

Factors Affecting Manufacturing Exports

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ABSTRACT

This study aims to determine the factors that influence manufacturing exports in Indonesia. This study uses time-series data with 40 data observations starting from the 1st quarter of 2010 to the 4th quarter of 2019. This study's analysis method is the vector error correction model (VECM), which can dynamically describe the short-term and long-term effects. Export determinants to be examined are inflation, the rupiah exchange rate, Gross Domestic Product (GDP), and Foreign Direct Investment (FDI). This study indicates that inflation at lag 1 harms manufactured exports both in the short and long term. Furthermore, GDP has a positive effect on manufacturing exports in the short run at lag 1 and lag 2, while in the long run, GDP has a positive effect only on lag 1. Meanwhile, the exchange rate and FDI factors did not affect manufactured exports, both in the short and long term. This study implies that inflation and GDP are essential factors in designing policies to increase exports in Indonesia, including exports of manufactured products.

ABSTRAK

Penelitian ini bertujuan untuk mengetahui factor-faktor yang mempengaruhi ekspor manufaktur di Indonesia. Studi ini menggunakan data time series dengan jumlah pengamatan sebanyak 40 buah data mulai dari kuartal 1 2010 sampai dengan kuartal 4 2019. Metode analisis data yang digunakan dalam penelitian ini adalah vector error correction model (VECM) yang bisa menggambarkan secara dinamis pengaruh jangka pendek dan jangka panjang. Determinan ekspor yang akan diteliti adalah inflasi, kurs rupiah, Produk Domestik Bruto (PDB) dan Foreign Direct Investment (FDI). Hasil penelitian ini menunjukkan bahwa inflasi pada lag 1 berpengaruh negative terhadap ekspor manufaktur baik dalam jangka pendek maupun jangka panjang. Selanjutnya, PDB berpengaruh positif terhadap ekspor manufaktur dalam jangka pendek pada lag 1 dan lag 2, sedangkan dalam jangka panjang, PDB berpengaruh positif hanya pada lag 1 saja. Sementara itu faktor kurs dan FDI tidak berpengaruh terhadap ekspor manufaktur baik dalam jangka pendek maupun jangka panjang. Penelitian ini mengimplikasikan bahwa factor Inflasi dan PDB menjadi factor penting dalam merancang kebijakan untuk meningkatkan ekspor di Indonesia termasuk ekspor produk manufaktur.

1. INTRODUCTION

Exports play an important role in driving economic growth (Chand et al., 2020). For many countries, including Indonesia, international trade, especially exports, has a crucial role, namely, a driving force for the national economy. Exports generate foreign exchange, which can then be used to finance imports and the domestic economic-development sector. However, Indonesia's export growth during the 2010-2019 period tended to decline. Even in 2015, it decreased very sharply, reaching a negative 14.55%. Although there was an increase again in the 2016-2017 period, growth again declined sharply to reach

negative 6.85% in 2019, shown in Figure 1.

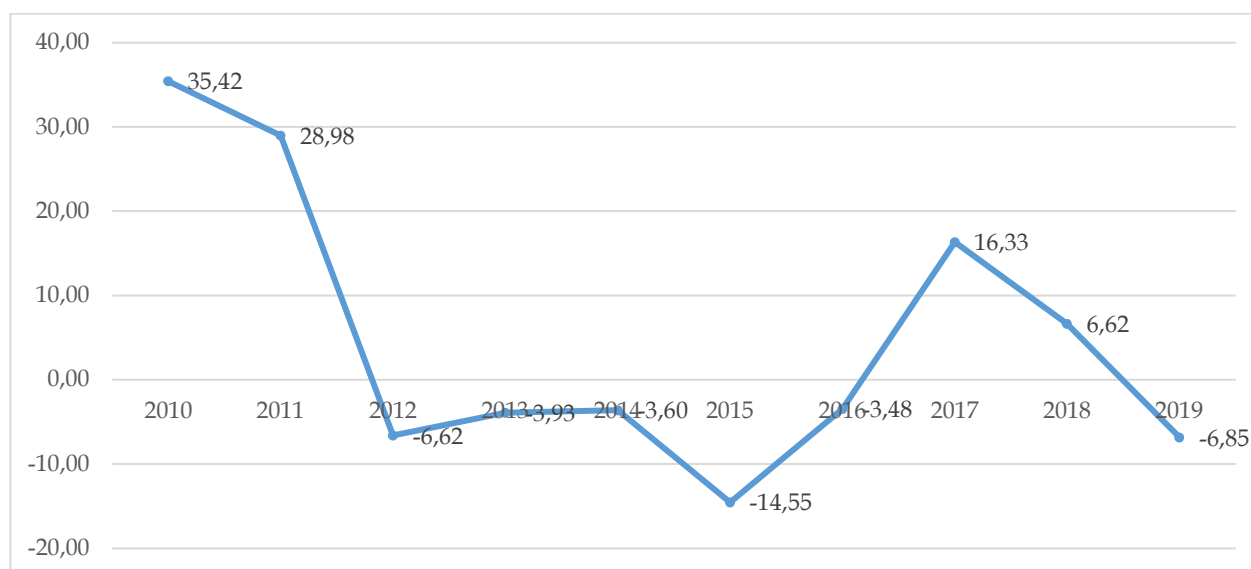
The decline in export growth was made possible due to the slowing growth in the global economy, followed by slowing world trade volume and declining commodity prices. Weakening commodity prices have lowered Indonesia's terms of trade (tot) and weakened export performance. On the other hand, strengthening domestic demand has boosted imports. These conditions caused the current account deficit in 2019 to widen to USD 30.376 million, higher than the current account deficit in 2017 of USD 16.196 million (Bank Indonesia, 2020).

