

# Macroeconomic Shocks to Non-Oil and Gas Exports to ASEAN Countries Amid Global Uncertainty

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## ABSTRACT

Global uncertainty has an impact on various aspects, one of which is the economy. Global uncertainties caused by various factors also affect international trade, especially exports. The purpose of this research is to see how the impact of macroeconomic shocks and global uncertainty on non-oil and gas commodities sent abroad from Indonesia to ASEAN countries. This study uses time series data from 2014 to 2019 in monthly form. Cointegration test and Vector estimation test The Error Correction Model (VECM) is an analytical tool in research. The variables used in this research are inflation, rupiah exchange rate, global oil price, and global uncertainty index. The results of this study found that in a short and long period of time each variable had a different effect on the quantity of non-oil and gas exports to each export destination country in ASEAN.

**Keywords:** Non- Oil and Gas Exports , Macroeconomics, VECM, Global Uncertainty

## 1. INTRODUCTION

The development of Indonesia's non-oil and gas exports tends to fluctuate. The intensity of the fluctuation is also quite high. The high fluctuation of non-oil exports from Indonesia can be observed in Figure 1. Although Indonesia's non-oil and gas exports fluctuate quite high, these exports were able to sustain the strength of Indonesia's exports. In the third quarter of 2019, non-oil and gas processing contributed 19.62 percent to gross domestic income. This makes this sector as the largest sector compared to other sectors, especially agriculture, forestry, and fisheries by 13.45 percent, trade by 13.45 percent and construction by 10.60 percent (Putra, 2020).

The strength of exports is clearly influenced by external fluctuations. Such as oil price shocks, exchange rate volatility, and even inflation. However, what is allegedly very influential on the strength of the export is global uncertainty. At the end of 2019, the quantity of

non-oil and gas exports was disrupted by global uncertainty. The non-oil and gas sector, which is the mainstay of Indonesia's exports, at the end of September fell 1.03 percent from the previous month's 13.4 billion dollars. Global economic uncertainty can be caused by various things, for example the occurrence of trade wars, political turmoil and other conditions that have a domino effect on the economic conditions of other countries.

In accumulation from January to September the total amount of Indonesian exports decreased by eight percent compared to the previous year (Prasetyo, 2019). On a quarterly basis, Precisely in quarter three in 2019 the export-oriented industries grew worth of 4.15 percent. This growth was higher than the second quarter which was only 3.45 percent. However, the growth of the non-oil and gas industry in the third quarter was also lower than the previous year which reached 4.35 percent (Kementerian Perindustrian Republik Indonesia, 2019).

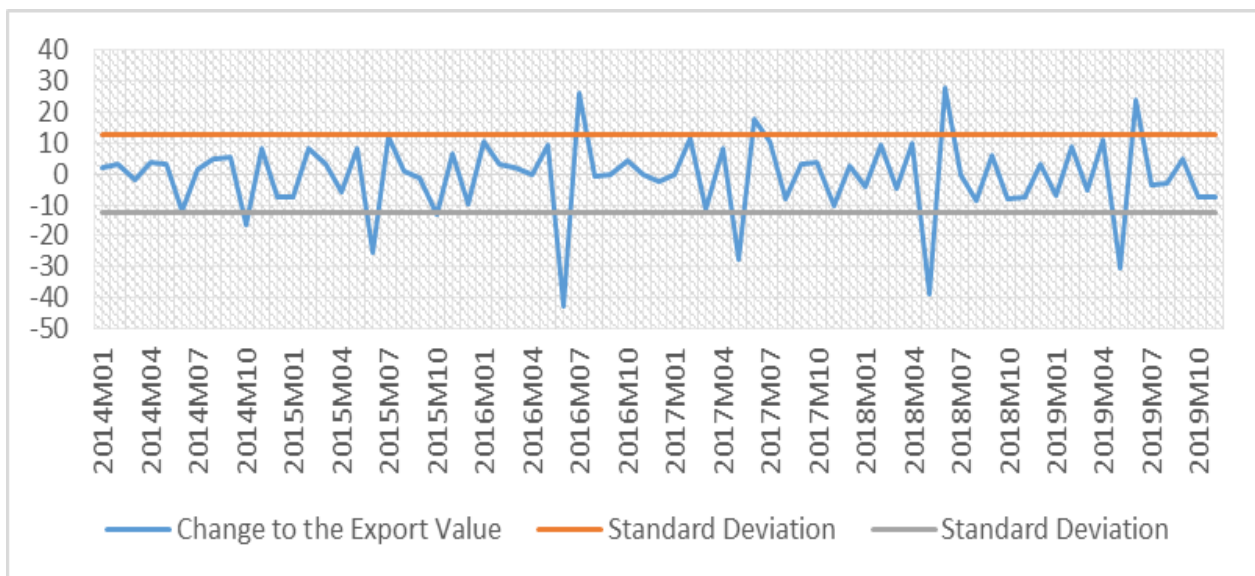
Previously (Sugiharti, Esquivias, & Setyorani, 2020), had conducted research related to the impact of exchange rate volatility on the five main export commodities from Indonesia. The results are known that each country which is the destination for the export of these five commodities is different in each country. The results show that in the aggregate there is a positive impact of exchange rate volatility on the quantity of exports sent to China, India, and Korea.

Meanwhile, exchange rate volatility had a negative impact on commodity exports to Japan and America. On the other hand, relevant research is also carried out (Alhakim & Ghuziny, 2016). This research analysis of the effect of the

price of oil globally on exports of the country's eight largest exporter in the world. The results showed that the oil price is positive affect on exports.

This is because the price of oil is a production input. Linear research was also conducted by (Mutia, 2015). In this study examined how the exchange rate, economic growth, and inflation in the export Indonesia to ASEAN countries.

The research findings show that the movement of the exchange rate or exchange rate and the economic growth of the destination countries have a good effect on Indonesia's exports to ASEAN countries.



**Figure 1.** The Movement of Indonesian Non-Oil and Gas Shipments Abroad to ASEAN (in percent)

**2. METHOD**

Quantitative descriptive is a type of research. Data in the form of secondary-based time series is the material for analysis in this study. The data used are monthly from January 2014 to November 2019. The data used are sourced from trusted website publications, such as from Bank Indonesia, the Central Bureau of Statistics, and websites on economic policy uncertainty.

