscape, the actual worth of its currency can fluctuate. Currency values may either depreciate, signifying a decrease or appreciate, indicating an increase, rendering the exchange rate a crucial consideration for countries engaged in export activities.

Research conducted by Setyorani in 2018 yielded a significant conclusion regarding the impact of a country's currency on Indonesia's export growth. In many developing countries, long-term export activity negatively influences the exchange rate. However, the exchange rate typically tends to weaken in the short term. This intricate relationship between the exchange rate and exports underscores the need for policymakers and stakeholders to comprehensively analyze and consider currency dynamics when formulating strategies for enhancing cocoa exports in Indonesia. It highlights the importance of aligning exchange rate policies with the goal of optimizing international trade in cocoa commodities.

RESEARCH METHODS

This research employs the Autoregressive Distributed Lag (ARDL) analysis method. The ARDL method is an econometric analysis technique used to estimate short-term and long-term relationships among variables when these variables are non-stationary, meaning they have unit roots. The ARDL method is particularly useful when dealing with cointegrated time series data. Furthermore, the ARDL

method is a regression technique that simultaneously includes lags of both dependent and independent variables. The ARDL model combines Auto-Regressive (AR) and Distributed Lag (DL) models. The AR model uses one or more past data points of the dependent variable, while the DL model is a regression model that combines current and past data of independent variables (Rahmasari et al., 2019).

In a broad sense, the steps for conducting econometric analysis using this method are as follows: Testing the stationarity of the variables in the research model, both at the level and first difference. Determining the optimal lag, Conducting Granger causality tests, Performing the bound test for cointegration, Estimating the ARDL model, Testing the stability of the ARDL model.

The ARDL model equation for this research is as follows:

$$Y_t = \alpha + \alpha_{1t} + \sum_{i=1}^p \alpha_i Y_{t-i} + \sum_{i=0}^q \alpha_2 X_{1t-i} + \sum_{i=0}^r \alpha_3 X_{2t-i} +$$

In this study, the stability of the ARDL model is tested using the CUSUM test at a 95% confidence level. Model stability is determined by the position of the blue CUSUM line, which should fall between two 5% significance lines represented in red. Before using data in regression analysis, including the ARDL model, it is essential to check whether it meets the Best Linear Unbiased Estimate (BLUE) criteria.

RESULTS AND DISCUSSION

Stationarity testing, a fundamental concept in time series analysis, is pivotal as it indicates that the statistical properties of time series data do not change over time. In the context of dynamic model research, stationarity testing is an initial and essential step, as it helps identify any spurious regression that may occur when estimating a model. Multiple methods are available for assessing data stationarity, and the Phillips-Perron test is employed in this study.

The Phillips-Perron test follows a specific criterion for evaluating data stationarity. It involves comparing the Phillips-Perron probability (PP) with the pre-defined significance level. If the probability value falls below the significance level, it signifies that the variable data is stationary. Conversely, the variable data is deemed non-stationary if the PP probability exceeds the significance level.

The outcomes of the stationarity test for the variables under investigation are presented in Table 4.

The Philips-Perron Unit Root Test establishes that all variables in this study exhibit stationarity in their first differences when employing a constant regression (Intercept) at the 1%, 5%, and 10% significance levels. This conclusion is evident as the probability values (Prob) fall below the critical threshold of 0.05 (Prob < 0.05), indicating that all variables are suitable for further analysis using their first differences.

The Lag Optimum test plays a vital role in assessing the duration of a variable's data to return to a state of stability or equilibrium after undergoing disturbances from other variables within the study (Marwanti, 2017). The outcomes of the Lag Optimum test in this study are presented in Table 5

Table 1.
Lag Optimum Test Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-261.5502	NA	19785.00	21.24402	21.43904	21.29811
1	-203.3218	93.16548*	689.5887	17.86574	18.84084	18.13619
2	-189.0734	18.23788	888.4290	18.00588	19.76106	18.49269
3	-170.7013	17.63723	1007.590	17.81611	20.35137	18.51928
4	-160.8552	6.301528	3462.754	18.30842	21.62376	19.22795
5	-98.21623	20.04447	531.2210*	14.57730*	18.67272*	15.71319*

* indicates lag order selected by the criterion

Analyzing the Table reveals that the optimal lag selection in this study points to the fifth lag as

the most suitable choice. This is evident from the preponderance of asterisks (stars) associated with the fifth lag. Specifically, the second lag exhibits the lowest values for LR (Sequential Modified LR test statistic, each test at the 5% level) and SC (Schwarz Criterion), whereas the fifth lag demonstrates the lowest values for FPE (Final Prediction Error), AIC (Akaike Information Criterion), and HQ (Hannan-Quinn Information Criterion). When considering these cumulative criteria, it becomes evident that most asterisks align with the fifth lag. Consequently, it is reasonable to conclude that the lag optimum is situated at the fifth lag.