This problem has attracted the Indonesian

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government's attention to resolve it immediately by increasing the total export performance. Secretary General of the Ministry of Industry, Haris Munandar, said that the government is currently focused on increasing exports' value to overcome the trade balance deficit. One sector that could be improved in is the manufacturing sector. These efforts are also in line with making Indonesia 4.0, wherein in 2030, the net export figure will return up

to 10 percent. There are five industrial sectors whose development is prioritized to enter the era of industrial revolution 4.0 and be encouraged to export actively. The five industries comprise the food and beverage business, the garment and apparel business, the automobile business, the chemical business, and the electronics business (Indonesian Ministry of Industry, 2018).



Source : Bank Indonesia (2020)

Figure 1. Export Growth (%)

From 2011 to 2019, the average growth of manufacturing exports tended to decline. In 2017-2019, it decreased sharply from 14.50% in 2017 to 3.84% in 2018. Even in 2019, it reached a negative 3.01%. However, when viewed from the contribution to total exports, the manufacturing sector contributed the highest to the achievement of national export value compared to other sectors, namely 73.02% in 2019, followed by exports of mining products by 20.28%, exports of agricultural products by 3.46%, and other merchandise by 1.13%. The manufacturing industry is also the industry that significantly contributes to the added value of national output, which in 2019 reached 20.79% by the wholesale and retail trade sector, car and motorcycle repair sector 13.16%, and agriculture, forestry, and fisheries sector 12.37% (Bank Indonesia, 2020). Likewise, its contribution to labor turning-point continued to increase during the 2015-2018 period. In 2015, the manufacturing industry created employment for 15.54 million people, and the number increased in 2016 to 15.97 million people. In 2017, the manufacturing sector employed up to 17.56 million people and significantly

increased in 2018 to 18.25 million people. During four years (2015-2018), there was a 17.4 percent increase in labor turning point.

The manufacturing sector's growth within the industry is essential to build national technological capacity, industrial capability, technology progress, productivity, and capital accumulation (Bekele, 2020). Singh and Mahmood (2014) revealed a significant and positive relationship between manufacturing strategy and export performance of manufacturing SMEs. The finding emphasizes the importance of adopting the manufacturing strategy among the owners/managers of manufacturing SMEs for their success. These firms would gain in terms of competitive advantage over their rivals and reap higher export performance.

Given the significance of the central role of exports, in particular exports of the manufacturing sector to Indonesia's economy, it is essential to recognize factors that affect the output of Indonesia's manufacturing exports. Previous research on export success's influential factors shows that supply-side factors drive exports, for example, domestic prices (established by government or market), gross

domestic product (GDP) rise, adaptable cost indexes, and capacity utilization. Fewer investigations also focused on determining export demand factors, such as wages and costs in the competing markets. The disparity in literature seems to have occurred because developing countries are generally considered unable to accommodate their demand. However, fluctuations in international demand will only impact goods through shifts in world prices.

Several researchers, such as Jongwanich (2010) and Oo et al. (2019), have researched export determinants in East Asian and ASEAN countries, including Indonesia. Jongwanich (2010) found that the exchange rate and FDI positively affect manufactured exports in Indonesia. Meanwhile, Oo et al. (2019) showed that the exchange rate and FDI do not affect Indonesia's exports. Furthermore, Hall et al. (2010) revealed that the ex-change rate harms exports in Emerging Market Economy (EME) countries, where Indonesia is included in the EME group. Alam et al. (2017) analyzed the relationship between the exchange rate and exports of Pakistan against several selected trading partner countries. They found that in the long run, the exchange rate has an effect on exports of manufactured products to selected countries but with different signs, namely that some have a positive effect and some have a negative effect. Meanwhile, Rakhman (2012) stated that the exchange rate does not affect export volume.

Apart from the exchange rate and FDI factors, other export determinants are inflation and Gross Domestic Product (GDP). The results of the study Abidin et al. (2013); Uysal and Mohamoud (2018) showed that inflation harms exports. On the contrary, Oo et al. (2019) found that inflation positively affects exports. Meanwhile, the results of the study Bakar et al. (2015) showed that inflation does not affect exports. Further-more, Abidin et al. (2013), Nguyen (2010), and Oo et al. (2019) showed that GDP has a positive influence on exports. In contrast, Bakar et al. (2015), Haseeb et al. (2014), and Uysal and Mohamoud (2018) found that GDP does not affect exports.

Referring to the findings of several previous studies that show different results, the authors are interested in filling the gap of several findings on exports' determinants, especially exports in the manufacturing sector. This study will examine how the exchange rate, FDI, inflation, and GDP influence manufactured ex-ports in Indonesia. The number of observations was 40 observations during Q1 2010 to the 4th quarter of 2019. The data analysis method used the Vector Error Correction Model (VECM).