In this study the data used are non-oil and gas export value data by destination countries in ASEAN, exchange rates, inflation, world oil prices, and global uncertainty indexes. Before estimating the model, several tests were carried out, namely the stationarity test, the optimal lag determination test, and the cointegration test. After that, an estimation is made on the research model.

**Table 1.** Variables Used

Variable	Variable definition	Source
Non Oil and Gas Export Value	The export value used is the percentage difference in value changes from non-oil and gas exports to the destination country for a commodity on a monthly basis.	(Bank Indonesia, 2020)
Exchange rate	Exchange rate is the percentage difference in exchange rates each month. The exchange rate used is the effective exchange rate adjusted for other indexes, such as the consumer price index.	(Bank Indonesia, 2020)
Inflation	The benchmark for the value of inflation used is the Wholesale Price Index, which measures transactions in a larger scope such as monthly export transactions from countries.	(Bank Indonesia, 2020)
World Oil Prices	In this case, the percentage of the difference in global oil prices is used on a monthly basis	(Investing.com, 2019)
Global uncertainty index	The global uncertainty index is an index measured by the accumulated uncertainty of influential countries in the world.	(Economic Policy Uncertainty Index, 2020)

Furthermore, to determine the optimal lag used in the study, an estimate was carried out. Estimation is done by testing the lag length criteria. To see how the relationship between variables in long-term research is carried out the Johansen cointegration test. To see how the influence of these variables were analyzed, then performed a VAR/VECM analysis. The model in this study is as follows.

$$\Delta BRN_t = \beta_0 + \sum_{i=0}^n \beta_{2i} \Delta PCO_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta IHPB_{t-i} + \sum_{i=0}^n \beta_{4i} \Delta ER_{t-i} + \sum_{i=0}^n \beta_{5i} \Delta UIP_{t-i} + \beta_{6i} ECT_{t-i} + \varepsilon_t \quad (1)$$

$$\Delta KMI_t = \beta_0 + \sum_{i=0}^n \beta_{2i} \Delta PCO_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta IHPB_{t-i} + \sum_{i=0}^n \beta_{4i} \Delta ER_{t-i} + \sum_{i=0}^n \beta_{5i} \Delta UIP_{t-i} + \beta_{6i} ECT_{t-i} + \varepsilon_t \quad (2)$$

$$\Delta LAQ_t = \beta_0 + \sum_{i=0}^n \beta_{2i} \Delta PCO_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta IHPB_{t-i} + \sum_{i=0}^n \beta_{4i} \Delta ER_{t-i} + \sum_{i=0}^n \beta_{5i} \Delta UIP_{t-i} + \beta_{6i} ECT_{t-i} + \varepsilon_t \quad (3)$$

$$\Delta LV_t = \beta_0 + \sum_{i=0}^n \beta_{2i} \Delta PCO_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta IHPB_{t-i} + \sum_{i=0}^n \beta_{4i} \Delta ER_{t-i} + \sum_{i=0}^n \beta_{5i} \Delta UIP_{t-i} + \beta_{6i} ECT_{t-i} + \varepsilon_t \quad (4)$$

$$\Delta MYR_t = \beta_0 + \sum_{i=0}^n \beta_{2i} \Delta PCO_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta IHPB_{t-i} + \sum_{i=0}^n \beta_{4i} \Delta ER_{t-i} + \sum_{i=0}^n \beta_{5i} \Delta UIP_{t-i} + \beta_{6i} ECT_{t-i} + \varepsilon_t \quad (5)$$

$$\Delta PHL_t = \beta_0 + \sum_{i=0}^n \beta_{2i} \Delta PCO_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta IHPB_{t-i} + \sum_{i=0}^n \beta_{4i} \Delta ER_{t-i} + \sum_{i=0}^n \beta_{5i} \Delta UIP_{t-i} + \beta_{6i} ECT_{t-i} + \varepsilon_t \quad (6)$$

$$\Delta SNG_t = \beta_0 + \sum_{i=0}^n \beta_{2i} \Delta PCO_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta IHPB_{t-i} + \sum_{i=0}^n \beta_{4i} \Delta ER_{t-i} + \sum_{i=0}^n \beta_{5i} \Delta UIP_{t-i} + \beta_{6i} ECT_{t-i} + \varepsilon_t \quad (7)$$

$$\Delta THL_t = \beta_0 + \sum_{i=0}^n \beta_{2i} \Delta PCO_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta IHPB_{t-i} + \sum_{i=0}^n \beta_{4i} \Delta ER_{t-i} + \sum_{i=0}^n \beta_{5i} \Delta UIP_{t-i} + \beta_{6i} ECT_{t-i} + \varepsilon_t \quad (8)$$

$$\Delta VTM_t = \beta_0 + \sum_{i=0}^n \beta_{2i} \Delta PCO_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta IHPB_{t-i} + \sum_{i=0}^n \beta_{4i} \Delta ER_{t-i} + \sum_{i=0}^n \beta_{5i} \Delta UIP_{t-i} + \beta_{6i} ECT_{t-i} + \varepsilon_t \quad (9)$$

### 3. RESULTS AND DISCUSSION

At first, we conducted a stationarity test. The stationarity test used was the Augmented Dickey Fuller test. The main purpose of the stationarity test is to find out whether the data in the study is stationary or not. If the data in this study are not stationary, then research using these data cannot be continued. If it continues, it will give rise to the possibility of an *incorrect regression* estimate.

In general the problem that is often experienced by this data is the problem of false regression (Albaity et al., 2018). The characteristics of false regression are significant values in the f statistic, t statistic, and the R-square value which is also high but the dw value is less than 0.5. The characteristics of stationary data are if the value of the data variance and the average are constant. All variables in this study passed the stationarity test.

In these tests, if the value of the ADF-test (*Augmented Dickey Fuller*) is higher than then use values critical five percent (*MacKinnon Critical Value*). In addition, the conclusion is stationary or not the data in the study can also be seen from the probability value. If the probability value less than 0.05 then the variable in the condition of stationary and if the probability value is greater than 0.05 then the data is not yet in a state of stationary or contain a unit root.

After the stationary test results showed that the level of the level of all variable in this study except Wholesaler Price Index (PPI), the exchange rate and the value of Global Uncertainty Index is stationary. At the level of difference in the two variables in the study are stationary, it can be seen from all probability values that are already smaller than 0.05. The results of the stationarity test can be observed in table 2.

