Foreign Direct Investment, Export and Economic Growth in Indonesia: ARDL - ECM Analysis

Review of Integrative Business & Economics Research

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ABSTRACT

This study applies the Auto Regression Distributed Lag (ARDL) approach and the ECM-ARDL model to examine the causal relationships among foreign direct investment (FDI), export, and economic growth in Indonesia over the period of 1981-2018. The results show a bidirectional causality between inward FDI and economic growth, a unidirectional causal relationship between export and economic growth, and the absence of a causal relationship between inward FDI and export. The findings provide evidence for FDI-led and export-led economic growth in Indonesia. These findings suggest that Indonesia should continue with policies intended to attract inward FDI and expand the export sector to promote economic growth. Moreover, policies that can diversify the kinds of FDI attracted into Indonesia are important in promoting export-led and FDI-led economic growth.

Keywords: FDI; Export; Economic growth; ARDL.

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1. INTRODUCTION

Foreign direct investment (FDI) is known as one of the most important factors in determining the economic growth of a country, especially the developing ones. According to Blomstrom *et al.* (1992), inward FDI drives the host country's economic growth if the home country's economy is a developed one. FDI serves as a channel through which new technologies are transferred from the home country to the host country. FDI also opens up foreign markets as multinational corporations strive to enter host countries' markets through competition using their superior innovations and production technologies. Moreover, inward FDI increases the exporting capability of the host countries, causing an increase in profits and foreign exchange earnings in developing countries.

There are numerous empirical studies on the impacts of FDI and export on economic growth in different countries using various econometric approaches and methods in different time periods. Results from these studies concerning the impacts of export and FDI on the economic growth are mixed. Majority of them show a positive causal

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relationship between FDI, export, and economic growth in either the short run, the long run, or both [see, for example, Hsiao and Hsiao (2006), Pelinescu and Radulescu (2009), Acaravci and Osturk (2012), Belloumi (2014), Dritsaki and Stiakakis (2014), Mahmoodi and Mahmoodi (2016), Mahadika, Kalayci and Altun (2017), Sandalcilar and Dilek (2017), Sunde (2017), Van,*et al*. (2017) and Sultanuzaman *et al.* (2018)].

In the 1990s, FDI became the main source of capital flowing into developing countries like Indonesia. Apart from being one of the main economic forces in Southeast Asia, Indonesia is also an emerging market with a high level of household consumption that attracts foreign investors to invest in the country. To provide policy implications, it is practically important to examine the relationship between inward FDI, export, and economic growth in Indonesia.

This article is organized as follows: Section 2 describes the characteristics of the Indonesian economy. Section 3 reviews the literature on the FDI, export and growth nexus. Section 4 describes the data collection methodology of this study. Empirical results are presented in Section 5. Finally, Section 6 concludes the article.

2. THE INDONESIAN ECONOMY

The Indonesian economy has achieved tremendous progress over the last two decades. During the 2000s, the economic growth of Indonesia was rather stable at 4% to 6%. As of today, Indonesia is the fourth most populous nation and the seventh-largest economy in the world, with a real GDP of $3.50 trillion (valued by purchasing power parity) and a nominal GDP of $1.02 trillion. According to the World Bank (2018), Indonesia achieved enormous progress in poverty reduction. Since 1999, Indonesia has been cutting the poverty rate by more than half to 10.9 % in 2016. Its annual per-capita GDP of $3,871 in 2018 was much higher than that in 2000 ($857).

According to the Central Bureau of Statistics of Indonesia (2018), Indonesia's total quantity of exported goods represented 5.2% of its overall real GDP in 2018. The same figure in 2017 was 6.7%, which indicates a decreasing reliance of Indonesia's economy on export.

Indonesia has abundant natural resources, including crude oil, natural gas, tin, copper, and gold. The country's key imports include machinery and equipment, chemicals, fuels, and foodstuffs, while its major exports include oil and gas, electrical appliances, plywood, rubber, and textiles.

Indonesia exported US$180.2 billion worth of goods in 2018. This dollar amount of exports reflects a 2.4% rise annually since 2014 and a 6.8% rise from 2017 to 2018. From the geographical distribution perspective, almost three-quarters (72%) of Indonesia's exports by value were delivered to fellow Asian countries, another 11.3% were delivered to North America, which was closely followed by European countries at 10.6%. Small percentages of its exports were shipped to Africa (2.6%), Australia and Oceania (2%), and Latin America (excluding Mexico but including the Caribbean) (1.5%).

