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**THE RELATIONSHIP BETWEEN FDI, EXCHANGE RATE, AND INDONESIAN  
AUTOMOTIVE EXPORTS**

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**ABSTRACT**

This study aims to analyze FDI, Exchange Rate, and Export in the Automotive Industry in Indonesia. Data was used from 2006 -2019 with the VAR method. The results obtained in this study are the three variables that do not have a cointegration relationship so the estimation uses the VAR model. Furthermore, the Granger Causality test results show that there is a one-way relationship for each variable. The causal relationship, namely FDI affects the exchange rate, exports affect the exchange rate. VAR test results show that the entry of FDI and the exchange rate does not significantly affect exports. Furthermore, FDI significantly affects the exchange rate, this is because of the integrated trading model with low Exchange Rate volatility. For this reason, it is very important to note the direction of capital inflows, which are used to finance domestic expenditure or finance accumulated capital in the traded or non-traded sectors.

**Keywords:**

Automotive Industry; Exchange Rate; Exports; FDI; International Trade; VAR

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## **INTRODUCTION**

The automotive industry is one of the industries that support the economy of developing countries. The automotive industry in Indonesia has become an important part of the country's manufacturing sector due to the number of leading car companies opening car manufacturing factories or increasing their production capacity in Indonesia, the country with the largest population and a growing economy in Southeast Asia. The automotive industry continues to grow and experience a transition from being a place of production of cars for export in the Southeast Asian region, but being now able to increase domestic sales to encourage an increase in GDP per capita.

In 2019 the Gakindo association noted that car sales in Indonesia reached 1,030,126 units. This figure is down 11% from 2018 reaching 1,151,291 units, but car sales in Indonesia are still the highest in the Southeast Asian region. In the second place, citing ASEAN Automotive Federation data, car sales in Southeast Asia are filled by Thailand. Thailand sold 1,007,552 cars in 2018, including commercial vehicles. The third-largest car sales in the ASEAN region are occupied by Malaysians who can sell 603,287 units of cars. The fourth rank was achieved by the Philippines by recording car sales during 2019 of 369,941 units. Underneath again, there is Vietnam with 322,322 car sales. While Singapore recorded car sales of 90,429 units, Myanmar's 21,916 units, and Brunei Darussalam's 11,909 units.

Indonesia continues to increase the productivity of the automotive sector, both for car exports in ASEAN countries and domestic consumption in the long run. This increase is expected to provide a large contribution to gross domestic product (GDP). In achieving the desired target, Indonesia needs investment, both domestic investment and foreign investment. The attractiveness of Indonesia as an investment destination for several global automotive companies continues to increase due to Indonesia's stable macroeconomic conditions, a large population, and maintaining economic growth are the reasons for these companies to invest

Increased investment in the automotive sector in Indonesia has increased quite well and is expected to increase Indonesia's automotive exports to ASEAN. The largest investment is obtained from Foreign Direct Investment which is based on the Regional Comprehensive Economic Partnership (RCEP). The aim of Foreign Direct Investment is expected not only to be domestic consumption, but the main objective is to increase Indonesia's exports.

Carrying out investment activities and developing exports, are closely related to Indonesia's trade with other countries that use conversion from Rupiah to Dollar as an international currency. The adoption of the free-floating exchange system that began in August 1997, the position of the exchange rate of the rupiah against foreign currencies is determined by the

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market mechanism. For this reason, it is interesting to study further.

This paper emphasizes the importance of foreign direct investment, Exchange, and Export in the Automotive Sector in Indonesia using the VAR approach. The rest of this paper is organized as follows: Section 2 reviews the Literature and relevant empirical studies. Section 3 describes the data and methodology. The next section presents the empirical results. Finally, the paper concludes.

## **LITERATURE REVIEW**

Research that discusses the relationship between FDI and exports has been done in several countries by adding other factors. These studies conclude with mixed results. Damoska Sekuloska (2018) revealed an increase in FDI inflows in the automotive sector and significantly increased the country's total exports. FDI is considered one of the ways of involvement in global supply chains, which also positively influences the competitiveness and increase of exports in the Macedonian country. In the period 2009 to 2016, there was a remarkable increase in FDI inflows in the automotive sector in the Macedonian economy, from 2.8% to 14.1%.