**Table 2** ADF Test Results

Variable	Prob. Level Difference	Prob. First Difference	Information
Brunei	0.0001	0.00	Stationary
Cambodia	0.0001	0.00	Stationary
Laos	0.0001	0.00	Stationary
Malaysia	0.00	0.00	Stationary
Myanmar	0.0001	0.00	Stationary
Philifina	0.0001	0.00	Stationary
Singapore	0.00	0.00	Stationary
Thailand	0.00	0.00	Stationary
Vietnamese	0.0001	0.00	Stationary
World oil prices	0.00	0.00	Stationary
IHPB	0.7516	0.00	Stationary
Exchange rate	0.0643	0.00	Stationary
Global Uncertainty Index	0.0855	0.0001	Stationary

*Source: Author's processed product*

#### 3.1 Optimal Lag (Lag Length Criteria)

The optimal lag test is carried out after testing the stationarity of the data. The optimal lag test that is commonly used is the lag test using the Akaike Criteria Information (AIC) method. Apart from that, there are many other methods that can be used to perform an optimal lag test. This method is the method of information criteria Schwarz, Hannan Quinnon.

The optimal lag test to see and avoid autocorrelation problems in the research model. Optimal lag testing in research is carried out on each model in the study. In determining the optimal lag that is seen is the smallest value from the test results of each method. If the smallest value is obtained from each test, the lag research model is the research model in the optimal lag condition

From the optimal lag test results, the results are obtained that all models in the study, except the Malaysian model are optimal in the first lag. However, the Malaysian model is a little different because in the Akaike Information Criteria method the model is optimal at lag 6,

on the information criteria of Schwarz and Hannan Quinnon the model is optimal in the first lag. From the results of determining the lag it can be concluded that the optimal lag that can be used is lag 1 for further testing.

**Table 3** Results of Determination of Brunei's Optimum Lag Length Model

Number	LogL	LR	FPE	AIC	SC	HQ
0	-1279,536	NA	1.01e + 11	39,52418	39.69144	39,59018
1	-1076,810	368.0262 *	4.26e + 08 *	34.05568 *	35.05924 *	34.45165 *
2	-1057,456	32,15731	5.13e + 08	34,22941	36.06927	34.95535
3	-1038,860	28.03716	6.48e + 08	34,42645	37.10262	35.48237
4	-1017,969	28,28214	7.87e + 08	34,55290	38.06538	35,93880
5	-997.4578	24.61391	1.01e + 09	34.69101	39,03978	36.40688
6	-965.8874	33.02745	9.97e + 08	34.48884	39.67392	36,53469

*Source: Author's Process*

**Table 4** Results of Determination of the Optimum Lag Length for the Cambodia Model

Number	LogL	LR	FPE	AIC	SC	HQ
0	-1233,034	NA	2.41e + 10	38.09334	38,26060	38.15934
1	-1027,468	373.1811 *	93243206 *	32,53747 *	33.54104 *	32,93344 *
2	-1006,753	34.41802	1.08e + 08	32.66933	34,50920	33,39528
3	-988,9569	26.83147	1.39e + 08	32,89098	35,56715	33,94690
4	-964,5998	32,97582	1.52e + 08	32,91076	36.42323	34.29666
5	-938.8812	30.86231	1.67e + 08	32.88865	37.23743	34.60452
6	-913.4973	26,55544	1,99e + 08	32.87684	38.06192	34.92269

*Source: Author's Process*

**Table 5** Results of the Determination of the Laos Optimum Lag Length Model

Number	LogL	LR	FPE	AIC	SC	HQ
0	-1319,549	NA	3.45e + 11	40,75537	40,92263	40,82136
1	-1117,943	365.9931	1.51e + 09 *	35.32132 *	36.32489 *	35.71729 *
2	-1103,715	23,63950	2.13e + 09	35.65278	37.49265	36.37873
3	-1090,553	19,84442	3.18e + 09	36.01703	38,69320	37.07295
4	-1058,369	43.57231 *	2.73e + 09	35,79598	39.30845	37.18187
5	-1041,389	20,37680	3.92e + 09	36.04273	40,39150	37,75860
6	-1019,281	23,12816	5.15e + 09	36.13172	41,31680	38.17756

*Source: Author's Process*

**Table 6** Results of Determination of Malaysia's Optimum Lag Length Model

Number	LogL	LR	FPE	AIC	SC	HQ
0	-1198,955	NA	8.43e + 09	37.04477	37.21203	37.11077
1	-994.9270	370.38894	34259144 *	31,53621	32,53978 *	31,93218 *
2	-977.2002	29.45374	43447281	31.76001	33,59987	32,48595
3	-962.5840	22.03673	61943142	32.07951	34,75568	33.13543
4	-934.3351	38,24462	60019232	31.97954	35.49201	33.3655
5	-900,4160	40,70291 *	51249282	31,70511	36.05388	33.42098
6	-868,9409	32,92780	50485492	31,50587 *	36,69095	33.55172

*Source: Author's Process*

**Table 7** Results of Determination of Myanmar Optimum Lag Length Model

Number	LogL	LR	FPE	AIC	SC	HQ
0	-1224,001	NA	1.82e + 10	37,81540	37,98266	37,88140
1	-1025,576	360,2176	87969508 *	32,47925 *	33.48281 *	32.87522 *
2	-1011,341	23.65125	1.24e + 08	32,81050	34,65036	33,53644
3	-994.9270	24,74739	1.68e + 08	33.07468	35,75085	34,13060
4	-972,3494	30,56666	1.93e + 08	33.14921	36.66168	34,53511
5	-937.4275	41.90629 *	1,60e + 08	32.84392	37,19270	34.55979
6	-906,8606	31.97763	1.62e + 08	32.67263	37.85771	34,71848

Source: Author's Process

**Table 8** Results of Determination of the Optimum Lag Length for the Philippines Model

Number	LogL	LR	FPE	AIC	SC	HQ
0	-1201,160	NA	9.02e + 09	37.11262	37,27988	37,17861
1	-1000,859	363.6232 *	41119450 *	31.71874 *	32.72231 *	32.11471 *
2	-979.0652	36.21134	46013517	31,81739	33.65726	32.54334
3	-965.7269	20,11010	68232618	32.17621	34.85238	33,23213
4	-945,7253	27.07906	85211261	32,33001	35.84248	33.71591
5	-923,3861	26.80707	1.04e + 08	32.41188	36,76066	34.12775
6	-894.4316	30.29085	1.11e + 08	32,29020	37.47528	34.33605

