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ANALYSIS OF FACTORS AFFECTING THE VALUE OF EXPORT OF INDONESIAN COCOA BEANS IN 1996-2015

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ABSTRACT

The purpose of this research is to analyze the export value of Indonesian cocoa beans, using Ordinary Least Square (OLS). The dependent variable used in this research is the export value of Indonesian cocoa beans, while the independent variables are international price of cocoa beans, exchange rate rupiah to US$, domestic production of Indonesian cocoa beans and the Gross Domestic Product (GDP) using time series data from 1996-2015 (20 years). The result shows that the international price variable of cocoa beans has a positive and significant effect on the export value of Indonesian cocoa beans. The rupiah exchange rate against US $ has a negative and significant effect on the export value of Indonesian cocoa beans. Domestic production of Indonesian cocoa beans has a positive and significant effect on the export value of Indonesian cocoa beans. Gross Domestic Product (GDP) of the world has a positive and significant effect on the export value of Indonesian cocoa beans in 1996-2015.

Keywords: *export value, international prices, exchange rate, domestic product, GDP, cocoa beans, OLS*

ABSTRAK

Tujuan penelitian ini adalah melakukan analisis nilai ekspor biji kakao Indonesia, menggunakan metode *Ordinary Least Square (OLS)*. Variabel dependen dalam penelitian ini adalah nilai ekspor biji kakao Indonesia, variabel independennyaadalah harga internasional biji kakao, kurs rupiah terhadap US$, produksi domestik biji kakao Indonesia dan *Gross Domestic Product* (GDP) dunia dengan data time series 1996-2015. Hasil analisis menunjukkan bahwa variabel harga internasional biji kakao berpengaruh positif dan signifikan terhadap nilai ekspor biji kakao Indonesia. Kurs rupiah terhadap US$ berpengaruh negatif dan signifikan terhadap nilai ekspor biji kakao Indonesia. Produksi domestik biji kakao Indonesia berpengaruh positif dan signifikan terhadap nilai ekspor biji kakao Indonesia. *Gross Domestic Product* (GDP) dunia berpengaruh positif dan signifikan terhadap nilai ekspor biji kakao Indonesia tahun 1996-2015.

Kata kunci: *nilai ekspor, harga internasional, kurs, produksi domestik, GDP dunia, biji kakao, OLS*

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INTRODUCTION

Indonesia is ranked third in the world as the world's largest cocoa producer after Ivory Coast and Ghana in 2015 and received recognition and has officially joined the international cocoa organization or ICCO (International Cocoa Council Organization). Indonesian cocoa beans are a mainstay of Indonesia's export commodities because Indonesian cocoa has advantages, namely the taste of high cocoa beans from Indonesia and Indonesian cocoa beans are not easy to melt, so it is suitable when used for blending or mixed ingredients (Farida Milias Tuty, 2009). The area of Indonesian cocoa plantations is 1.4 million hectares with a production of approximately 500 thousand tons per year, placing Indonesia as the world's third largest producer country after Evory Coast (Ivory Coast) and Ghana. Ivory Coast, with an area of 1.6 hectares and production of 1.3 million tons per year and Ghana at 900 thousand tons per year. The volume of cocoa beans fluctuated in recent years. The main destination countries for cocoa exports from Indonesia were Malaysia, Singapore, America, China and Brazil which controlled 93.1%. The volume of commodity exports of cocoa beans in recent years has fluctuated, presented in table 1.

Table 1. The volume of Indonesian Cocoa Beans Export by Country of Destination Year 2011-2015 (Tons)

The Years	2011	2012	2013	2014	2015
Tiongkok	8.764,20	6.962,10	8.670,20	480,00	683,30
Thailand	6.037,00	8.049,40	7.713,40	4.978,50	1.378,10
Singapura	34.839,40	40.879,40	33.146,90	10.617,10	5.850,00
Malaysia	143.296,00	102.350,0	134.774,0	43.733,00	33.735,s0
Amerika Serikat	9.841,00	143,30	7.208,70	218,90	1.823,10
Kanada	5.500,00	25,50	118,20	120,80	36,10
India	4.848,00	5.131,00	5.700,00	7.820,10	55,00
Belanda	776,00	510,60	187,50	237,50	608,70
Jerman	293,80	369,80	490,50	600,70	2.103,30
Others	543,90	7.565,10	3.494,90	7.819,30	9.026,00
Total	214.739,30	171.986,0	201.504,0	76.625,90	55.299,0