FDI flowing into Indonesia reached USD 21 billion in 2018, a 6.8% increase from that in 2017 (UNCTAD World Investment Report, 2019). The country's FDI growth was associated with a set of economic policy packages implemented by the Indonesian

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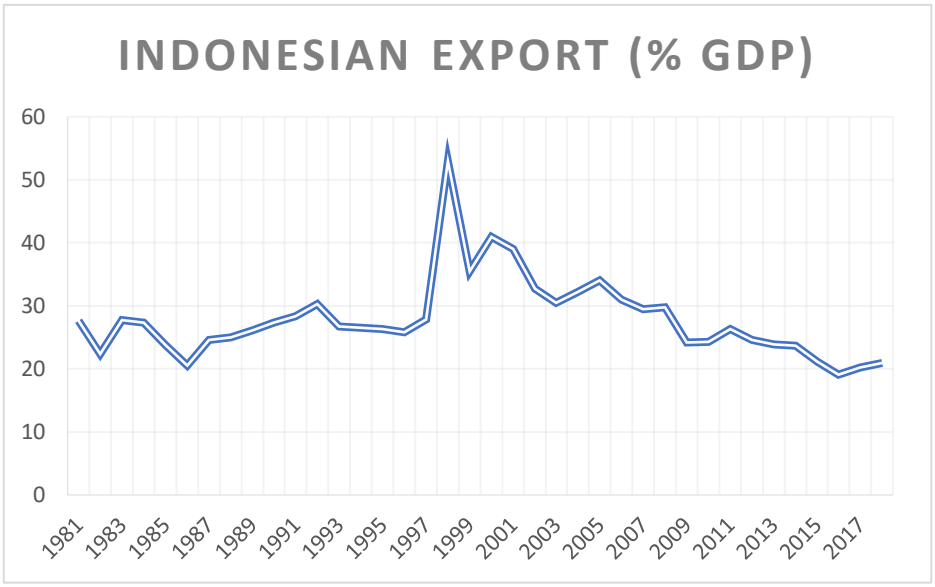
government over the last couple of years. In particular, the government introduced 14 stimulus packages mainly focusing on deregulation, law enforcement and business certainty, lower interest rates and taxs for exporters, lower energy tariffs for labor-intensive industries, tax incentives for investments in special economic zones, and lower tax rates on properties acquired by local real estate investment trusts. In 2018, the country was the 16th largest recipient of FDI in the world and the 5th largest in Asia. The 2018 increase is FDI was mainly caused by the increase in intra-ASEAN investments from Singapore. One of the biggest projects was the infrastructure in the new sections of the Jakarta Light Rail Transit. New SEZs also contributed to the increase in FDI. For instance, Indonesia lowered the minimum equity requirement for foreign investors and abolished the approval requirement for several business transactions involving foreign investors. The country's FDI stock reached $226 billion (22.1% of GDP) in 2018, which was a 2.2% decrease from that in 2017. The sectors receving the largest shares of FDI are the mining, the machinery and electronics, the electricity, gas and water supply, and the chemical and pharmaceutical sectors. Singapore remains to be the largest source of FDI, followed by China and Japan.

Figure 1. Export of Indonesia (% of GDP)



Source: World Bank

According to the data from the Investment Coordinating Board (BKPM), Indonesia's inward FDI dropped by 20.2% year-on-year to USD 5.9 billion in the third quarter of 2018, which constitutes the third consecutive quarterly decline in FDI flowing into the country. The Indonesian government improved the overall atmosphere of the market in 2018 by consolidating political and economic stability and implementing structural reforms aiming to lower investment risks.