Source: Author's Process

**Table 9** Results of Determining the Optimum Lag Length of the Singapore Model

Number	LogL	LR	FPE	AIC	SC	HQ
0	-1207,808	NA	1.11e + 10	37,31717	37.48443	37.38316
1	-1004,491	369.0981	45981393 *	31.83050 *	32.83406 *	32.22647 *
2	-855.1653	32.11064	55513686	32.00 509	33,84495	32.73103
3	-971.6697	20,34726	81922789	32.35907	35.03524	33,41499
4	-941.3253	41.08169	74421625	32,19462	35,70710	33,58052
5	-909,7036	37.94600 *	68201947	31,99088	36.33965	33.70675
6	-880,9529	30,07765	73060310	31,87547	37.06055	33.92132

Source: Author's Process

**Table 10** Results of Determination of the Optimum Lag Length in Thailand Model

Number	LogL	LR	FPE	AIC	SC	HQ
0	-1207,465	NA	1.10e + 10	37.30662	37.47388	37.37261
1	-994.2345	387,0955	33536875 *	31,51491 *	32,51847 *	31,91088 *
2	-975,9669	30,35216	41829540	31.72206	33.56193	32.44801
3	-961.8377	21.30256	60536985	32.05654	34,73271	33.11246
4	-942.2486	26,52061	76566324	32.22303	35.73551	33.60893
5	-896.3458	55.08341 *	45216556	31.57987	35,92864	33.29574
6	-872.2017	25,25840	55813630	31.60621	36.79128	33.65205

Source: Author's Process

**Table 11** Results of Determination of the Optimum Lag Length for the Vietnam Model

Number	LogL	LR	FPE	AIC	SC	HQ
0	-1217,557	NA	1.49e + 10	37,61714	37,78440	37.68313
1	-1018,330	361.6730 *	70390445 *	32,25632 *	33.25988 *	32.65229 *
2	-1000,557	29.53074	89141623	32,47868	34.31855	33.20463
3	-985.0308	23.40906	1.24e + 08	32,77018	35,44635	33.82610
4	-963.9656	28.51907	1.49e + 08	32.89125	36.40372	34.27714
5	-932.8364	37,355	1.39e + 08	32.70266	37.05143	34.41853
6	-906.5795	27.46881	1.61e + 08	32.66398	37.84906	34.70983

Source: Author's Process

### 3.2 Cointegration Tests

In economic studies, cointegration is a statistical expression of the long-run equilibrium relationship of the variables in research. In this study Johansens cointegration test was used by taking into account the statistical trace value and the critical value of five percent, and looking

at the probability value. If the trace statistic value is higher than the critical value of five percent, it means that the research model has cointegration. In addition, if the probability value is also smaller than 0.05, it can also be said that in the research there is cointegration.

**Table 12.** Johansens Cointegration Test Results

Hypothesized Number of CE (s)	Eigenvalues	Footprint Statistics	0.05 Critical value	Prob **
None *	0.870290	678,8020	334,987	0.0000
At most 1 *	0.777794	539,9150	285.1425	0.0000
At most 2 *	0.756939	437,6328	239,2354	0.0000
At most 3 *	0.695644	341,4506	197.3709	0.0000
At most 4 *	0.606831	260,5606	159,5297	0.0000
At most 5 *	0.559845	197.0816	125,6154	0.0000
At most 6 *	0.459959	141.2789	95.75366	0.0000
At most 7 *	0.407421	99.38343	69.81889	0.0000
At most 8 *	0.333794	63.80103	47,85613	0.0008
At most 9 *	0.255258	36.18242	29.79707	0.0080
At most 10 *	0.204852	16.14161	15.49471	0.0399
At most 11	0.008116	0.554147	3.841466	0.4566

Source: Author's Process

Cointegration test results with statistical methods Johansens shows the value of the trace on almost all hypotheses are higher than the critical value (5%). Of the eleven hypotheses in table 5, ten of them have a trace statistic higher than the critical value and a probability value lower than 0.05. So it can be concluded that the variables in research generally have cointegration.

This condition means that in a long period the variables in this study have an equilibrium

relationship and have the same movement. So a good model to use for estimating the research model is the VECM model (Vector Error Correction Model).

### 3.3 VECM Model Estimation Results

#### 3.3.1 Results of Estimated Non-Oil and Gas Export Value to Brunei

To find out how the relationship and influence of world oil price shocks, inflation, exchange

rates, and global uncertainty can be observed in Table 13.

**Table 13** Estimation Results for Brunei's VECM Model in the Long Run

Not.	Variable	Coefficient	T-value statistics	Information (T-Table: 1.66901 )
1	Brunei		1,000000	
2	World Oil Prices	2.910256	[3,38825]	Significant
3	IHPB	-1,318599	[-3,25385]	Significant
4	Exchange rate	-0.468834	[-0,45919]	Not significant
5	Global Uncertainty Index	0.383097	[3.15877]	Significant
6	C		118,1452	

Source: Author's Process

The table above shows the long-term equation for Indonesia's non-oil and gas exports to Malaysia as follows

$$\Delta BRN_t = 118.1452 + 2.910256PCO - 1.318599IHPB - 0.468834ER + 0.383097IUP \quad (10)$$

Relationship variables with one another in a research note to reconcile the value of t-statistic with t-table value her. If the t-statistic value is higher than the t-table value, it means that the independent variable in the study has a significant effect on the dependent variable. In this research study the value of degrees of freedom is 64, so that the t-table value is 1.66901.

This means that if the t-statistic value is higher than the t-table value of 1.66901, it means that the independent variable has a significant effect on the dependent variable. From table 13, it is known that in a long period of time world oil prices, inflation and global uncertainty had a significant effect on the quantity of Indonesia's exports to Brunei Darussalam, particularly non-oil and gas. Meanwhile, the exchange rate in the period of time does not give impact significantly on the value of exports of non-oil and gas Indonesia to Brunei Darussalam.

In addition, the fact is oil prices accounted for a positive impact on the value of commodity exports export to Brunei with a coefficient of 2.910256, especially non-oil. This situation illustrates that when the global oil price increases by one percent, it will have an impact

on increasing the value of exports from Indonesia to Brunei by 2.91 percent, especially non-oil and gas. Conversely, if the decline in world oil prices is 1 percent, then exports to Brunei will decrease by 2.91 percent, especially non-oil and gas exports.