Source: Central Statistics Agency, 2017

Cocoa beans and processed cocoa products are internationally traded commodities. Indonesia is an important exporting country in the trade of cocoa beans. On average, the broad growth of

cocoa plantations in Indonesia in 2000-2009 was 8 percent. Cocoa bean exports have good competitiveness but have tended to decline since 2011 because in 2010 the government established Export Tax (BK) to farmers and exporters by 20.5% with a legal basis: *PMK* No. 67 of 2010 Jo *PMK* No. 75 of 2012. The regulation was made to reduce the export of cocoa beans so that the supply of domestic cocoa beans can be met. Empowerment of cocoa processing in Indonesia in the last few years has increased so that the regulations stipulating BK rules are implemented until now. As a result, the number of Indonesian cocoa bean exports has declined quite dramatically since 2010.

RESEARCH METHODS

This research concerns the export value of Indonesian cocoa beans along with the factors that influence them. The data used is serial data time for 20 years starting from 1996-2015. A clearer definition of these variables is presented in table 2.

Table 2. Operational definitions of variables

Variable	Unit	Description
the price of international cocoa beans	US$/Ton	price indicators set by the International Cocoa Council Organization as a reference for cocoa prices for international market producers and consumers.
Rupiah exchange rate against US$	US$	Rupiah currency exchange rate against US $ currency
production of domestic cocoa beans	Ton	The amount produced by the commodity of cocoa beans originating from Indonesia
World GDP	US$ million	value of the total production of goods and services of a country which is expressed as the total income of the country concerned, taken GDP of the entire country
the export value of Indonesian cocoa beans	US$ million	in value from the export of Indonesian cocoa beans

The analysis technique used is multiple regression analysis with the least squares method, Ordinary Least Square (OLS). The data used were analyzed quantitatively using statistical analysis namely multiple linear equations. The equation model used is as follows:

$$Y = \beta0 + \beta1\ hrg + \beta2\ exchange\ rate + \beta3\ prod + \beta4\ gdp + \mu$$

where: Y = export value of Indonesian cocoa beans

β0 = Intercept / constant

β1, β2, β3, β4 = Regression Coefficient

hrg = International price of cocoa beans

exchange rate = exchange rate of Rupiah against US $

prod = Production of domestic Indonesian cocoa beans

gdp = World Gross Domestic Product (GDP)

μ = Term of Error

1. Test of Classical Assumptions

There are several assumptions that must be fulfilled, in principle, the linear regression model that is built should not deviate from the BLUE assumption (Best, Linear, Unbiased, and Estimator) in another sense the model must pass the deviation from the assumption of serial autocorrelation, normality, heteroscedasticity, and multicollinearity. The occurrence of deviations from the classic assumptions mentioned above will cause the statistical tests (t-stat test and f-stat) to be made invalid and statistically will confuse the conclusions obtained.

a) Normality Test

Normality detection aims to test whether, in the regression model, the data used has a normal distribution or not. Good data is those that have a normal or near normal distribution. As it is known that the F test and t-test assume that the residual value follows a normal distribution. To detect this, the Jarque-Berra test is used, the test uses a probability distribution. Where if the probability is greater than alpha 5% then the normality test is accepted. Another justification for this Detection is to compare the value of J-B calculated with $\chi 2$ tables, if J-B counts $<\chi 2$ tables then Ut residuals are normally distributed. (Gujarati, 1995).

b) Multicollinearity Test

Multicollinearity test aims to test whether the regression model is found to have a correlation between

independent variables. A good regression model should not have a correlation between independent variables. If the independent variables correlate with each other, then these variables are not orthogonal. Orthogonal variables are independent variables whose correlation value between independent variables is zero.

In this study, to detect the presence or absence of multicollinearity in the regression model can be seen from the value of Tolerance and its opponent Variance Inflation Factor (VIF). The basis of the analysis is:

1) If the tolerance value is> 0.10 or the same as the VIF value <10, it can be concluded that there is no multicollinearity between the independent variables in the regression model.

2) If the tolerance value is <0.10 or equal to VIF value> 10, it can be concluded that there is multicollinearity between independent variables in the regression model.

c) Autocorrelation Test

Autocorrelation is used to test a model whether between confounding variables each independent variable influences each other. Prob value. F count is greater than the alpha level of 0.05% so that based on the hypothesis test, H0 is accepted which means there is no autocorrelation. Vice versa. In this study using the Breusch-Godfrey method or Lagrange multiplier (LM).

d) Heteroscedasticity Test

Detection of heteroscedasticity aims to test whether in the regression model there is an inequality of variance from the residual one observation to another observation. A good regression model is that homoskedasticity or heteroscedasticity does not occur. There are test methods, such as Breusch-Pagan-Godfrey, Harvey, Glejser, ARCH, White and others. In this study using the Glejser Test.