Mohanty & Sethi (2019) used the ARDL method to examine FDI and export performance in India during the 1980-2017 period. The results presented are FDI results are not the same in all sectors, and policymakers must understand the differences and identify policies in each sector related to FDI. The

results show an insignificant negative impact of FDI on real exports in the long term, but not in the short term. The Granger causality test results confirm that there is a direct causal relationship that exists between variables where FDI has a cause for Granger to export. The results of the stability test indicate that there is no structural instability in the residual real export equation. Mohanty explained Law and order must be maintained, which is an important part of attracting foreign investors.

Babu (2018) analyses the relationship between India's FDI and exports in the period 1990-1991 to 2014-2015, and the results reveal that there is no long-term interplay between FDI inflows and exports. The Granger causality test is used to find the causal relationship between these variables. The results show that there is a two-way causal relationship between Foreign Direct Investment and exports. This shows that foreign direct investment might lead to imports which in turn led to exports from India in the post-reform period. This was similarly expressed (Bhasin & Paul, 2016), (Anwar & Sun, 2018), and (Pulatova, 2016).

Febiyansah (2017) analyses the relationship between FDI inflows, exports, and economic growth in Indonesia. The analytical tool used is VECM to estimate the causal relationship between FDI, exports, and GDP. The findings in this study verify the proposition that FDI plays a very important role along with exports that can drive economic growth in the short term and increase competitiveness for Indonesia's commodity exports. Nonetheless, the absence and the effect

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of economic growth of FDI and exports each show that Indonesia still has some domestic economic constraints. Indonesia needs to accelerate its economic growth policies and further integrate the trade chain to reduce restrictions on the domestic economy and increase the level of competitiveness similar to Indonesia. It is delivered (Ahmad, Draz, & Yang, 2018), (Hayakawa, Mukunoki, & Yang, 2020)

Suliman et al., (2018) using panel data from countries of the Economic and Social Commission for West Asia (ESCWA) from 1980-2011, this study examine together for an endogenous relationship between FDI and economic growth by controlling the regressors originating from growth FDI. The results prove that FDI positively and significantly increases growth and growth rates also positively stimulate FDI inward. The results have several policy attributes including promoting the idea that broad-based and sustainable economic growth can be achieved by increasing the share of inward FDI. This research is similar to that conducted (Shamim, Ghais, & Shaikh, 2016), (Chen & Wu, 2017), (Selimi, Reçi, & Sadiku, 2016) and (Sun, 2019).

Li, (2019) used panel data for Brazil, Russia, India, China, and South Africa (BRICS) in the period 1990 to 2010, the researchers explained that outside FDI from BRICS was significantly associated with "better exports, every increase 1 % of external FDI causes an increase of about 0.1% in export sophistication. Meanwhile, inward FDI does not appear to increase the sophistication of BRICS exports.

Liu, Xu, Wang, & Akamavi, (2016) used an external and export gravity pendulum model. External FDI and exports can be complementary or substituted, depending on the stage of development of external FDI. The development of outside FDI is accompanied by advances in productivity, technology, and favorable transformation in the differences in endowment factors, which can be reflected in the ratio of exports to outside FDI.

Ciani & Imbruno, (2017) studied how the presence of multinational companies affects the export performance of Bulgarian manufacturing companies - export overflows from FDI. The results show that the presence of foreign input suppliers allows domestic companies to export additional varieties of lower quality and improve the average quality of existing varieties, while the presence of foreign customers produces the opposite effect. A similar sentiment was delivered by (Popovici, 2018)

Conconi, Sapir, & Zanardi, (2016) show that most companies serve the market through exports before investing there. To rationalize this pattern, researchers describe a model in which companies are unsure about their profits in foreign markets and can experiment with exports before engaging in FDI. In line with this idea, researchers show that the probability that a company starts investing in a foreign country increases with its export experience in that country. In a more uncertain destination, companies postpone the entry of FDI, experimenting longer with exports before forming foreign affiliations.

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Nguye, (2017), Gulcin Tapsin, (2009), and Deseatnicov & Kucheryavyy, (2017) show that in the long run, FDI has a significant positive impact on economic growth while the effect of export is negative. However, FDI and exports do not have a significant impact on growth in the short term. These results offer new insights into openness policies to encourage economic growth

Research that has dealt with the exchange rate and export relations has been carried out in several countries by adding other factors. These studies conclude with mixed results. Ginting, (2013) analyzed the effect of the Rupiah exchange rate on Indonesia's export performance using data from the 2005 quarter I to 2012 quarter III using the Error Correction Model (ECM). The results show that Indonesia's exports need to be addressed to new target countries. This study found that the exchange rate in the long term and short term has a negative and significant effect on Indonesian exports. This shows the importance of exchange rate policies to trigger an increase in Indonesia's exports.