Apart from that, inflation is explained by the Wholesaler Price Index (PPI) with a coefficient of -1.318599. This means that inflation has a significant negative impact on the value of non-oil and gas exports to Brunei. A one percent increase in inflation will reduce exports to Brunei by 1.31 percent. Conversely, a one percent decrease in inflation caused an increase in export value of 1.31 percent.

Furthermore, global uncertainty has significantly affected Indonesia's exports to Brunei. An increase in the global uncertainty index by one percent had an impact on Indonesia's exports to Brunei which rose by 0.38 percent. Conversely, if the global uncertainty index drops by one percent, it will reduce Indonesia's exports to Brunei by 0.38 percent, particularly the value of non-oil and gas exports.

The exchange rate is negatively related to Indonesian exports, particularly non-oil and gas exports to Brunei. However, this relationship did not have a significant effect on Indonesia's export to Brunei

When the exchange rate increases by one percent, the export value to Brunei will increase by 0.46 percent. The definition of



an increase in exchange rates in this study is a condition that describes an exchange rate experiencing appreciation.

*3.3.2 Results of the Estimation of the Export Value of Non-Oil and Gas Commodities to Cambodia*

Estimation results of world oil prices, inflation, exchange rates, and global uncertainty on the value of non-oil and gas exports to Cambodia can be seen in table 14.

**Table 14.** Results Estimated value of non-oil exports to Cambodia

No.	Variable	Coefficient	T-value statistics	Information (T-Table: 1.66901 )
1		1,000000		
2	World Oil Prices	0.530267	[2,01441]	Significant
3	IHPB	0.155395	[1.24719]	Not significant
4	Exchange rate	0.487734	[1,56635]	Not significant
5	Global Uncertainty Index	-0.056295	[-1,51411]	Not significant
6	C	-19,51671		

Source: Author's Process

From the table above we can find out the long-term equation as follows:

$$\Delta KMJ_t = -19.51671 + 0.530267PCO + 0.155395IHPB + 0.487734ER - 0.0562957IU \quad (11)$$

From table 14, we can observe from the table that only oil prices have an impact on exports from Indonesia to Cambodia, particularly the value of non-oil and gas exports. Meanwhile inflation, the rupiah exchange rate, and global uncertainty in the long run had no effect and had an impact on the value of non-oil commodity exports from Indonesia to Cambodia.

Oil prices globally have impact positive on exports of from Indonesia to Cambodia. The one percent increase in oil prices caused an increase in the value of exports to Cambodia by 53.02

percent. Conversely, when a decline in world oil prices by one per cent will reduce the value of exports from Indonesia to Malaysia by 53.02 percent. Inflation and exchange rate are positively give effect but not significant to Indonesia's exports to Cambodia. Global uncertainty also has no significant effect on Indonesia's exports to Cambodia. However, global uncertainty has had a significant negative impact on Indonesia's exports to Cambodia.

*3.3.3 Estimated Value of Non-Oil and Gas Exports to Laos*

Estimation results of world oil prices, inflation, exchange rates, and global uncertainty on the value of non-oil and gas exports to Laos can be seen in table 15.

**Table 15.** Estimation Results for the Laos VECM Model

Not.	Variable	Coefficient	T-value statistics	Information (T-Table: 1.66901 )
1		1,000000		
2	World Oil Prices	-14.20651	[-4.43431]	Significant
3	IHPB	2,519830	[1.66318]	Not significant
4	Exchange rate	1.656937	[0.43869]	Not significant
5	Global Uncertainty Index	-1.072026	[-2.36987]	Significant
6	C	-69.13327		

Source: Author's Process

From the table above we can get the following model equation:

$$\Delta LAO_t = -69.13327 - 14.20651PCO + 2.519830IHPB + 1.656937ER - 1.0720267IUP \quad (12)$$

From table 15 it can be seen that the world oil price and global uncertainty have a significant influence or impact on Indonesia's exports to Laos. The one percent increase in oil prices resulted in a decrease in the value of exports to Laos by 14.2 percent. Conversely, the decline in oil prices will actually increase the value of exports to Laos.

In addition, global uncertainty has a major impact and influence on non-oil and gas exports. An increase in the global uncertainty index by one percent will reduce the value of non-oil and gas commodities to Laos by 1.07 percent. Conversely, if the global uncertainty index decreases by one percent, the export value of non-oil commodities will increase by 1.07 percent.

Meanwhile, inflation and the exchange rate did not have a significant effect on Indonesia's exports to Laos. However, inflation and the exchange rate have positive relationship with Indonesia's export to Laos, particularly the value of non oil and gas export.

### 3.3.4 Estimated Value of Non-Oil and Gas Exports to Malaysia.

In table 16, we can see that almost all independent variables in this study has a correlation large enough and the effect on exports from Indonesia to Malaysia. Only one variable that does not have a significant effect on Indonesia's exports to Malaysia is the exchange rate. While oil prices globally, inflation and global uncertainty have a correlation and influence is quite large on the value of Indonesia's exports to Malaysia.

**Table 16** Results of VECM Estimates of Non-Oil and Gas Value to Malaysia

Not.	Variable	Coefficient	T-value statistics	Information (T-Table: 1.66901)
1	Export		1,000000	
2	World Oil Prices	0.409450	[2.01385]	significant
3	IHPB	-0.190012	[-1.97183]	significant
4	Exchange rate	-0.263705	[-1,09898]	Not significant
5	Global Uncertainty Index	0.064264	[2,23443]	Significant
6	C		17.08272	

*Source: Author's processed product*

From the table above we can get the following equation:

$$\Delta MLV_t = 17.08272 + 0.409450PCO - 0.190012IHPB - 0.263705ER + 0.064264IUP \quad (13)$$

From the above equation, it can be seen that the world oil price which went up by one percent had an impact on increasing the quantity of Indonesian exports to Malaysia by 40.94 percent, especially the value of non-oil and gas exports. On the other hand, if the decline in world oil prices is one percent, then non-oil trade exports from Indonesia to Malaysia will also decrease by 40.94 percent. Meanwhile, when

there was an increase in inflation by 19 percent. Conversely, if inflation decreases by one percent, then Indonesia's trade exports to Malaysia will also increase by 19 percent. Global uncertainty turns out to have a positive impact on trade from Indonesia to Malaysia. If the global uncertainty index increases by one percent, then exports or trade between countries will increase from Indonesia to Malaysia by 6.42 percent.