The presence or absence of Heteroscedasticity is done by looking at the value of the Prob. F-statistic (F count). If the value of the Prob. F-statistic (F count) is large than alpha level 0.05 (5%) then H0 is accepted which means there is no heteroscedasticity. Vice versa.

2. Test Statistics

Furthermore, to test the level of significance or closeness of the relationship of independent variables to the dependent variable, various statistical tests were used including:

a) Test Statistics t

The t-test is carried out to ascertain how far the influence of one independent variable individually in explaining the dependent variable (Ghozali, 2009). The testing steps are as follows:

1) Hypothesis
   Ho: β1 = 0, meaning that the independent variables individually do not have a significant effect on the dependent variable.
   Ha: β1 ≠ 0, meaning that the independent variables individually affect the dependent variable.
2) Determining the level of significance
   The level of significance of this study uses 0.05 (= 5%)
3) Calculation of t-test
   Value of t count: search based on a calculation of results
   The value of t table: sought at t table at 0.05 significance
   Df = n-k 1 (n: number of samples; k: number of variables)
4) Conclusion
   t count <t table, then Ho is accepted
   t count> t table, then Ho is rejected.

b) R^2 statistical test (coefficient of determination)

The coefficient of determination is used to see how much the independent variables are able to provide an explanation of the dependent variable where the value of R^2 ranges from 0 to 1 ($0 \leq R^2 \leq 1$). The greater the value of R^2, the greater the variation of the dependent variable can be explained by the independent variable.

Conversely, the smaller the value of $R2$, the smaller the variation in the dependent variable can be explained by variations in the independent variables. The nature of the coefficient of determination is:

1) R^2 is a non-negative quantity.
2) the top is ($0 \leq R^2 \leq 1$). (Gujarati, 1995)

If R^2 is 0, it means there is no relationship between the independent variables and the dependent variable. The greater the value of R^2, the more precise the regression line in describing the values of observation.

c) Simultaneous significance test (Test F)

The F test is used to determine whether all the independent variables used in the study have the same effect on the independent variables (Ghozali, 2009). Testing is done by comparing the value of F count with F table. If F count is greater than F table, the result is significant, whereas if F count is smaller than F table, the result is not significant. The testing steps are as follows:

1) Determine the null hypothesis and alternative hypothesis
   Ho: β1 = β2 = β3 = β4 = β5 = 0
   This means that the independent variables simultaneously have no effect on the dependent variable.
   Ho: β1 ≠ β2 ≠ β3 ≠ β4 ≠ β5 ≠ 0
   This means that the independent variables simultaneously influence the dependent variable.
2) Determining the level of significance
   The level of significance in this study used 0.05 (= 5%)
3) Calculation of F test
   Calculated F value: search based on a calculation of results
   F table value: searched at F table at 0.05 significance
   df1 = k-1; df2 = n-k (k: number of variables; n: number of samples)
4) Conclusion
   F count <F table, then Ho is accepted
   F count> F table, then Ho is rejected

PREVIOUS RESEARCH

In this study, there are also several previous studies that took the theme of the export of a commodity that is useful for the authors in compiling this study. Some of these studies are:

1. Milias (2009), a thesis entitled "Analysis of Central Sulawesi Cocoa Beans Export Demand by Malaysia." The method in this study is the Error Correction Model (ECM) method. The dependent variable is the export of cocoa beans, while the independent variables are the price of cocoa beans at the exporter level, price volatility, Malaysian inflation, Rupiah / US $ exchange rate, Malaysian economic growth. The results of this study are:

a. Long and short term, the price of cocoa beans at the exporter level has a significant and positive effect
b. Long and short term, price volatility has a significant but negative effect.
c. Malaysia's long-term inflation is not significant but negative. Short term significant but negative effect.
d. Long-term and short-term exchange rates are not significant but positive
e. Long-term and short-term Malaysian economic growth is not significant but positive.