Fitrianti, (2017) investigates the long-term and short-term effects of exchange rate volatility on Indonesia's real exports to its main trading partners; Japan and the US. The findings show the volatility of the rupiah against the Japanese yen reduces Indonesian exports to Japan, both in the short and long term. Fluctuations in the rupiah against the US dollar help Indonesian exports to the US in the short term, but the impact will not occur in the long term. On the other hand, the impact of

commodity price shocks can be ignored, except for long-term exports to Japan.

Sekkat, (2016) the impact of exchange rate misalignment on export diversification in developing countries is highly debated and empirical evidence is conflicting. However, so far there has been no in-depth investigation of such impacts. This paper uses a different explanation for this lack of consensus to investigate conditions where disharmony can affect export diversification. While we found some support for the undervaluation effect on the manufacturing share in total exports, no support was found for the impact of misalignment (either above or undervaluation) on export diversification in manufacturing. The conclusion rejects many endurance checks.

Khalighi & Fadaei, (2017) studied the impact of the exchange rate on export dates as one of the most important and largest foreign currency revenues obtained by horticultural products in the agricultural sector in Iran. The results also show that implementing an exchange rate unification policy without an appropriate exchange rate encourages exporters to harm the export date. Therefore, by implementing an exchange rate stabilization policy, according to inflation in the country, the income of potential exporters has decreased and production costs have alternately increased. A similar sentiment was conveyed (Caglayan & Demir, 2019), (Palazzo & Rapetti, 2017).

Regarding the relationship between FDI and the exchange rate, few discussed it. Kosteletou, N., & Liargovas, (2000) revealed ambiguity regarding the relationship between FDI and RER (Real

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Exchange Rate), there are two levels: (a) which causes FDI or RER and (b) even if there is causality then which theory which will be used. To overcome these two problems the researcher distinguishes between the integrated trading model and the financial behavior model. The first type of model refers to integrated market trading with low RER volatility, where FDI is the driving force of the RER movement. In such markets, FDI policies will have important implications for the RER Movement. The second type of model refers to free-floating currencies, where the volatility of the RER is quite large and therefore the RER is the driving force of the movement of FDI. In such a market, the RER policy will have important implications for FDI movements.

## METHODOLOGY

### Data

Data used in this paper are first: export data (X) Product: HS Code 8703, Motor cars and other motor vehicles principally designed for the transport of persons, incl. Sourced from the *Trade Map*. Second: data on the entry of Foreign Direct Investment (FDI) from the Agency and Exchange Rate sourced from Bank Indonesia.

### Method

The estimation method used in this study is the estimation of the VAR model with the following formula:

$$D(X) = C(1) * D(X(-1)) + C(2) * D(FDI(-1)) + C(3) * D(ER(-1)) + C(4) * D(X(-2)) + C(5) * D(FDI(-2)) + C(6) * D(ER(-2)) + C(7) \dots\dots\dots (1)$$

$$D(FDI) = C(8) * D(X(-1)) + C(9) * D(FDI(-1)) + C(10) * D(ER(-1)) + C(11) * D(X(-2)) + C(12) * D(FDI(-2)) + C(13) * D(ER(-2)) + C(14) \dots\dots\dots (2)$$

$$D(ER) = C(15) * D(X(-1)) + C(16) * D(FDI(-1)) + C(17) * D(ER(-1)) + C(18) * D(X(-2)) + C(19) * D(FDI(-2)) + C(20) * D(ER(-2)) + C(21) \dots\dots\dots (3)$$

## RESULT AND DISCUSSION

The first test, conducted in this paper is stationary testing using the following method:

### Root Unit

Stationary test results with Augmented Dicker-Fuller (Table. 1) Shows that the three variables (ER, FDI, and X) are not stationary at the level or still contain root units. This will make the regression spurious. This flawed regression will estimate each variable has a relationship when in reality it is not. This requires testing the root unit in First Difference.

**Table 1: Augmented Dicker-Fuller Unit Root Test Result at Level**

Variable	T-Statistics	Prob.	Critical Values		
			1%	5%	10%
ER	0,000139	0.9540	-3.565430	-2.919952	-2.597905
FDI	-1.760590	0.39530.953	-3.568308- 3.568308	-2.921175- 2.921175	-2.598551- 2.598551
XX	-1.270819- 1.270819	0.63620.636 2	-3.565430- 3.565430	-2.919952- 2.919952	-297907- 29790.905

After the test results are not on the level, the First Difference test is presented in Table 2. The stationarity test results in Table 2 indicate that the

three variables to be estimated (ER, FDI, and X) already do not contain a root unit or are stationary.