The interactions between the variables under scrutiny unfold over the subsequent five years. This implies that when one variable undergoes a change, its impact ripples through to other variables in the ensuing five years. For instance, if cocoa production experiences an increase, it is likely to result in an upturn in cocoa export variables over the following five years. The subsequent phase of this analysis entails selecting the most appropriate model by specifying and estimating the fundamental ARDL model. Model selection is based on a comprehensive evaluation using summary criteria graphics, with the Akaike Information Criteria (top 20 models) as the preferred method. This model selection process is further illustrated in the following figure.

The Granger Causality Test, a fundamental component of our analysis, is designed to shed light on the existence of a reciprocal relationship between variables. This test helps us explore the intricate dynamics between the key elements under investigation. The evaluation of causal relationships hinges on comparing the Granger probability values with a predetermined significance level. If the calculated Granger probability value surpasses the significance level, it suggests that no causal link exists between the variables. However, if the probability value falls below the significance level, it signifies the presence of a significant causality. The outcomes of the Granger Causality Test are detailed in Table 6, offering valuable insights into the intricate interplay between the variables at the core of our analysis. Examining causal relationships provides a deeper understanding of how changes in one variable may influence others, a crucial facet of our research objectives.

The results of the Granger Causality Test provide a clear and definitive conclusion. They indicate that no bidirectional relationship exists among the variables, signifying the absence of Granger causality. This absence of a causal relationship is established as the Granger probability values consistently exceed the predetermined significance level. Consequently, it can be confidently stated that there is no significant causal interplay between the variables under examination.

The cointegration test examines whether there is a long-term relationship and the possibility of an imbalance between independent and dependent variables. If there is an imbalance, an error correction model is required. In this study, the cointegration test is performed using the bound test. The cointegration test results, The F-Statistic value of 6.538164 surpasses the IO Bound value at multiple significance levels, including 10%, 5%, 2.5%, and 1%. This substantial difference in values strongly supports the conclusion that cointegration exists among the variables within the tested model. This cointegration signifies the presence of both short-term and long-term equilibrium among the variables, underlining the interdependence and interconnectedness of these crucial elements in our analysis.

Following the data input, stationarity tests, and cointegration analysis, the research proceeded with ARDL analysis. The data processing phase was segmented into two components, specifically focusing on short-term and long-term processing.

Table 2.
ARDL Model Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
D(Y(-1))	-0.168244	0.232019	-0.725131	0.4777
D(LNX1)	127.0545	135.7287	0.936091	0.3616
D(LNX1(-1))	182.3755	144.4192	1.262820	0.2228
D(LNX1(-2))	222.6000	128.9151	1.726718	0.1013
D(LNX2)	158.2374	75.89362	2.084990	0.0516
D(LNX2(-1))	94.69425	80.05913	1.182804	0.2523
C	87.20326	77.04391	1.131864	0.2725

As presented in Table, the outcomes derived from the short-term test offer valuable insights into the dynamic interplay among the key variables. The short-term equation can be formulated as follows: Exports = 87.20326 + 127.0545LnX1 + 158.2374*LnX2

This equation encapsulates the immediate impacts and relationships between the variables, allowing us to draw critical conclusions about their interdependencies. To delve into a deeper understanding of this short-term equation, the following interpretations are provided:

1. **Constant (87.20326):** This constant, approximately equal to 87.20, is a pivotal anchor in our analysis. It signifies that if factors such as production, inflation, and the exchange rate of the Indonesian Rupiah to the US Dollar remain constant in the short term, then exports will also remain steady at around Rp 87.20 million per year. Essentially, it establishes a baseline from which we can gauge the deviations caused by changes in these factors.
2. **Coefficient for Inflation (X2, 127.0545):** The coefficient for inflation, around 127.05, sheds light on the impact of inflation on exports in the short term. If there is a 1 percent increase in inflation, exports will increase by approximately Rp 127.05 million annually. This implies a positive relationship between inflation and exports during the short-term period. Higher inflation seems to stimulate exports in this immediate context.
3. **Coefficient for Exchange Rate (X3, 158.2374):** The coefficient related to the exchange rate of the Indonesian Rupiah to the US Dollar, approximately 158.24, provides insights into the dynamics of exchange rates in the short term. A 1 percent increase in the exchange rate will correspond to an increase in exports by roughly Rp 158.24 million per year. This suggests a positive correlation between the exchange rate and exports during the short term. As the exchange rate strengthens, exports appear to benefit from this appreciation.

In sum, this short-term equation unveils the intricate relationships between these key variables within an immediate timeframe. It offers valuable insights for policymakers and stakeholders seeking to understand and anticipate the short-term effects of changes in production, inflation, and exchange rates on export levels. These insights can inform decision-making and strategy development within the realm of our analysis.