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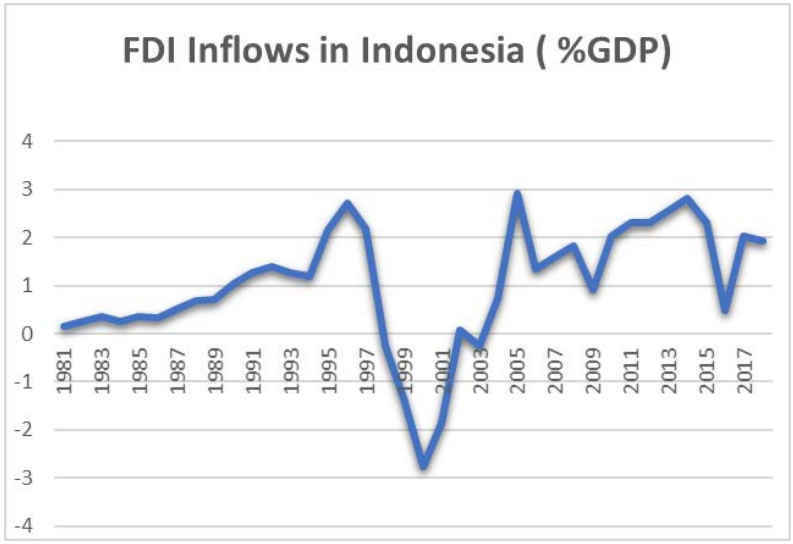
Figure 2: Inward FDI in Indonesia



Source: World Bank

3. LITERATURE REVIEW

A multitude of studies have been conducted to examine the relationship between FDI, export, and economic growth. Nevertheless, there has been no consensus on this relationship. Most studies were conducted to examine the bivariate relationships between FDI and GDP, between GDP and export, and between FDI and export. The interrelationships between the three variables in an individual country or group of countries are briefly summarized in the literature review below.

Liu, Burridge, and Sinclair (2002) investigated the causal links between trade, economic growth, and inward FDI in China using quarterly data from 1980:Q1 to 1997:Q4. They found a bi-directional causality between economic growth, FDI, and export. Likewise, Dritsaki, Dritsaki, and Adamopoulos (2004) using annual IMF data from 1960 to 2002 found that there are long-run equilibrium relationships and causal relationships between FDI, export, and economic growth in Greece.

Another study by Dritsaki and Stiakakis (2014) found bidirectional long-run and short-run causal relationships between export and growth, while FDI does not have the expected positive impact on economic growth. Their study was conducted in Croatia using annual time series data in 1994-2012. Sunde (2017) examined economic growth as a function of FDI and export in South Africa using annual time series data from 1990 to 2014. He found that both FDI and export drive economic growth and that there is a unidirectional causality between economic growth and FDI and a bidirectional causality between economic growth and export. Singh (2017) examined the long-run relationship between outward FDI, export, and GDP in India for the time period 1980 to 2014 and found that all the variables are cointegrated when outward FDI is taken as the dependent variable. His study also indicates that there is a unidirectional causality running from export to outward FDI and another one running from FDI and GDP to export. The results of his study also reveal a chain of relationships between the variables, i.e., GDP causes export, which in turn causes outward FDI.

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Using a VECM Model to analyze Vietnamese data over the period of 1990-2015, Van *et al*. (2017) found a bidirectional causality relationship among FDI, export, and economic growth. They also found that FDI and export have positive effects on economic growth in the same country. Alici and Ucal (2003) investigated the causal relationship among trade, FDI, and economic growth in Turkey from 1987 to 2002. Their results show a unidirectional causality between export and economic growth, but such relationship does not exist between FDI and economic growth. Likewise, Ahmad *et al*. (2004) found unidirectional causalities from export to GDP and from FDI to GDP in Pakistan using annual data from 1972 to 2001. Cuadros *et al*. (2004) found unidirectional causalities from real FDI and real exports to real GDP in Mexico and Argentina, and a unidirectional causality from real GDP to real exports in Brazil using quarterly data from 1970 to 2000. In addition, Chowdhury and Mavrotas (2006) found a unidirectional causality from GDP to FDI in Chile, and a bidirectional causality between GDP and FDI in Malaysia and Thailand using data from 1969 to 2000. Sultanuzzaman *et al*. (2018) found that there is a bidirectional causality between FDI and economic growth but only a unidirectional causal relationship between export and economic growth in Sri Lanka using annual time series data from 1980-2016. Moreover, Romero (2015) found a bidirectional causality relationship between FDI and GDP using annual time series data over the period 1989-2013 in Mexico.