**Table 2: Augmented Dicker-Fuller Unit Root Test Result at First Difference**

Variable	T-Statistics	Prob.	Critical Values		
			1%	5%	10%
ER	-5.281292	0.0001	-3.571310	-2.922449	-2.599224
FDI	-12.93433	0.0000	-3.568308	-2.921175	-2.598551
X	-7.440529	0.0000	-3.571310	-2.922449	-2.599224

**Cointegration Test**

Cointegration Test is required for knowing the long-term relationship between each variable. This is useful for determining the next estimation of whether to use VAR or VECM. The results

of cointegration testing (Table 4) on the three variables analyzed in this paper indicate that the three variables do not have a cointegration or long-term relationship so the next estimate uses the VAR model.

**Table 4. Johansen Cointegration Trace Test**

Hypothesis No. of CE (s)	Unrestricted Cointegration Rank Test (Trace)		Unrestricted Cointegration Rank Test (Maximum Eigenvalue)	
	Trace Statistic	Prob. **	Trace Statistic	Prob. **
None	0.4118 14.08620 0.3580			20.16376
At most 1	6.077566	0.6864	5.660659	0.6571
At most 2	0.416907	0.5185	0.416907	0.5185

**Granger Causality Tests Group**

Statistical tests with Granger Causality Tests are used to determine the

direction of influence of each variable. The results of this test presented in Table 2 show that the entry of foreign direct

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investment (FDI) significantly influences the movement of ER and not vice versa where ER does not significantly influence the entry of FDI. Next to the direction of the relationship between X and ER. The test results show that export (X) significantly affects the exchange rate (ER). Meanwhile, the exchange rate did not significantly affect exports. For the relationship between exports and FDI, the results of the causality test show that these two variables do not significantly have a Granger causality relationship.

FDI - ER	3.22293	0.0492
ER - FDI	0.58404	0.5618
X - ER	3.91199	0.0271
ER - X	0.39201	0.6780
X - FDI	0.93559	0.3999
FDI - X	1.34775	0.2701

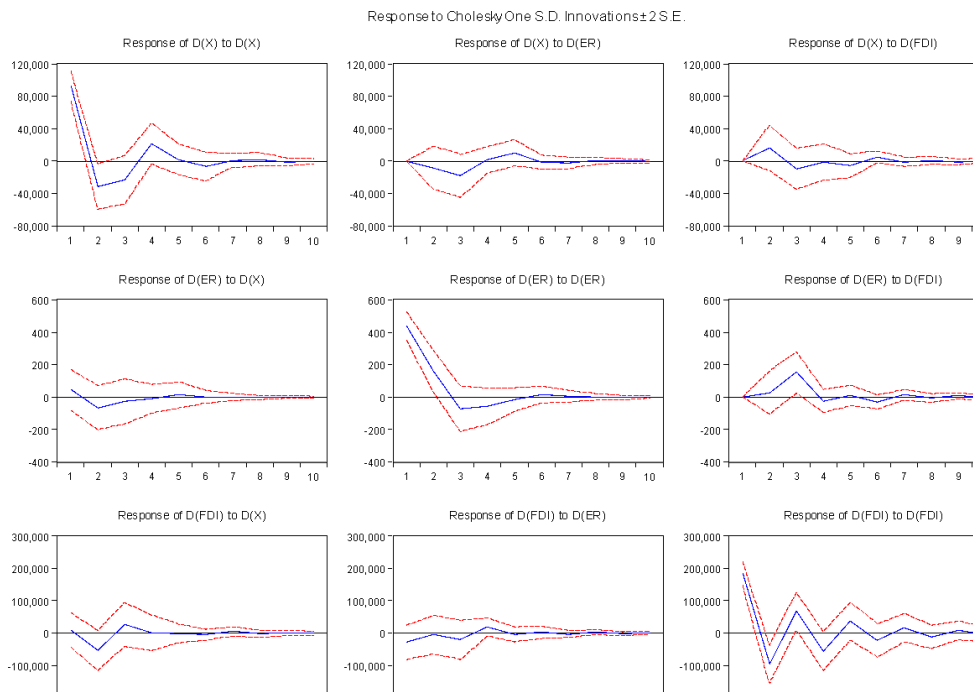
The findings from the Causality Granger test results are the direction of the relationship between variables. The direction of this relationship shows that the variables associated with the flow of money into Indonesia significantly affect the exchange rate. However, this test is a precedence test so further testing (VAR estimation) is needed.