Conversely, when the global uncertainty index drops by one percent, exports or cross-border trade will fall from Indonesia to Malaysia by 6.42 percent. Meanwhile, the exchange

rate has a negative relationship from Indonesia to Malaysia but it is not significant.

3.3.5 Estimation Result of Non Oil and Gas Export Value to Myanmar.

The results of the estimated value of Indonesia's non-oil and gas exports to Myanmar are as follows:

**Table 17** Estimated Value of Non-Oil and Gas Exports to Myanmar

No.	Variable	Coefficient	T-value statistics	Information (T-Table: 1.66901 )
1		1,000000		
2	World Oil Prices	-1.472066	[-2.72146]	significant
3	IHPB	0.789836	[3,09123]	significant
4	Exchange rate	0.287445	[0.45118]	Not significant
5	Global Uncertainty Index	-0.285992	[-3,74755]	Significant
6	C	-56.90657		

Source: Author's processed product

From the table above we can find out the equation as follows:

$$\Delta MYR_t = -56.90657 - 1.472066PCO + 0.789836IHPB + 287445ER - 0.285992IUP \tag{14}$$

From the above equation we can see that the world oil price provides a substantial amount negative effect on the value of Indonesian exports to Malaysia. If the oil price increases by one percent, it will result in a decrease in Indonesia's exports to Malaysia by 1.47 percent, especially non-oil and gas commodities. On the other hand, a one percent decline in oil prices has an impact on increasing Indonesia's exports to Malaysia by 1.47 percent. In addition, non-oil and gas exports have a reciprocal correlation and have a positive impact on the inflation rate. When inflation increases by one percent, exports increase by 0.78 to Myanmar, especially non-oil and gas exports.

On the contrary, when the inflation rate dropped by one percent it affected the

decline of 0.78 non-oil and gas exports to Myanmar. Meanwhile, global uncertainty has a significant effect on trade commodity exports from Indonesia to Myanmar. An increase in global uncertainty of 1 percent had an impact on the decline in Indonesia's commodity exports by 28.74 percent. Conversely, if there is a decrease in the global uncertainty index by one percent, the value of Indonesia's exports to Myanmar increases by 28.78 percent. Meanwhile, the exchange rate does not affect non-oil and gas exports from Indonesia to Myanmar. However, the exchange rate has a negative correlation with non-oil and gas exports.

3.3.6 Results of Estimated Non-Oil and Gas Export Value to the Philippines.

Estimated results of modelling Indonesian exports to the Philippines

**Table 17** Results of estimated non-oil and gas export values to the Philippines

No.	Variable	Coefficient	T-value statistics	Information (T-Table: 1.66901 )
1			1,000000	
2	World Oil Prices	-0.852795	[-2.68639]	significant
3	IHPB	0.178575	[1,16994]	significant
4	Exchange rate	-0.291677	[-0.76403]	Not significant
5	Global Uncertainty Index	-0.028951	[-0.62625]	Significant
6	C		-12,39344	

Source: Author’s processed product

From the table above we can find out the equation model as follows:

$$\Delta PHL_t = -12.39344 - 0.852795PCO + 0.178575IHPB - 0.291677ER - 0.028951IU \tag{15}$$

From the above equation, it can be seen that in the above equation there are variables that have a significant effect and some are not. World oil prices, inflation, and global uncertainty have an effect on commodity exports from Indonesia to the Philippines. Meanwhile, the exchange rate has no significant effect on the value of non-oil and gas exports.

Global oil prices have had a significant negative effect on non-oil and gas commodities. If there is an increase in oil prices by one percent will result in a decrease in non-oil exports from Indonesia to the Philippines amounted to 85.27 percent. On the other hand, a global oil price drop by one percent will increase the quantity of commodity exports from Indonesia to the Philippines by 85.27 percent.

Meanwhile, inflation made a positive contribution to non-oil and gas exports from Indonesia to the Philippines. If inflation increases by one percent, the value of non-oil and gas exports will also increase by 17.85 percent. While the exchange rate contributed no impact significantly on the value of non-oil exports, but there is a correlation that is negative between the exchange rate with the quantity of exports of Indonesia to the Philippines, particularly in non-oil .

*3.3.7 Estimated Value of Non-Oil and Gas Exports to Singapore .*

After the VECM analysis of the research model, the results of the estimated exports from Indonesia to Singapore in the non-oil and gas context are obtained as follows

$$\Delta SNG_t = 7.008715 + 0.062244PCO - 0.057564IHPB - 0.277956ER + 0.028224IUP \tag{16}$$

From the above equation it can be seen that all variables in this study besides the exchange rate have an effect on export commodities from Indonesia to Singapore, especially non-oil and gas. World oil prices contributed significantly to the value of commodity exports. In the event of world oil prices go up then it will have an impact on exports which decreased by 6.22 percent.

On the other hand, a one percent decline in world oil prices resulted in an increase in non-oil and gas value by 6.22 percent. Meanwhile, inflation has a significant negative effect on Indonesia's exports to Singapore. Inflation, which rose by one percent, actually decreased the value of Indonesia's non-oil and gas commodity exports to Malaysia by 5.75 percent. Instead, if reduced one percent inflation was actually boost exports commodity trade from Indonesia to Singapore 5.75 percent. Apart from that, the exchange rate does not have a significant impact on trade from Indonesia to Singapore.

However, the exchange rate has a negative relationship with Indonesian exports to Singapore. Meanwhile, global uncertainty has a positive and significant effect on Indonesian exports to Singapore. When the global uncertainty index rises by one percent, it actually increases the quantity of exports by 2.82 percent. Meanwhile, if the global uncertainty

index decreases it will also reduce exports by 2.82 percent, especially the value of non-oil exports .

**Table 18** Estimated Value of Non-Oil and Gas Exports to Singapore

Not.	Variable	Coefficient	T-value statistics	Information (T-Table: 1.66901 )
1		1,000000		
2	World Oil Prices	0.062244	[0.25087]	Urgent
3	IHPB	-0.057564	[-0,48812]	Urgent
4	Exchange rate	-0.277956	[-0,94633]	Not significant
5	Global Uncertainty Index	0.028224	[0.80244]	Urgent
6	C	7.008715		

Source: Author’s processed product

3.3.7 Estimated Value of Non-Oil and Gas Exports to Thailand.

After estimating the VECM model for exports from Indonesia to Thailand, the following estimation results are obtained. From the table, the following equation is obtained.

$$\Delta THL_t = -6.204626 - 0.075930PCO + 0.060526IHPB - 0.275260ER + 0.007667IUP \quad (17)$$

From this equation it is known that world oil prices, inflation and global uncertainty have contributed to the effects of export commodities from Indonesia to Thailand. Meanwhile, the exchange rate does not have a significant effect on the value of trade between Indonesia and Thailand.