The advantage of the VECM model is that it can dynamically describe short and long-term effects. VECM is relatively better than the Ordinary Least Square Method (OLS), which has a weakness where if there are outliers in the data, the parameter estimation results will be inefficient. One of the previous researchers who used the OLS method is Uysal and Mohamoud (2018).

2. THEORETICAL FRAMEWORK AND HYPOTHESES

This study identifies factors influencing manufacturing exports in Indonesia. The variables studied include inflation, exchange rate, Gross Domestic Product (GDP), and Foreign Direct Investment (FDI). Research concerning the relationship between exports and inflation, exchange rate, Gross Domestic Product (GDP), and Foreign Direct Investment (FDI) is essential and primary research topics in the economy.

The relationship between inflation and trade has been a subject of research, theoretically and empirically. Inflation is defined as a rise in price as a whole, where inflation decreases purchasing power from a currency. Inflation has some indicators such as the Consumer Price Index, the Wholesale Price Index, and Implicit Price Index. Uysal and Mohamoud (2018) took a sample of seven countries in East Africa during 1990-2014. They found that inflation negatively impacts export performance in the Seven East Africa countries (Ethiopia, Madagascar, Kenya, Sudan, Mozambique, Tanzania, and Zambia). Abidin et al.(2013) investigated the impact of economic factors on bilateral exports between Malaysia and the OIC member countries, using the gravity model's panel estimation. The data covers the period from 1997 to 2009. The empirical analysis showed a negative relation between export and inflation on bilateral exports between Malaysia and the OIC member countries. Oo et al. (2019) investigated the export performance's determinants of ASEAN countries in a short-term and long-term relationship. They showed that in the long term, Inflation had a significant positive relationship with ASEAN export performances. Bakar et al. (2015) studied the long-term effect of macroeconomic factors on the export activity in Malaysia and other OIC member countries in 1997-2012 using panel data regression techniques and short-term relationships with an error correction model (ECM) panel. The results showed that inflation does not affect export performance. Deh (2016) investigated Inflation's effect on Ghana's Manufacturing Sector Productivity

for the period 1968-2013. The results indicated a significant negative link between inflation and manufacturing sector productivity. The findings suggest that inflation has led to a decrease in manufacturing sector productivity. Judith & Chijindu (2016) examined the linkage between inflation and manufacturing sector growth in Nigeria using annualized time-series data from 1982 to 2014. The results revealed that inflation has an insignificant negative effect on manufacturing sector growth value-added.

Many previous researchers have also conducted research related to exchange rate and export. The exchange rate is an essential factor to be included for the determinant of export. In general, depreciation of a country's currency tends to encourage its exports. The depreciation of the currency makes goods cheaper in international markets. Uysal and Mohamoud (2018) analyzed the effects of exchange rates on exports and found exchange rates positively impacted exports. Bakar et al. (2015) also found that the exchange rate positively affects Malaysian export activity to OIC countries. Oo et al. (2019) showed that the exchange rate had a significant positive relationship with ASEAN export performances in the long term. Meanwhile, Abidin et al. (2013) found that the exchange rate negatively impacts Malaysian exports to OIC countries. They found that appreciation of the exchange rate would discourage Malaysia's exports to country OIC countries. Moreover, Alam et al. (2017) analyzed the exchange rate volatility in the Pakistani sectoral exports with its main trading associates, namely the United States, the United Kingdom, Japan, Germany, and Saudi Arabia. The findings indicate a long-term connection between exchange rate volatility and sectoral exports. Exchange rate volatility has a consistent and beneficial influence on Pakistan's sector-specific exports. Jongwanich (2010) analyzed the determinant factors of exports in eight East Asian and Southeast Asian countries during 1993-2008 and revealed that the use of production components weakens the relationship between the real exchange rate and export results. Nguyen (2010) investigated the determinant factors of Vietnam's export movements using a static and dynamic panel gravity approach to show that the effect of exchange rate variable on bilateral trade between Vietnam and a foreign partner is positive as expected. Meanwhile, Sharma (2003) investigated the influential factors of export activity in India during 1970-1998 using simultaneous regression and showed a negative elasticity of export demand concerning REER implies that the real appreciation of the rupee

adversely affects Indian exports. Safuan (2017) examined the impact of exchange rate volatility on Indonesia's export to United States, Japan, and China using aggregate and disaggregate data based on data from 1996 to 2014 and showed that exchange rate volatility hurt export. Besides, Hall et al. (2010) studied the effect of real exchange rate volatility on exports in ten Emerging Market Economies (EMEs) using panel data and two estimation methods, namely GMM and time-varying-coefficient (TVC). The results proved that the exchange rate volatility is an undesirable and substantial effect on trade in non-EMEs countries, while it positively affects the EMEs countries. Tumwebaze (2015) also investigated the determinant factors related to Uganda's export output during the 1980-2012 period using random effects and the generalized method of moment (GMM) model and found real exchange rates positively and significantly affected Uganda's exports. Mujtaba et al. (2016) examined the impact of the exchange rate on exports and imports of major South-Asian and Southeast Asian Economies using an Autoregressive Distributed Lag (ARDL) and error correction model to investigate the long run and the short-run relationship between the variables in the sample economies for 1979-2010. The results showed that the long-run relationship between exchange rate and exports exists in more than half of the sample countries. The short-run relationship is found between the exchange rate and exports for only Sri Lanka and Bangladesh.