**Table 5. Granger Causality Tests**

Granger Causality	F-Statistic	Prob.
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Variance Decomposition

**Table 6. Response to Cholesky**



Model Estimation Results

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The first VAR estimate is an estimate with an export-dependent variable. The VAR estimation results in Table 6 show that export (X) is not significantly affected by both variables

(FDI and ER) but is significantly affected by the lag of that variable. In other words, the value of export is influenced by the export itself in the first lag D (X-1) and the second lag D (X-2).

**Table 7. Estimated export variables**

<b>D (X)</b>	<b>-0.340 * D (X<sub>-1</sub>) + 0.085 * D (FDI<sub>-1</sub>) + -13.24 * D (ER<sub>-1</sub>) + -0.308 * D</b>
<b>=</b>	<b>(X<sub>-2</sub>) + 0.024 * D (FDI<sub>-2</sub>) +</b>
Prob.	0.02** 0.25 0.65 0.03 ** 0.75
	<b>-40.940 * D (ER<sub>-2</sub>) + 31864.27</b>
Prob.	0.17 0.03

Explanation: \*): significant at 1%; \*\*): significant at 5%; \*\*\*): significant at 10%

The next VAR estimate is an estimate with FDI as the dependent variable. The independent variables that significantly affect FDI are D (X (-1) and

FDI (-1). The estimation results show that the export of motor vehicles in lag 1 significantly influences the entry of FDI.

**Table 8. Estimation of the FDI variable**

<b>D (FDI)</b>	<b>-0.508 * D (X<sub>-1</sub>) + -0,521 * D (FDI<sub>-1</sub>) + -46,619 * D (ER<sub>-1</sub>) + -0,217</b>
<b>=</b>	<b>* D (X<sub>-2</sub>) + 0.140 * D (FDI<sub>-2</sub>) +</b>
Prob.	12:09 *** * 0.44 0.46 0.37 -37,067
	<b>0,001* D (ER<sub>-2</sub>)+ 26767.08</b>
Prob.	0:54 0:35

Explanation: \*): significant at 1%; \*\*): significant at 5%; \*\*\*): significant at 10%

The VAR model with ER as the dependent variable shows several independent variables that significantly influence it. These variables are D (ER<sub>-1</sub>),

D (ER<sub>-2</sub>), and D (FDI<sub>-2</sub>). This shows that the influx of FDI significantly influences exchange rate movements.

**Table 9. Model VAR with ER**

<b>D (ER)</b>	<b>-0.0009 * D (X<sub>-1</sub>) + 0.0001 * D (FDI<sub>-1</sub>) + 0.373 * D (ER<sub>-1</sub>) + -</b>
<b>=</b>	<b>0.000227 * D (X<sub>-2</sub>) + 0.000924 * D (FDI<sub>-2</sub>) +</b>
Prob.	0.2023 0.6874 0.0115 * 0.7435 0.0172 *
	<b>-0.255 * D (ER<sub>-2</sub>) + -0.255032</b>
Prob.	0.0811 0.0936

Explanation: \*): significant at 1%; \*\*): significant at 5%; \*\*\*): significant at 10%

## CONCLUSION

Based on the results of stationary testing, the three stationary variables are the first difference. Related to cointegration testing, the three variables do not have a cointegration relationship so the estimation uses the VAR model. Furthermore, the Granger Causality test results show that there is a one-way

relationship for each variable. The causal relationship, namely FDI affects the exchange rate, exports affect the exchange rate. VAR test results show that the entry of FDI and the exchange rate does not significantly affect exports. Meanwhile, exports significantly affect FDI, this is in line with Conconi, Sapir, & Zanardi, (2016) showing that most

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companies or investors make transactions in the markets of destination countries through exports before investing with those countries. This is done to get a level of confidence in the benefits of the foreign market before being directly involved in FDI. Furthermore, FDI significantly affects the exchange rate, this is due to the integrated trading model with low Exchange Rate volatility where FDI is the driving force of the Exchange Rate (Kosteletou, N., & Liargovas, 2000). For this reason, it is very important to note the direction of capital inflows used to finance domestic expenditure or accumulated capital in the traded or non-traded sectors. If capital inflows are used to finance domestic consumption, it must increase purchasing power and demand for traded and non-traded goods because it will cause a real exchange rate appreciation and a trade balance deficit. If the nominal exchange rate depreciates as a result of trade deficits, the final effect of FDI inflows on the RER cannot be predicted. Thus, a change in the flow of FDI affects the real exchange rate through spending.

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