Table 3.
ARDL Model Estimation Results - Long-Term

Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNX1)	455.4098	326.4057	1.395227	0.1799
D(LNX2)	216.5058	117.3611	1.844784	0.0416
C	74.64471	65.57687	1.138278	0.2699

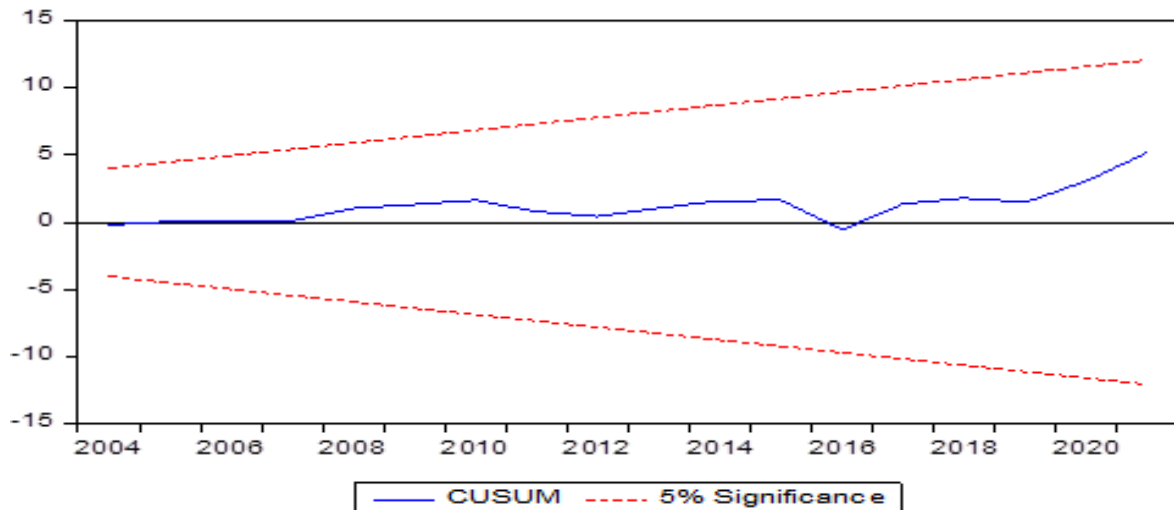
$$\text{Exports} = 74.64471 + 455.4098\text{LnX1} + 216.5058*\text{LnX2}$$

In the context of the long-term estimation results provided in Table 9, we can decode the implications of these coefficients to understand the dynamics at play better. Let us explore the long-term relationships between the variables:

- a. Coefficient for Inflation (X1, 455.4098): The coefficient for inflation reveals that in the long term, a 1 percent increase in inflation corresponds to a substantial increase in exports, approximately 455.41. This positive coefficient suggests a strong positive relationship between inflation and exports in the long run. Higher inflation seems to boost exports significantly over an extended period.
- b. Coefficient for Exchange Rate (X2, 216.5058): The coefficient associated with the exchange rate showcases that in the long term, a 1 percent increase in the exchange rate leads to a substantial increase in exports, approximately 216.51. Similar to the effect of inflation, this positive coefficient indicates a significant positive correlation between the exchange rate and exports over the long term. As the exchange rate strengthens, exports experience a notable boost.
- c. Constant (C, 74.64471): The constant of 74.64471, or roughly 74.64, signifies the export baseline when the other variables remain constant. It indicates that in the long term, with production, inflation, and the constant exchange rate, exports are expected to reach approximately Rp 74.64 million annually.

To summarize, the long-term equation offers a comprehensive view of how these variables interact over an extended timeframe. In this context, Production appears to influence exports long-term negatively. Inflation demonstrates a substantial and positive long-term effect on exports. The exchange rate also displays a significant and positive long-term relationship with exports

Model Stability Test



The CUSUM test results with the Export variable as the dependent variable. The CUSUM test is crucial for assessing the stability of the model. The outcomes of the CUSUM Test, as depicted in Figure, provide valuable insights into the stability of the model. Notably, the blue line does not intersect or touch the red boundary line, which is a positive sign. This observation leads us to conclude that the ARDL model under examination is stable and successfully passes the CUSUM test. All the variables considered in the analysis have been verified for stability. This means that the quantity plot, represented by W_r , remains below the boundary line at the 5% significance level, affirming the model's structural integrity.

In essence, the ARDL model is a valuable framework for comprehending the complexities of these interactions, contributing to our insights into the broader dynamics of the cocoa export market in Indonesia.

CONCLUSION

Inflation showed a positive relationship with cocoa export value, although not statistically significant, over the same time frames. Most notably, fluctuations in the exchange rate positively and significantly influenced cocoa export value in the short and long term.

When considering the combined inflation fluctuations and exchange rate, they were found to exert a significant collective influence on cocoa export value in the short and long term. This collective impact underscores the complex interplay of these variables in shaping Indonesia's cocoa export market, providing valuable insights for policymakers and industry stakeholders.

Recommendations

To enhance Indonesia's cocoa exports, it is crucial to focus on expanding and maintaining export markets, improving product quality, diversifying cocoa products, conducting research and innovation, promoting Indonesian cocoa in international markets, and ensuring environmental sustainability. When dealing with inflation's impact on cocoa exports, strategies such as inflation control, market diversification, long-term contracts, currency risk management, production efficiency enhancement, product quality improvement, market research, and industry partnerships are advisable. Regarding the effects of exchange rate fluctuations on cocoa exports, diversification of markets, foreign exchange hedging, emphasis on product quality and value addition, international promotion, cost management, government support, and negotiation skills training are suggested. These recommendations collectively aim to facilitate Indonesia's cocoa export industry's growth and resilience.

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