Another study on a group of countries by Sandalcilar and Dilek (2017) found a two-way relationship among FDI, export, and economic growth. Mahmoodi and Mahmoodi (2016) examined the causal relationship between FDI, export, and economic growth in two panels of developing countries (consisting of eight European developing countries and eight Asian developing countries). They found in the European group a bidirectional causality between GDP and FDI and a unidirectional causality from GDP and FDI to export in the short run. In the Asian group, they found a bidirectional causality between export and economic growth in the short run. Moreover, Hsiao and Hsiao (2006) examined the causality relationships between GDP, export, and FDI among China, Korea, Taiwan, Hong Kong, Singapore, Malaysia, Philippines, and Thailand using time-series and panel data from 1986 to 2004. They found that FDI has a unidirectional effect on GDP, both directly and indirectly through export, and that there is a bidirectional causality between export and GDP within the same group.

According to Mehrara *et al*'s (2013) study using panel techniques to estimate the causality among economic growth, export, and FDI in developing countries over the period of 1980 to 2008, there is strong evidence for a bidirectional causality between economic growth and inward FDI. The export-led growth hypothesis is also supported by their finding of a unidirectional causality running from export to economic growth in both the short run and the long run. The relationship between FDI, export, and economic growth was also examined by Keho (2015) who conducted a study in 12 sub-Saharan African countries over the period 1970 to 2013. By applying the multivariate co-integration approach of Johansen, he found that economic growth has a positive long-run effect on FDI in five countries and that export is positively related to FDI in four countries. The results of his study also reveal a short-run bidirectional causality between FDI and GDP, and a unidirectional causality running from GDP to export in Ghana, a bidirectional causality between FDI and export in Benin. His findings also suggest that GDP causes export in Benin, Congo Democratic, and Gabon and that FDI causes export in Cote d'Ivoire and Kenya. In the long run, both GDP and export cause FDI in Benin, Burkina Faso, Gabon,

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and Senegal. Moreover, a bidirectional causality exists between FDI and GDP in Cameroon, Cote d'Ivoire, and South Africa, and between FDI, GDP and export in Congo Democratic. In addition, there is a bidirectional causality between GDP and export in Ghana, and between FDI and export in Kenya.

All in all, findings from past empirical studies reviewed above appear to substantially vary with the sample period, the econometric methods used, the presence of other related variables, and the inclusion of interaction variables in the estimation. Bidirectional, unidirectional, and/or absence of causality were all found in these past studies. In general, the findings tend to show a positive relationship running from FDI and export to economic growth. In view of the mixed findings from past research, the present study aims to re-examine the causal relationships between FDI, export, and economic growth with special reference to Indonesia.

4. DATA AND METHODOLOGY

4.1. Data

This study used annual time series data from 1981 to 2018 in Indonesia. The major economic variables considered in this study include Indonesia's net inward FDI (as a percentage of GDP), quantity of exported goods and services (as a percentage of GDP), and annual GDP growth rate (in percentage terms). The data on all these variables were taken from the World Development Indicators database (WDI, 2019).

4.2. Methodology

This study applied the Bounds Test for cointegration and causality within the ARDL modeling framework developed by Pesaran *et al.* (2001). It was shown that this statistical approach can be applied irrespective of the order of integration of the variables (i.e., irrespective of whether the regressors are I(0), I(1), or mutually cointegrated). Another reason for applying the ARDL approach is that alternative cointegration techniques may not operate properly for a small sample. Our approach is specifically linked to the class of ECM models known as VECMs.

4.2.1. Unit Root Test

The order of integration of each variable has to be tested because ARDL uses the level of each variable at which it is stationary. This study applied the Augmented Dickey Fuller (ADF) unit root test (Dickey and Fuller, 1979) and the Phillips Peron (PP) test (Phillips and Perron, 1988) to check the stationarity of each time series. In both the ADF and the PP tests, the value of the coefficient δ_2 is to be estimated from following equation:

$$\Delta \boldsymbol{Z_t} = \boldsymbol{\delta_0} + \boldsymbol{\delta_1 t} + \boldsymbol{\delta_2 Z_{t-1}} + \sum_{i=1}^{n} \boldsymbol{\beta_i} \Delta \boldsymbol{Z_{t-1}} + \boldsymbol{\varepsilon_t} \qquad \textbf{(1)}$$