However, the exchange rate and export value have a negative correlation. In addition, if there is an increase in world oil prices by one percent it will reduce non-oil and gas exports by 7.59 percent. On the other hand, a one percent reduction in world oil prices will increase non-oil and gas exports by 7.59 percent.

In addition, there is a positive influence between inflation and non-oil and gas exports. An increase in inflation of one percent will have an impact on the increase in non-oil and gas exports by 6.05 percent, and vice versa. In addition, global uncertainty has also had a positive effect on non-oil and gas exports. An increase in the global uncertainty index by one percent will have an impact on the increase in non-oil and gas exports by 0.76 percent, and vice versa.

**Table 18** Estimated Results of Exports to Thailand

No.	Variable	Coefficient	T-value statistics	Information (T-Table: 1.66901 )
1		1,000000		
2	World Oil Prices	-0.075930	[-0.57337]	significant
3	IHPB	0.060526	[0.97301]	significant
4	Exchange rate	-0.275260	[-1,77105]	Not significant
5	Global Uncertainty Index	0.007667	[0.41259]	Significant
6	C	-6.204626		

Source: Author’s processed product

**3.3.8 Estimation Result of Non Oil and Gas**

After estimating the export research model to Vietnam, the following estimation results are obtained. From the estimation results, the equation is:

$$\Delta VM_t = -26.20819 - 0.267057PCO + 0.288305IHPB + 0.997164ER - 0.130485IUP \quad (18)$$

From the above equation it can be seen that inflation, exchange rates and global uncertainty contributes impact significantly on exports from Indonesia to Vietnam. Only the world oil price contributes to a significant effect on commodity exports from Indonesia to Vietnam. An increase in inflation of one percent had an impact on increasing Indonesia's exports to Vietnam by 28.83 percent. On the other hand, if inflation is reduced by one percent it will

**Export Value to Vietnam.**

actually reduce commodity exports by 28.83 percent, particularly non-oil and gas. In addition, the exchange rate has a positive effect on Indonesia's exports to Vietnam. When the exchange rate increases by one percent, it will result in an increase in export commodities of 0.99 percent, and vice versa. Global uncertainty has a negative correlation from Indonesia to Vietnam. When there is a hit on the global uncertainty index, it actually reduces the commodity trade from Indonesia to Vietnam by 13.04 percent. Conversely, if the global uncertainty index decreases, it will have an impact on increasing the value of Indonesia's non-oil and gas exports to Vietnam.

**Table 19** Estimation Results of Non-Oil and Gas Exports to Vietnam

Not.	Variable	Coefficient	T-value statistics	Information (T-Table: 1.66901 )
1			1,000000	
2	World Oil Prices	-0.267057	[-0,81222]	Not significant
3	IHPB	0.288305	[1,85124]	Significant
4	Exchange rate	0.997164	[2,57110]	significant
5	Global Uncertainty Index	-0.130485	[-2,80993]	Significant
6	C		-26.20819	

*Source: Author's processed product*

**3.3.10 Comparison of the Effects of World Oil Prices, Inflation, Exchange Rates and Global Uncertainty on Non-Oil and Gas Export Value in ASEAN Countries**

From the estimation results, it can be seen how each country is influenced by the macroeconomic variables in the study. There is a positive influence, there is a negative influence, some are not. This includes short term and long term. From table 20, it can be seen that the world oil price has a different response in each export destination country from Indonesia in the long term. Brunei, Cambodia and Malaysia are export destination countries where when the world oil price increases, the value of exports to these countries also increases, especially non-oil and gas commodities. Conversely, when there was

a weakening in world oil prices, exports to Brunei, Cambodia and Malaysia also declined. This is inversely proportional to the export destination countries to Laos, Myanmar, and the Philippines. When there is an increase in world oil prices, exports to that country will decline, especially non-oil and gas commodities. By contrast, when global oil prices fall then export to outside the country will increase. Export destination countries also experienced different things, namely Singapore, Thailand and Vietnam. These three countries are export destination countries from Indonesia which are not affected by world oil price shocks, especially the non-oil and gas sector.



**Table 20.** Comparison of the Effects of Macroeconomics and Global Uncertainty against Non-Oil and Gas Export Value in the Long Term

No.	Country	Variable			
		World Oil Prices	IHPB	Exchange rate	Global Uncertainty Index
1	Brunei	Significant +	Significant -	Not significant	Significant +
2	Cambodia	Significant +	Not significant	Not significant	Not significant
3	Laos	Significant -	Not significant	Not significant	Significant -
4	Malaysia	Significant +	Significant -	Not significant	Significant +
5	Myanmar	Significant -	Significant +	Not significant	Significant -
6	Philippines	Significant -	Significant +	Not significant	Not significant
7	Singapore	Not significant	Not significant	Not significant	Not significant
8	Thailand	Not significant	Not significant	Significant -	Not significant
9	Vietnamese	Not significant	Significant +	Significant +	Significant -

*Source: Author's Process*

From table 20 it can also be seen that inflation also has a different effect on export commodities from Indonesia in the long run. Brunei and Malaysia are the two ASEAN non-oil and gas export destinations from Indonesia which are affected by the surge in inflation. Inflation has a significant negative impact on the export value of non-oil and gas commodities from Indonesia.

This means when inflation rises the impact on exports to other countries is declining, and vice versa. In contrast to Myanmar, the Philippines and Vietnam which are significantly affected by inflation. This means that when there is an increase in inflation, the export value of non-oil and gas commodities will increase the value of Indonesia's non-oil and gas commodity exports to the country. On the other hand, Cambodia, Laos, Singapore and Thailand were not affected by changes in inflation, especially on the value of non-oil and gas commodity exports from Indonesia.