2. Archibald Damar Pambudi (2011), a thesis entitled "Analysis of Factors Affecting Indonesian Cocoa Beans Export to Malaysia and Singapore". The method used is Ordinary Least Square (OLS). The dependent variable used is the volume of demand for Indonesian cocoa beans by Malaysia and Singapore. While the independent variables are the price of Indonesian cocoa beans to Malaysia and Singapore, the exchange rate of Rupiah against US $, Gross Domestic Product of Malaysia and Singapore and the price of cocoa beans from competing countries (Ghana). From the results of the research can be obtained:
   a. Significant factors in the demand for Indonesian cocoa beans to Malaysia are the price of Indonesian cocoa beans, Malaysian GDP, and prices of competing for cocoa beans (Ghana).
   b. A significant factor for the demand for Indonesian cocoa beans to Singapore is the price of Indonesian cocoa beans and the price of cocoa beans from competing countries (Ghana).
   c. The price of Indonesian cocoa beans and the price of cocoa beans from competing countries (Ghana) has a significant effect on the demand for Indonesian cocoa beans to the two countries.
3. Puspita, Ratna (2015) in his research journal entitled "The Effect of Domestic Cocoa Production, International Cocoa Prices, and Exchange Rates on Indonesian Cocoa Exports to the United States for the 2010-2013 Period". The method used in this study is Ordinary Least Square (OLS). The dependent variable is Indonesian cocoa exports to the

United States, while the independent variables are domestic cocoa production, international cocoa prices, and exchange rates. From the results of the research can be obtained:

a. There is significant influence between domestic cocoa production, international cocoa prices, and the exchange rate of Rupiah against US Dollar against Indonesian cocoa exports to the United States from the results of simultaneous hypothesis testing.
b. The results of the t-test show that each of the independent variables has a positive relationship with significant and insignificant influence.

RESULTS AND DISCUSSION

The multiple linear regression results in the equation model that connects the price of international cocoa beans, the exchange rate of the Rupiah to US $, the domestic production of Indonesian cocoa beans and the Gross Domestic Product (GDP) of the export value of Indonesian cocoa beans.

Tabel 3 Hasil Analisis Regresi OLS

Variabel	Notasi	Koefisien	Std. Error	t-Statistik	Prob
Harga Internasional Biji Kakao	HRG	0.379704	0.057371	6.618382	0.0000
Kurs Rupiah Terhadap US$	KURS	-0.041068	0.015463	-2.655830	0.0180
Produksi Domestik Biji Kakao Indonesia	PROD	0.001010	0.000281	3.595922	0.0026
Gross Domestic Product (GDP) Dunia	GDP	1.12E-05	2.45E-06	4.586068	0.0004
Konstanta	C	-873.3956	125.4239	-6.963552	0.0000
R-Squared		0.957253	**F Stat**		83.97477
Adjusted R-Squared		0.945853	**Prob. F statistik**		0.000000

Based on table 3, the multiple linear regression equation can be written as follows:

VALUE = 0.379 HRG - 0.041 EXCHANGE + 0.001 PROD + 1.12 GDP - 873.3956

After estimating the results in table 4.6, classic assumption and statistical tests will be tested. The classic assumption test is carried out before statistical tests to avoid linearity problems, multicollinearity problems,

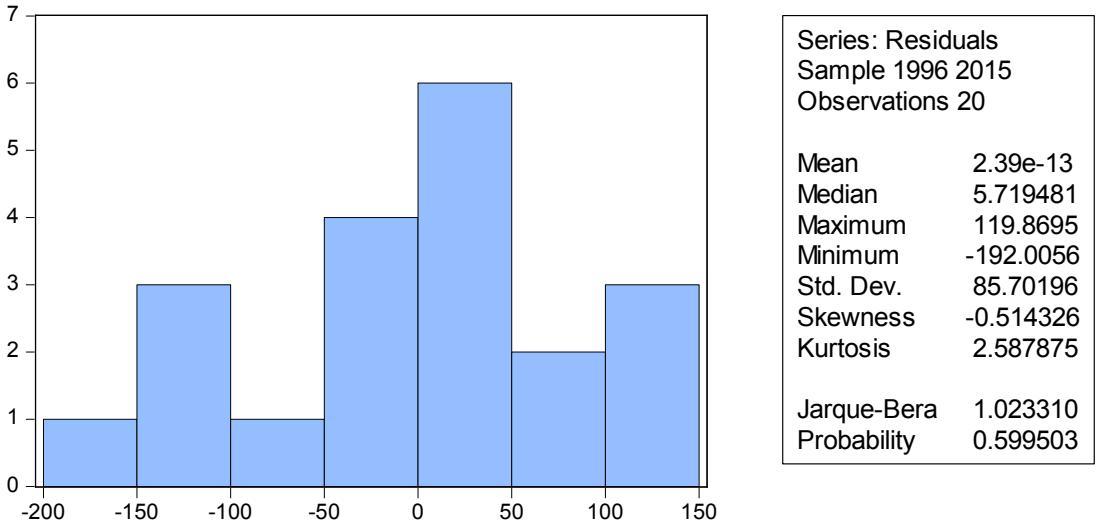
heteroscedasticity problems, and autocorrelation problems. Statistical tests which include t-test, F test, and coefficient of determination, are conducted to determine the effect of independent variables on the dependent variable. The results of the classic assumption test and statistical tests in this study are as follows:

1. Test of Classical Assumptions

a. Normality test

The normality test is used to find out whether the study sample comes from a population that is normally distributed or not. To find out the distribution of data, in this study using the Jarque-Bera test method. The results of the normality test using the JB test method can be seen in the following picture:

Figure 1. Normal Test Results for JB Test



Source: Data Results of Eviews 9

Based on Figure 1, the JB probability value is 0.599503. So, it can be concluded that the data has a normal distribution, because the probability value of JB> α (5%), which is 0.599503> 0.05.

b. Multicollinearity Test

A good regression model should not have a correlation between independent variables. In this study, to detect the presence or absence of multicollinearity in the regression model is by testing carried out based on the Variance Inflation Factor (VIF) criteria where if the VIF value is greater than 10, the

explanatory variable indicates the presence of multicollinearity. Independent variables are said to be closely related to other independent variables if they have a VIF value of more than 10. The results of VIF testing can be seen in the following table:

Table 4. Multicollinearity Test Results for VIF Testing

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
HRG	0.003291	35.58510	2.358210
EXCHANGE	0.000239	36.19794	6.431709
PROD	7.89E-08	72.86255	4.325117
GDP	6.00E-12	38.43214	3.936919
C	15731.15	33.81789	NA

Source: Data Results of Eviews 9

From table 4, it can be seen that there is no multicollinearity between independent variables in the regression. This is evidenced by the Centered VIF value on all variables less than 10. Where is the VIF of the international price variable of 2.358210, VIF of the exchange rate variable Rupiah against US $ is 6.431709, VIF of the Indonesian cocoa bean domestic production variable is 4,325117, and VIF of the variable world GDP of 3,936919

c. Heteroscedasticity test

Heteroscedasticity occurs when residuals and predictive values have correlations or relationship patterns. This pattern of relationships is not only limited to linear relationships but in different patterns, it is also possible. Therefore there are several heteroscedasticity test methods possessed by E Views, such as Breusch-Pagan-Godfrey, Harvey, Glejser, ARCH, White and others. In this study using the Glejser test.

Where the occurrence or absence of heteroscedasticity in the linear regression model is to look at the Prob Value. F-statistic (F count). If the value of the Prob. F count is greater than alpha level 0.05 (5%) then H0 is accepted which means there is no

heteroscedasticity, whereas if the value of Prob. F count is smaller than alpha level 0.05 (5%) then H0 is rejected which means there is heteroscedasticity.

The results of the Glejser heteroscedasticity test can be seen in the table as follows:

Table 5. Glejser Test Heteroscedasticity Test Results

F-statistic	0.499065	Prob. F(4,15)	0.7369
Obs*R-squared	2.349057	Prob. Chi-Square(4)	0.6719
Scaled explained SS	1.857335	Prob. Chi-Square(4)	0.7620

Source: Data Results of Eviews 9

Based on table 5, the results of the Glejser Prob Value. F count is 0.7369 greater than the alpha level of 0.05 (5%) so that, based on hypothesis testing, H0 is accepted which means there is no heteroscedasticity.

d. Autocorrelation Test

One good model criterion is that no autocorrelation in the regression equation model is used. In this study, the symptoms of autocorrelation in the equation model will be tested using the Breusch-Godfrey LM test method. The results of testing the autocorrelation of the Breusch-Godfrey LM test method are as follows:

Table 6. Breusch-Godfrey LM Test Test Results

F-statistic	0.124636	Prob. F(2,13)	0.8839
Obs*R-squared	0.376281	Prob. Chi-Square(2)	0.8285

Source: Data Eviews 9

The results of the autocorrelation test of the Breusch-Godfrey LM test method produce a probability value of Obs * R-squared of 0.376281. Because the probability value of Obs * R-squared> α, which is 0.376281> 0.05, it can be concluded that there is no autocorrelation.