ADF tests for the existence of unit root in $\boldsymbol{Z_t}$, which represents a particular economic variable considered in this study (i.e., export, FDI, and GDP); $\Delta \boldsymbol{Z_{t-1}}$ is the first difference of $\boldsymbol{Z_t}$; *n* is the lag length to be determined, and; $\boldsymbol{\varepsilon_t}$ is the error term adjusted for autocorrelation. The coefficients $\boldsymbol{\delta_0}$, $\boldsymbol{\delta_1}$, $\boldsymbol{\delta_2}$, and $\boldsymbol{\beta_i}$ are to be estimated from Equation (1). The null and the alternative hypotheses for the existence of unit root in $\boldsymbol{Z_t}$ are stated as follows:

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$$\mathbf{H_0: \delta_2 = 0}$$

$$\mathbf{H_{1:} \delta_2 < 0}$$

The other method applied in this study is the Phillips Peron (PP) test, which corrects for possible serial correlation and heteroscedasticity in the error term by directly modifying the test statistics without the lagged term in Equation (1) (Enders, 2004). Thus, the equations and hypotheses to be tested are similar to ADF except for that the lagged term is excluded from the model as follows:

$$\Delta Z_t = \delta_0 + \delta_1 t + \delta_2 Z_{t-1} + \varepsilon_t \quad \textbf{(2)}$$

4.2.2. Bound Test Approach

This study applied the Bound test to examine the causality between FDI, export (EXP) and economic growth (GDP) in Indonesia because this approach is known to be capable of generating more reliable estimates in the presence of endogeneity (Gujarati, 2009). Application of the ARDL Bound test is useful for estimating and interpreting the dynamic relationships between economic variables (Dixit, 2014). This study selected the optimal lag length based on the Akaike information criterion. Unit-root tests on each variable were conducted using the ADF and PP tests as described in the previous section. Cointegration tests were conducted by applying the LR test technique proposed by Johansen (1995).

The ARDL model used in this study is specified as follows:

$$\Delta FDI_t = \beta_{01} + \sum_{i=1}^{p} \alpha_{1i} \Delta FDI_{t-1} + \sum_{i=0}^{q} \alpha_{2i} \Delta GDP_{t-1} + \sum_{i=1}^{s} \alpha_{3i} \Delta EXP_{t-1} + \delta_{11} FDI_{t-1} + \delta_{21} GDP_{t-1} + \delta_{31} EXP_{t-1} + \varepsilon_{1t} \quad \textbf{(3)}$$

$$\Delta GDP_t = \beta_{02} + \sum_{i=1}^{p} \alpha_{1i} \Delta GDP_{t-1} + \sum_{i=0}^{q} \alpha_{2i} \Delta FDI_{t-1} + \sum_{i=1}^{s} \alpha_{3i} \Delta EXP_{t-1} \delta_{12} GDP_{t-1} + \delta_{22} FDI_{t-1} + \delta_{32} EXP_{t1} + \varepsilon_{2t} \quad \textbf{(4)}$$

$$\Delta EXP_t = \beta_{03} + \sum_{i=1}^{p} \alpha_{1i} \Delta EXP_{t-1} + \sum_{i=0}^{q} \alpha_{2i} \Delta FDI_{t-1} + \sum_{i=1}^{s} \alpha_{3i} \Delta GDP_{t-1} + \delta_{13} EXP_{t-1} + \delta_{23} FDI_{t-1} + \delta_{33} GDP_{t-1} + \varepsilon_{3t} \quad \textbf{(5)}$$

where Δ denotes the first difference operator and ε_{1t} , ε_{2t} and ε_{3t} are error terms assumed to be independently and identically distributed.

We choose the optimal lag length of the first-differenced dependent variables based on the Akaike information criterion that give rise to the following model:

$$\Delta FDI_t = \beta_{01} + \sum_{i=1}^{p} \alpha_{1i} \Delta FDI_{t-I} + \sum_{i=0}^{q} \alpha_{2i} \Delta GDP_{t-I} + \sum_{i=1}^{s} \alpha_{3i} \Delta EXP_{t-I} + \mu_{1t} \quad \textbf{(6)}$$

$$\Delta GDP_t = \beta_{02} + \sum_{i=1}^{p} \alpha_{1i} \Delta GDP_{t-I} + \sum_{i=0}^{q} \alpha_{2i} \Delta FDI_{t-I} + \sum_{i=1}^{s} \alpha_{3i} \Delta EXP_{t-I} + \mu_{2t} \quad \textbf{(7)}$$

$$\Delta EXP_t = \beta_{03} + \sum_{i=1}^{p} \alpha_{1i} \Delta EXP_{t-I} + \sum_{i=0}^{q} \alpha_{2i} \Delta FDI_{t-I} + \sum_{i=1}^{s} \alpha_{3i} \Delta GDP_{t-I} + \mu_{3t} \quad \textbf{(8)}$$

where: ΔFDI_t , ΔGDP_t and ΔEXP_t are the dependent variables; α_1 , α_2 and α_3 are the long-run coefficients, and; *p, q,* and *s* are the optimal lag lengths of the ARDL model.