From table 20 we also know that the exchange rate has different effects on export destination countries. In general, ASEAN countries are not affected by long-term shocks caused by the exchange rate, especially non-oil and gas commodity exports from Indonesia. This can be seen from the table that Brunei, Cambodia, Laos, Malaysia, Myanmar, the Philippines and Singapore are non-oil and gas export destination

countries from Indonesia which are not affected by inflation in their export value. Only Thailand and Vietnam which gave different results. The exchange rate turned out to have a significant negative effect on Indonesia's exports to Thailand. Exchange rates contributed significantly positively to exports from Indonesia to Vietnam.

From table 20, it is known that global uncertainty has a different effect on each export destination country from Indonesia in the long term. Global uncertainty did not affect significantly on exports to Cambodia, the Philippines, Singapore and Thailand. Global uncertainty has a significant negative impact and correlation on export destinations to Laos and Vietnam. Surprising thing, global uncertainty contributed significantly to the negative impact of Indonesian exports to Malaysia and Brunei. This means that if the global uncertainty index rises, the quantity of Indonesia's exports to Brunei and Malaysia will also increase.

From table 21 below, it can be seen that in a short period of time, Indonesian exports to ASEAN countries were generally less affected by macroeconomic conditions and global uncertainty. This can be seen from the inflation which does not have a significant impact on export commodities from Indonesia to all countries in ASEAN.

The same thing can also be seen from the effect of exchange rates on exports from Indonesia. In a short period of time the exchange rate did not significantly affect the value of Indonesia's commodity exports to ASEAN countries, except Malaysia, Myanmar and Vietnam. Exchange rates contribute to a significant positive effect on exports from Indonesia to Malaysia. However, the exchange rate had a significant negative impact and correlation to Indonesia's exports to Myanmar and Vietnam, particularly for non-oil and gas commodities.

Meanwhile, global uncertainty in a brief period generally has no significant correlation and correlation with countries destined for exports in ASEAN. Global uncertainty only contributes to a significant negative effect on Indonesia's non-oil and gas commodity exports to the Philippines and Vietnam. Things that are slightly different can be seen from the effect of global oil prices on the quantity of Indonesia's exports to ASEAN countries.

Global oil prices have a significant positive correlation over a brief period to the value of non-oil and gas commodity exports to Brunei, Cambodia and Malaysia. Meanwhile, world oil prices have a significant negative impact on the value of non-oil and gas commodity exports to Laos, Myanmar and the Philippines. Meanwhile, Singapore, Thailand and Vietnam were less affected by world oil prices.

There is a good correlation between the exchange rate and the development of the quantity of exports because when there is a depreciation in the exchange rate, especially in the rupiah exchange rate, the price of a country's export products becomes cheap (Krugman & Obsfeld, 2005). These low prices encourage an increase in the volume of exports from one country to the destination country. This is also due to the influence of the exchange rates of other countries that are experiencing appreciation.

So that the prices of domestic goods products become more expensive compared to other countries that do not experience exchange rate appreciation. This condition makes importing countries switch to exporting countries that offer their commodities at lower prices. Meanwhile, the negative impact of the exchange rate on the value of non-oil commodities could be caused by other factors, such as international market prices and market uncertainty. In addition, the absence of exchange rate influence on export commodities in a short period is also caused by the condition of a country in responding to changes in exchange rates. This is due to the volume of commodity exports that do not respond directly to changes in exchange rates, particularly non-oil and gas. What is interesting is that apart from the exchange rate, there are other factors outside the exchange rate that affect the value of exports such as consumer tastes, transportation costs, and government policies regarding international trade (Mankiw, 2006).

In addition, inflation which is represented by the wholesale price index, also contributes to the negative impact of exports, especially non-oil and gas. This is due to the increase in inflation which will increase prices. If the price of goods increases, it will affect the competitiveness of these goods in the international market which in turn will reduce exports (Sadono, 2006). In addition, if we look at the impact on domestic conditions, it will have an impact on increasing import values (Sadono, 2006).

Meanwhile, the results of research on the positive influence between world oil prices and Indonesia's exports to ASEAN countries reinforce the research conducted by (Bangun & Purwanto, 2012). In this study, it is known that exports as one of the constituent variables of Gross Domestic Product provide a positive correlation with exports, especially non-oil and gas.



**Table 21.** Comparison of the Effects of Macroeconomics and Global Uncertainty Non- Oil and Gas Export Quantity and in the Short Term

No.	Country	Variable			
		World Oil Prices	IHPB	Exchange rate	Global Uncertainty Index
1	Brunei (-1)	significant +	Not significant	Not significant	Not significant
	Brunei (-2)	Not significant	Not significant	Not significant	Not significant
2	Cambodia (-1)	Significant +	Not significant	Not significant	Not significant
	Cambodia (-2)	Not significant	Not significant	Not significant	Not significant
3	Laos (-1)	Significant -	Not significant	Not significant	Not significant
	Laos (-2)	Significant -	Not significant	Not significant	Not significant
4	Malaysia (-1)	Significant +	Not significant	Not significant	Not significant
	Malaysia (-2)	Not significant	Not significant	Significant +	Not significant
5	Myanmar (-1)	Significant -	Not significant	Not significant	Not significant
	Myanmar (-2)	Not significant	Not significant	Significant -	Not significant
6	Philippines (-1)	Not significant	Not significant	Not significant	Not significant
	Philippines (-2)	Significant -	Not significant	Not significant	Significant -
7	Singapore (-1)	Not significant	Not significant	Not significant	Not significant
	Singapore (-2)	Not significant	Not significant	Not significant	Not significant
8	Thailand (-1)	Not significant	Not significant	Not significant	Not significant
	Thailand (-2)	Not significant	Not significant	Not significant	Not significant
9	Vietnam (-1)	Not significant	Not significant	Not significant	Not significant
	Vietnam (-2)	Not significant	Not significant	Significant -	Significant -

Source: Author's Process

#### 4. CONCLUSION

Indonesia has the opportunity to continue to improve the quality and quantity of non-oil and gas commodity exports. This is because exports are one of the main pillars of Indonesia's export strength, especially non-oil and gas. However, if you look at the development of exports very fluctuating. So that needs to be examined more factor anything that affects fluctuations in the volume of exports of non-oil commodities. It is assumed that several factors that affect non-oil and gas exports in Indonesia are exchange rates, inflation, world oil prices, and global uncertainty. After estimating, it is known that in the long term and short term, the variables in this study vary in their influence on the volume of exports from Indonesia to export destinations in ASEAN, particularly non-oil and gas.

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