2. Test Statistics

a. T-test

The t-test is carried out to find out whether the independent

variables individually influence the dependent variable as follows:

1. HRG (International Price of Cocoa Beans)

   The HRG variable coefficient value is 0.3797 and the probability value is 0.0000. That is, the HRG variable has a positive effect on the dependent variable of export value (because βn ≠ 0) and is significant at the 5% significance level (0.0000 <0.05).

2. KURS (Rupiah Exchange Rate Against US $)

   The coefficient value of the EXCHANGE RATE variable is -0.0410 and the probability value is 0.0180. That is, the EXCHANGE RATE variable has a negative effect on the dependent variable of export value (because βn ≠ 0) and is significant at the 5% significance level (0.0180 <0.05).

3. Prod (Domestic Production of Indonesian Cocoa Beans)

   The coefficient of the Prod variable is 0.0010 with a probability value of 0.0026. That is, the PROD variable has a positive effect on the dependent variable of export value (because βn ≠ 0) and is significant at the 5% significance level (0.0026 <0.05).

4. World GDP (Gross Domestic Product)

   The value of the GDP variable coefficient is 1.12 with a probability value of 0.0004. That is, the GDP variable has a positive effect on the dependent variable of export value (because βn ≠ 0) and is significant at the significance level of 5% (0.0004 <0.05).

b. Test F

The F test is performed to determine the effect of all independent variables together on the dependent variable. From the regression results in table 4.6, the amount of F calculated is 83.97477. The regression model uses 20 years of observation (n = 20) and 5 variables (k = 5), then the F table is 3.06. The calculated F value is greater than F table, which is 83.97477> 3.06, so it can be concluded that the independent variables together have a significant effect on the dependent variable.

c. Determinant Coefficient (R2)

To determine the percentage variation in dependent changes that can be explained by independent variables, this study uses adjusted R2.

From table 3, it can be seen that the adjusted R2 value of the estimated equation model is 0.945853, meaning that variations in changes in the export value of Indonesian cocoa beans can be explained by the international price of cocoa beans, the exchange rate of Rupiah against US $, domestic production of Indonesian cocoa beans and world GDP amounting to 94.5853%. Whereas the other 5.4147% is explained by other independent variables outside the equation model.

CONCLUSION

This study aims to determine whether there is an effect of the international price of cocoa beans, the exchange rate of the Rupiah against US $, the domestic production of Indonesian cocoa beans and the Gross Domestic Product (GDP) as an independent variable on the export value of Indonesian cocoa beans as the dependent variable in the 1996 analysis period until 2015 several conclusions were obtained, namely:

1. The international price of cocoa beans has a positive and significant effect on the export value of Indonesian cocoa beans in 1996 - 2015. This result is consistent with the initial hypothesis which states that the variable international price of cocoa beans has a positive influence on the export value of Indonesian cocoa beans. This is in accordance with the theory that if international prices rise, the value of exports will also rise. From this theory, it can be concluded that if the international price of cocoa beans increases, it will affect the value of Indonesian cocoa beans exports which also increase.
2. The exchange rate of the Rupiah against the US $ has a negative and significant effect on the export value of Indonesian cocoa beans in 1996-2015. This result is in accordance with the initial hypothesis A for the value of Indonesian cocoa bean exports. This is in accordance with the theory if the exchange rate rises, the export value falls. From the theory, it can be concluded that if the exchange rate of Rupiah against US $ appreciates it will affect the value of Indonesian cocoa bean exports to decline in response to international market demand for cocoa bean consumption.
3. The domestic production of Indonesian cocoa beans has a positive and significant influence on the export value of Indonesian cocoa beans in

1996-2015. This result is in accordance with the initial hypothesis which states that the variable production of Indonesian cocoa beans has a positive influence on the export value of Indonesian cocoa beans. This is in accordance with the theory if domestic production rises then the value of exports will also rise. From this theory, it can be concluded that if the domestic production of Indonesian cocoa beans increases, it will affect the value of Indonesian cocoa beans exports which also increase.

4. The World Gross Domestic Product (GDP) has a positive and significant effect on the export value of Indonesian cocoa beans in 1996 - 2015. This result is consistent with the initial hypothesis which states that the Gross Domestic Product (GDP) variable of the world has a positive influence on the export value of Indonesian cocoa beans. This is in accordance with the theory if the Gross Domestic Product (GDP) rises to the value of exports will also increase. From the theory, it can be concluded that if the Gross Domestic Product (GDP) of the world increases, it will affect the export value of Indonesian cocoa beans which also increases.

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