According to Pesaran *et al*. (2001), a F-test can be conducted for the joint significance of the lagged variables' coefficients. The null hypotheses for the absence of cointegrating relationship among the variables in Equations (3), (4) and (5) are respectively:

$$\mathbf{H_0: \delta_{11} = \delta_{21} = \delta_{31} = 0},$$

$$\mathbf{H_0: \delta_{12} = \delta_{22} = \delta_{32} = 0},$$

$$\mathbf{H_0: \delta_{13} = \delta_{23} = \delta_{33} = 0}.$$

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The alternative hypotheses for the presence of cointegration are respectively:

$$\mathbf{H_1: \delta_{11} \neq \delta_{21} \neq \delta_{31} \neq 0},$$

$$\mathbf{H_1: \delta_{12} \neq \delta_{22} \neq \delta_{32} \neq 0},$$

$$\mathbf{H_1: \delta_{13} \neq \delta_{23} \neq \delta_{33} \neq 0}.$$

To statistically test for the above hypotheses, two alternative sets of critical values for a given significance level are considered. The first set of critical values is based on the assumption that all the variables included in the ARDL specification are I(0), while the second set is based on the assumption that the variables are I(1).

5. EMPIRICAL RESULTS

5.1. Unit root test analysis

We applied the ADF test of Dickey and Fuller (1979) and the PP test of Philips and Perron (1988) to check the presence of unit roots in the variables. The test results are presented in Table 1, which indicates that FDI and EXP are stationary in first difference [i.e., I(1)] while GDP is stationary in level [i.e., I(0)] with a constant and time trend.

Table. 1. Stationarity Test

VARIABLES	MODEL	AUGMENTED DICKEY FULLER TEST (ADF)		PHILLIPS PERRON TEST (P.P)		DECISION
		I(0)	I(1)	I(0)	I(1)	
FDI	Constant	-2.328519(0.1688)	-4.161200(0.0027)***	-2.461847(0.1328)	-5.718205(0.0000)***	I(1)
	Trend	-2.523516(0.3157)	-4.088116(0.0151)**	-2.687235(0.2473)	-5.633538(0.0003)***	
	None	-1.593794(0.1034)	-4.196105(0.0001)***	-1.677706(0.0879)	-5.788112(0.0000)***	
GDP	Constant	-4.600349(0.0007)***		-4.634096(0.0006)***		I(0)
	Trend	-4.530508(0.0046)***		-4.566188(0.0042)***		
	None	-2.309313(0.0221)***		-2.309313(0.0221)***		
EXP	Constant	-1.807313(0.3711)	-9.194025(0.0000)***	-2.834802(0.0632)	-9.309015(0.0000)***	I(1)
	Trend	-2.837253(0.1938)	-9.205593(0.0000)***	-2.815160(0.2011)	-9.857980(0.0000)***	
	None	-0.482520(0.4998)	-9.326407(0.0000)***	-0.650749(0.4285)	-9.444109(0.0000)***	

Notes: ***, ** and * indicate significance at the 1%, 5%, and 10% levels, respectively. Values in parentheses are p-values.

5.2. Cointegration analysis

After testing for stationarity, we applied the ARDL (Autoregressive Distributed Lag) bound test approach developed by Pesaran *et al.* (2001) to investigate the presence of cointegration in the long-run relationships between FDI, export, and economic growth in Indonesia. The results of the ARDL cointegration test are presented in Table 2.