Gross Domestic Product (GDP) is also one of the crucial factors that affect export value. Production Level or Gross Domestic Product (GDP) Production level is a crucial supply-side determinant of exports. The higher production level generates surplus output, which can be traded in overseas markets to earn foreign exchange. Thus, the gross domestic product is final goods, and services at competitive cost are vital to a country's export performance. Oo et al. (2019) showed that GDP had a significant positive relationship with ASEAN export performance in the long term. Bakar et al. (2015) found that GDP positively affects Malaysian export activity to OIC countries. The finding is similar to Tumwebaze (2015) found that GDP had a positive and statistically significant effect on Uganda's exports. Uysal and Mohamoud (2018) examined the relationship between export and gross domestic product in seven countries in East Africa during 1990-2014 using the OLS technique. They showed that Gross Domestic Product growth was found to be statistically insignificant. Therefore, Gross Domestic Product growth is the variable that does

not affect the exportation of the seven East Africa countries. Hsiao (2006) studied the relationship among foreign direct investment, export, and gross domestic product for eight East and Southeast Asian economies using the Granger causality between 1986 and 2004 and found bidirectional causality between exports and gross domestic product. So far, all reviewed empirical studies agree that GDP was both found to influence export performance positively. Mehrara and Firouzjaee (2011) used the Granger causality relationship between non-oil export and economic growth is investigated based on panel cointegration analysis for 73 developing countries during 1970-2007. Sample countries are categorized into two groups of oil-dependent countries and non-oil developing countries. The results showed that there is bidirectional long-run causality between export and GDP growth for both groups of countries. Besides, there is bidirectional short-run causality between export and GDP growth for non-oil developing countries.

Foreign Direct Investment (FDI) FDI is another supply-side determinant expected to affect export performance. Abor et al. (2008) stated that FDI promoted exports of host countries by augmenting domestic capital for exports, transferring technology and new products for exports, facilitating access to new and large foreign markets, and providing training for the local workforce, and upgrading technology and management skills. Uysal and Mohamoud (2018) and Jongwanich (2010) found that FDI positively impacts export value. Oo et al. (2019) also suggested that FDI had a significant positive relationship with ASEAN export performance. Meanwhile, Sharma (2003) investigated the influential factors of export activity in India during 1970-1998 using simultaneous regression and found that FDI appears to have statistically no significant impact on India's export performance. However, its coefficient has a positive sign. Prasanna (2017) explored the impact of FDI inflows on India's export performance and found that the impact of FDI inflows on export performance is significantly positive. Rahmaddi and Ichihashi (2013) examined the contribution of foreign direct investment (FDI) to the changing structure of Indonesia's manufacturing exports. They revealed that FDI promotes exports in most panel observations, especially exports from physical-capital-intensive (PCI), human-capital-intensive (HCI), and technology-intensive (TI) industries. Narjoko (2009) examined the existence of spillovers associated with the presence of multinational enterprises (MNEs) on a firm's

decision to export and on export intensity. The results revealed that given the mixed evidence, policies to promote MNEs are still worth pursuing. The most apparent justification comes from the positive impact of the increased pool of technological knowledge. Strengthening trade facilitation seems to be a positive proposition, given that many of the new domestic exporters seem to have been constrained in increasing their exports.

Based on the literature review, the hypotheses in this study are:

- H₁: Inflation negatively affects Indonesia's manufacturing export in the short and long term
- H₂: Exchange rate positively affects Indonesia's manufacturing exports in the short and long term.
- H₃: FDI positively affects Indonesia's manufacturing exports in the short and long term
- H₄: GDP positively affects Indonesia's manufacturing exports in the short and long term

3. RESEARCH METHOD

This research employs quantitative methods. The data used in the research is time-series data from the 2010-Q1 through 2019-Q4 periods obtained from Bank Indonesia's Indonesian Financial Economic and Financial Statistics (SEKI). By referring to several variables from previous studies, to explore the influence of determinant factors of manufacturing exports in Indonesia, the specification of the research model has been determined that manufacturing exports (EXP) is a function of the inflation (INF), FDI, ER, and GDP or $EXP = f(INF, FDI, ER, GDP)$.

Furthermore, the data analysis technique used is the time-series VECM. The VECM method analyzes the long-term and short-term connection between the independent and dependent variables in the time-series data. VECM is an estimated method of VAR. The restriction is given because the data is not stationary but cointegrated. Before running the VECM method, we examine the data stationarity, determine the optimum lag, and perform the cointegration test. If the data is not stationary but cointegrated, it is followed by forming a VECM model to test its feasibility (Gujarati, 2004).

Stationarity Test

The data stationarity test uses the unit root test to verify if the data contains unit roots or not. When the

variable has unit-roots, then it is non-stationary. Besides, to determine the order of integration, the unit root test can be carried out to identify how many times the differentiation must be done so that the data becomes stationary. The most widely used method to carry out the unit root test is Dickey-Fuller (DF). In practice, there are three forms of the Dickey-Fuller test equation as follows:

1. Model without intercept and trend
2. Model with intercept and without trend
3. Model with intercept and trend

The specification of equations used by Dickey-Fuller in equations without intercept and trend (random walk) can be defined in this manner:

$$\Delta Y_t = \lambda Y_{t-1} + \sum_{i=2}^p \beta_i \Delta Y_{t-i+1} + \varepsilon_t \dots \dots (1)$$

The equation with an intercept and without a trend (random walk with drift) can be defined as:

$$\Delta Y_t = a_0 + \lambda Y_{t-1} + \sum_{i=2}^p \beta_i \Delta Y_{t-i+1} + \varepsilon_t \dots (2)$$

Furthermore, the equation with intercept and trend is:

$$\Delta Y_t = a_0 + \lambda Y_{t-1} + a_2 t + \sum_{i=2}^p \beta_i \Delta Y_{t-i+1} + \varepsilon_t \dots \dots (3)$$

The classic assumption criteria for obtaining the Best Linear Unisex Estimator (BLUE) regression results, according to Ekananda (2018), is that the variables in the regression equation must be stationary and ε_t have a zero average and finite variance. The non-stationary variables' presence will result in a spurious regression characterized by a high R_{square} value and significant t_{stat} value. The unit root test was used with the Augmented Dickey-Fuller (ADF) test procedure through the process for each variable in this fashion:

$$Y_t = Y_{t-1} + \varepsilon_t \dots \dots \dots (4)$$

if the Y_{t-1} coefficient is equal to one, then the unit root problems arise.

Furthermore, the regression estimation is specified as follows:

$$Y_t = \rho Y_{t-1} + \varepsilon_t \dots \dots \dots (5)$$

If ρ is equal to one, then the variance of the variable Y_t is non-stationary or does not contain a unit root (random walk). Based on the equation above, the left and right sides are reduced by Y_{t-1} , and the equation

be converted into:

$$Y_t - Y_{t-1} = \rho Y_{t-1} - Y_{t-1} + \varepsilon_t \dots \dots \dots (6)$$

$$\Delta Y_t = (\rho - 1) Y_{t-1} + \varepsilon_t \dots \dots \dots (7)$$

$$\Delta Y_t = \delta Y_{t-1} + \varepsilon_t \dots \dots \dots (8)$$

where $\Delta Y_t = Y_t - Y_{t-1}$, and $\varepsilon =$ error term

The stationarity test hypotheses are:

H0: $\delta = 0$ (a unit root is present or Y_t time-series data is not stationary)

H1: $\delta \neq 0$ (a unit root is not present or Y_t time-series data is stationary)

If $\delta = 0$, then $\rho = 1$. It means a unit root is present, where the Y_t time-series data is not stationary. Whether the data is stationary or not is dependent on the comparison of the P-value statistic between MacKinnon and 5%. Unless the P-value is higher than 5%, H0 shall not be denied. For the data is not stationary, but if the P-value is lower than 5%, then H0 is denied, or the data occurs to be stationary.

In the previous model, it is almost impossible to assume the error (ε_t) is uncorrelated. To anticipate this correlation, Dickey-Fuller developed the above test called the ADF test with the following formulation:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^m \alpha_i \Delta Y_{t-1} + \varepsilon_t \dots \dots (9)$$

Optimum Lag

Optimum lag is a way to choose how much lag is used in a study before carrying out cointegration, granger causality, VAR, and VECM tests. Determining the optimum lag is an essential step in the VAR model, considering that the purpose of building a VAR model is to see the behavior and relationships of each variable in the system. One of the most commonly used methods is the Akaike Information Criterion (AIC), which evaluates the lag duration. The formula is:

$$AIC = T \text{Log} |\Sigma + 2 N \dots \dots \dots (10)$$

Σ is the essential factor of the residual matrix of variance or covariance, while N is the sum of parameters calculated in all formulas. Gujarati (2004) guides in seeing the AIC value, where the lowest AIC value obtained from the VAR estimation results with various lags shows that the lag length is best to use. The selection of the optimum number of lag is necessary to obtain better results or avoid autocorrelation. The number of lag can be determined using the Eviews 10 software, namely

by conducting the VAR Lag Order Selection Criteria test. In the VAR Lag Order Selection Criteria, various criteria can determine the most optimal number of lag.

Cointegration Test

The cointegration test is conducted to resume the evaluation of non-stationary time-series data. The cointegration method assumes that specific time-series data will deviate from their short-term average and shift together. For a more extended period, the data move toward steadiness in the long term. When many variables shift all in the same direction in a lengthy period, it can be assumed that the model's variables are cointegrated. The economic understanding of cointegration refers to the presence of a long-term steadiness, in which the economic structure converges, ideally, over time. If a shock happens in an economic system, there will be a force that encourages the economy to recover back to its steadiness condition in the long term.

Several approaches are used to test cointegration relationships, namely Granger (1988) and Johansen (1991). However, the cointegration test approach that is frequently employed in the VECM method is the Johansen approach. The hypothesis of the Johansen cointegration test is:

- H₀: $r = r^* < k$ (has no cointegration relationship)
- H₁: $r = k$ (has cointegration relationship)

To calculate the results is to analyze the value of the Trace Statistic and the Max-Eigen Statistics for each critical value at None*. The null hypothesis will be recognized when the critical value is 1%, 5%, or 10% higher than the Trace Statistic value and the Max-Eigen Statistic value. Conversely, the null hypothesis will be denied when the critical value is 1%, 5%, or 10% fewer than the Trace Statistic and the Max-Eigen Statistics. The rejected null hypothesis in this analysis means the formula being tested has a cointegration relationship. A whole other approach to evaluate the outcomes is by looking at the probability of each statistic. If both values are less than the critical value (1%, 5%, or 10%), then the null

hypothesis is rejected. Suppose the Johansen approach test outcomes demonstrate a cointegration relationship in the variable equation. In that case, the VECM method is the next tool that can be applied to establish long-term and short-term associations. However, if the Johansen test outcomes reveal that the variable equation does not have a cointegration relationship, the method used is not the VECM method, but the Unrestricted VAR method.

Vector Error Correction Model (VECM)

From the VECM estimation results, relationships in long and short periods among independent and dependent variables are obtainable. The t-test is performed by contrasting the t-statistics with the t-table to see the importance of the effect. When the t-statistic is higher than the t-table, the independent variable significantly influences the dependent variable. Next is the model's feasibility investigation by comparing the P-value. If P-value is > 0.05, it implies that H₀ will be accepted and that there is no residual autocorrelation. In other words, the optimum lag has met the feasibility of the model. In the coefficient of the error correction term (ECT) depending on the sign and the outcome of the coefficient significance test using the t-test statistics of OLS method, the study of the long-term causality relationship between the independent and dependent variables in VECM modeling can be seen. The short-term formula is presented below:

$$\Delta Y_t = \gamma_{10} + \gamma_{11} \Delta Y_{t-1} + \gamma_{13} \Delta Z_{t-1} + ECT_{t-1} \dots \dots \dots (11)$$

4. DATA ANALYSIS AND DISCUSSION

Data Stationarity Test

Stationary time series data are vital in a study. If non-stationary data is still used to estimate regression, there will be spurious regression (Ekananda, 2018). The data stationarity test uses the unit root test to verify if the data contains unit roots or not. When the variable has unit-roots, then it is non-stationary. The stationary test used the unit root test with the Augmented Dickey-Fuller (ADF) procedure.

Table 1. Results of The ADF Unit Root for Stationarity

Variables	Probability (P-Value)			Result
	Level	First Difference	Second Difference	
EXP	0.0775*	0.0000***	0.0000***	I(2)
INF	0.5074	0.1312	0.0000***	I(2)
FDI	0.0067***	0.0000***	0.0000***	I(2)
ER	0.75	0.0017***	0.0000***	I(2)
GDP	0.0005***	0.0000***	0.0000***	I(2)

Notes: EXP is Manufacturing export value, INF is Inflation, FDI is Foreign direct investment, ER is Exchange rate, GDP = Gross domestic product

The sign*, **, and *** indicate significance at the level of 10%, 5%, and 1%, respectively.

Table 1 shows that FDI and GDP have become staff at the data level because they have a P-Value smaller than the 5% significance level (rejecting the null hypothesis). Meanwhile, data on exports, inflation, and the exchange rate are not stationary because the P-value is greater than 5% (does not reject zero). Because there are still data that are not stationary at the degree level, then the stationary test uses the first degree of difference. It turns out that there are still those that are not stationary, namely inflation data. Finally, in the second degree of difference, all data are stationary, shown by the P-value, which is smaller than the 5% significance level, even less than 1%.

Optimum Lag

Furthermore, the lag length calculation uses sequentially modified LR test statistic, Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quin Information Criterion (HQ) at the 5% level. The optimum lag is concluded by selecting the largest number of sequential modified LR test statistic or the smallest value of Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Criterion (SC), and Hannan-Quinn Criterion (HQ). The optimum lag length utilized in this work is the fifth lag since there are five significant criteria. The results of the lag length calculation are shown in Table 2.

Table 2. Results of Optimum Lag

Lag	LogL	LR	FPE	AIC	SC	HQ
0	394.3972	NA	3.88E-17	-23.59983	-23.37309	-23.52354
1	446.4463	85.17122	7.68E-18	-25.23917	-23.87871	-24.78142
2	485.1115	51.55362	3.75E-18	-26.06736	-23.57318	-25.22815
3	551.9236	68.8367	4.07E-19	-28.60143	-24.97353	-27.38075
4	609.9093	42.17144	1.12E-19	-30.60056	-25.83895	-28.99843
5	719.935	46.67755*	3.29e-21*	-35.75363*	-29.85830*	-33.77003*

* indicates lag order selected by the criterion

Cointegration Test

The concept of cointegration is related to the existence of a long-run equilibrium where the economic system meets over time as desired in theory. The cointegration test is also one way to test the theory. If a shock occurs in an economic system, a force encourages the economy to return to its equilibrium condition within a certain period. In other words, if

there is a disequilibrium in the short term, there will be a force that will push the economy towards its equilibrium condition or pull data to always move side by side (Ekananda, 2018). The application of cointegration techniques in this study is based on the fact that macroeconomic data has behavior, as stated above. The cointegration test uses the Johansen cointegration test.

Table 3. Results of Johansen Co-integration Test

Hypothesized No. of CE(s)	Unrestricted Cointegration Rank Test (Trace)			Unrestricted Cointegration Rank Test (Maximum Eigenvalue)		
	Trace Statistic	0,05 Critical Value	Prob.**	Max-Eigen Statistic	0,05 Critical Value	Prob.**
None *	182.6872	76.97277	0.0000	103.6644	34.80587	0.0000
At most 1	79.02289	54.07904	0.0001	47.55285	28.58808	0.0001
At most 2	31.47004	35.19275	0.1194	17.38248	22.29962	0.2111
At most 3	14.08756	20.26184	0.2834	8.727017	15.8921	0.4637
At most 4	5.360541	9.164546	0.2462	5.360541	9.164546	0.2462

Trace test indicates 2 cointegrating equations at the 0.05 level

Max-eigenvalue test indicates 2 cointegrating equations at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Depending on the outcomes of the Johansen cointegration test exhibited by the trace test and the maximum eigenvalue test, it is understood that there are two cointegration formulas since the trace statistic value and the Max-Eigen Statistic value are either 5 % higher than the critical value or the P-Value is less than 0.05. It suggests that the alternative hypothesis is acknowledged, indicating a cointegration relation, as seen in Table 3 below. The Johansen test's cointegration shows an early indication of a long-term relationship between variables (cointegrated) so that these variables form a linear relationship. Because the Johansen cointegration test results reveal a cointegration relationship in the variable equation and it is stationary in the second difference, the analysis can be continued to the next method, namely the VECM method, which is utilized to define the long-term and short-term relationships.

Vector Error Correction Model

Based on the stationarity and the data cointegration tests, the VECM estimation results in the long-run and short-run coefficients that show the relationship between explanatory variables and dependent variables are presented in Table 4. According to Table 4, VECM estimation results in the long term and short term coefficients that determined the relationship between explanatory variables and dependent variables. The VECM is estimated to look dynamic in the manufacturing exports equation in the short term. The error correction term (ECT) shows how many short-term shocks adjust towards the long-run equilibrium of the manufacturing exports within a quarter. In this case, its value is -0.90315 and statistically significant. It indicates approximately 90.32 percent of the long term disequilibrium from the previous quarter's shock converges back to the current quarter's long-term equilibrium. Also, the error correction value signifies the long-run causality (Bekele, 2020).

Table 4. Result of Vector Error Correction Model

The Short Term		
Variable	Coefficient	t-statistics
CointEq1 or ECT *	-0.90315	-2.62733
D(LNEXP(-1),2)	-0.28416	-1.04098
D(LNEXP(-2),2)	-0.37085	-1.54305
D(LNEXP(-3),2)	-0.11979	-0.6396
D(INF(-1),2) *	-0.04205	-2.0645
D(INF(-2),2)	-0.02196	-1.13531
D(INF(-3),2)	-0.00049	-0.03747
D(LNER(-1),2)	-5761.82	-0.89703
D(LNER(-2),2)	-864.48	-0.15866
D(LNER(-3),2)	725.1009	0.12497

The Short Term		
Variable	Coefficient	t-statistics
D(LNFDI(-1),2)	-0.12165	-1.96957
D(LNFDI(-2),2)	-0.06033	-1.19156
D(LNFDI(-3),2)	-0.00205	-0.06799
D(LNGDP(-1),2) *	4.198521	1.81758
D(LNGDP(-2),2) *	3.156927	1.75115
D(LNGDP(-3),2)	-0.34867	-0.27743
The Long Term		
Variable	Coefficient	t-statistic
D(INF(-1)) *	-0.058044	-3.83782
D(LNER(-1))	-7857.088	-1.41691
D(LNFDI(-1))	-0.185038	-2.55188
D(LNGDP(-1)) *	7.462824	2.13306
C	-0.098814	-2.44583

*the critical values at a significant level of 10%
t-tabel = 1.31784 (1 tailed; α 10% ; degree of freedom or df = 24)
df=n-k where n=40 (the number of data observations) and
k=16 (the number of variables on the short-term of VECM output)

The short term estimated model result revealed that the inflation on lag 1 has a significant negative impact on the manufacturing exports that when a 1% increase of inflation will decrease the manufacturing exports in Indonesia with the value of 0.04205 %, holding the other variables constant. The GDP on lags 1 and 2 positively impact the manufacturing exports. The coefficient shows when a 1% increase of GDP on lags 1 and 2 will increase the manufacturing exports with the value 4.198521% and 3.156927%, holding the other variables constant. On the other hand, the exchange rate and FDI are statistically insignificant.

The long-term estimated model result showed that the inflation on lag 1 negatively impacts the manufacturing exports when a 1% increase of inflation will decrease the manufacturing exports with the value of 0.058044%, holding the other variables constant. The GDP on lag 1 has a positive impact on the manufacturing exports. The coefficient shows when a 1% increase of GDP on lag 1 will increase the manufacturing exports with the value 7.462824%, holding the other variables constant. Meanwhile, the exchange rate and FDI are statistically insignificant.

Among all the independent variables used, only the inflation and GDP have a statistically significant effect on Indonesia's manufacturing exports both in the short and long term. The study results in inflation harm the manufacturing exports in Indonesia. According to Bekele (2020), inflation results increase in the cost of production and a real appreciation of the currency, which reduces domestic firms' international

competitiveness and discourages firms from engaging in the manufacturing sector. So, the government has to control the general inflation level. As a monetary policymaker, Bank Indonesia has to strengthen policy coordination with the government to control the general inflation level. This finding supports the previous empirical work of Uysal and Mohamoud (2018) and Abidin et al.(2013).

The GDP positively impacts Indonesia's manufacturing export both in the short and long terms is in line with theoretical expectations. This result suggests that GDP a vital determinant of the country's capacity to export. A higher GDP means a higher production capacity, which translates into the economy's ability to export more (supply-side). So, the government has to promote the competitiveness of the manufacturing exports where the government has to use effective and efficient government expenditure to increase the manufacturing sector's value-added. The government also has to strengthen the backward link of the sector to decrease its import-input dependency to reduce the effect of exchange rate depreciation. This is consistent with the findings of Oo et al. (2019), Bakar et al. (2015), and Tumwebaze (2015).

On the other hand, the exchange rate is statistically insignificant. The finding is similar to Oo et al. (2019), who investigated the export performance's determinants of ASEAN countries in a short-term and long-term relationship, covering the 2000-2015 period using the Autoregressive Distributed Lag (ARDL) panel data analysis. Based

on Pooled Mean Group (PMG) of Individual Cross Section Estimation revealed that the exchange rate was statistically insignificant in Thailand, Cambodia, Laos, Singapore, and Indonesia. Whereas based on Mean group (MG) and pooled mean group (PMG) used in order to find out the relationship between the determinants of export performance in the short-run and long-run of selected states found that the long term exchange rate has a significant positive impact on the export of ASEAN countries

Foreign direct investment (FDI) is also statistically insignificant. The finding is similar to Oo et al. (2019) found that individually, FDI also statistically insignificant in Thailand, Cambodia, Vietnam, Laos, Singapore, Indonesia, Philippine, and Brunei. Whereas as a whole, FDI has a significant positive impact on the export of ASEAN countries.

5. CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

Based on the results of this study, it can be concluded that in the short term and long term, inflation on lag 1 has a significant negative impact on the manufacturing exports in Indonesia. Likewise, GDP on lags 1 and 2 show a positive effect on manufacturing exports in Indonesia. Meanwhile, the exchange rate and FDI factors do not affect the manufacturing exports in Indonesia. The result of the VECM model test is valid. This can be seen from the ECT coefficient, where it shows a significant negative value. This means that short-term balance fluctuations will be corrected towards long-term equilibrium and the correction process or adjustment process start from the first quarter. In the long run, the variables that significantly affect Indonesia's manufacturing exports are inflation on lag 1 and GDP on lag 1, where inflation has a negative effect, and GDP positively affects.

Inflation increases the cost of production and a real appreciation of the currency, which reduces domestic firms' international competitiveness and discourages firms from engaging in the manufacturing sector. So, the government has to control the general inflation level. As a monetary policymaker, Bank Indonesia has to strengthen coordination policy with the government to control the general inflation level. This result suggests that GDP a vital determinant of the country's capacity to export. A higher GDP means a higher production capacity, which translates into the economy's ability to export more (supply-side). So the policy implication is that the government has to promote the competitiveness of the manufacturing exports where the government has to use effective and

efficient government expenditure to increase the manufacturing sector's value-added. The government also has to strengthen the backward link of the sector to decrease its import-input dependency to reduce the effect of exchange rate depreciation. The manufacturing export is the sector which gave the highest contribution to national export achievements. The regulation on the supply side of export goods is relatively easier to compare from the demand side, which tends to be challenging to control. In the short term, the government has to make policies synergize to increase quality economic growth, increase competitiveness, select superior commodities, access finance, simplify procedural and economic diplomacy, and increase market access. In the long term, the government has to develop infrastructure and human resources. Furthermore, the government also has to encourage the business climate's improvement through integrated licensing services, tax incentive facilities, and vocational development to attract foreign investment, especially FDI. So far, incoming investment has been dominated by portfolio investment, which is very vulnerable to negative issues so that it cannot survive in the long term. The entrepreneurs have to increase knowledge and update export policies and procedures dynamically, primarily related to customs and banking.

However, this study has limitations as it only includes four independent variables: inflation, FDI, the exchange rates, and GDP in the manufacturing sector. Several other factors, such as transportation costs, distance to trading partners, labor force, and trading partner countries' economic growth, cannot be covered in this study because of the period's limitation. It is not possible to include a large number of independent variables. This research can be extended in the future by adding some other sectors, periods, and macroeconomic variables to document more comprehensive results. Additionally, further research can also be conducted to classify exports' determining variables from two sides, particularly the supply and demand sides.

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