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Table 2. Cointegration Test

Estimated model	Bound Test for Cointegration Test		Diagnostic Test		
	Optimal lag length	F-Statistic	Normality (Prob.)	X^2 Serial	X^2 Heteroskedasticity
F_{FDI} **(FDI/GDP,EXP)**	(1,1,0)	7.619811	0.142430	0.1341	0.5256
F_{GDP}**(GDP/FDI,EXP)**	(1,1,1)	7.669627	0.096804	0.2102	0.5661
F_{EXP}**(EXP/FDI,GDP)**	(1,0,1)	2.630154**	0.124818	0.4356	0.0588

Note: ** indicates that there is no cointegration.

Table 2 shows that there are two cointegrating vectors (with the F-statistics exceeding the upper critical bounds at the 5% level of significance), confirming the existence of long-run relationships among the variables in Equations (3) (with FDI as the dependent variable) and those in Equation (4) (with GDP as the dependent variable). However, there is not any cointegration relationship in Equation (5) (with EXP as the dependent variable). The table also confirms that the ARDL model fulfills the assumptions of normality, autoregressive conditional heteroskedasticity, functional forms, and serial correlation.

5.3. Estimation of the long-run and short-run relationships

We examined the long-run relationship among the variables of the model using the following equations:

$$\boldsymbol{FDI}_t = \boldsymbol{\beta}_{01} + \sum_{i=1}^{p} \boldsymbol{\delta}_{11}\boldsymbol{FDI}_{t-I} + \sum_{i=0}^{q} \boldsymbol{\delta}_{21}\boldsymbol{GDP}_{t-I} + \sum_{i=1}^{s} \boldsymbol{\delta}_{31}\boldsymbol{EXP}_{t-I} + \boldsymbol{e}_{1t} \quad \textbf{(9)}$$

$$\boldsymbol{GDP}_t = \boldsymbol{\beta}_{02} + \sum_{i=1}^{p} \boldsymbol{\delta}_{12}\boldsymbol{GDP}_{t-I} + \sum_{i=0}^{q} \boldsymbol{\delta}_{22}\boldsymbol{FDI}_{t-I} + \sum_{i=1}^{s} \boldsymbol{\delta}_{32}\boldsymbol{EXP}_{t-I} + \boldsymbol{e}_{2t} \quad \textbf{(10)}$$

$$\boldsymbol{EXP}_t = \boldsymbol{\beta}_{03} + \sum_{i=1}^{p} \boldsymbol{\delta}_{13}\boldsymbol{EXP}_{t-I} + \sum_{i=0}^{q} \boldsymbol{\delta}_{23}\boldsymbol{FDI}_{t-I} + \sum_{i=1}^{s} \boldsymbol{\delta}_{33}\boldsymbol{GDP}_{t-I} + \boldsymbol{e}_{3t} \quad \textbf{(11)}$$

Moreover, a dynamic error correction model can be devised from the bounds of the ARDL test through a simple linear transformation, which incorporates the short-run dynamics and the long-run equilibrium. As such, the dynamic unrestricted error correction model is specified as follows:

$$\Delta\boldsymbol{FDI}_t = \boldsymbol{\beta}_{01} + \sum_{i=1}^{p} \boldsymbol{\alpha}_{1i}\Delta\boldsymbol{FDI}_{t-I} + \sum_{i=0}^{q} \boldsymbol{\alpha}_{2i}\Delta\boldsymbol{GDP}_{t-I} + \sum_{i=1}^{s} \boldsymbol{\alpha}_{3i}\Delta\boldsymbol{EXP}_{t-I} + \boldsymbol{\lambda}_1\mathbf{ECT}_{t-1} + \boldsymbol{\varepsilon}_t \quad \textbf{(12)}$$

$$\Delta\boldsymbol{GDP}_t = \boldsymbol{\beta}_{02} + \sum_{i=1}^{p} \boldsymbol{\alpha}_{1i}\Delta\boldsymbol{GDP}_{t-I} + \sum_{i=0}^{q} \boldsymbol{\alpha}_{2i}\Delta\boldsymbol{FDI}_{t-I} + \sum_{i=1}^{s} \boldsymbol{\alpha}_{3i}\Delta\boldsymbol{EXP}_{t-I} + \boldsymbol{\lambda}_2\mathbf{ECT}_{t-1} + \boldsymbol{\varepsilon}_t \quad \textbf{(13)}$$

$$\Delta\boldsymbol{EXP}_t = \boldsymbol{\beta}_{03} + \sum_{i=1}^{p} \boldsymbol{\alpha}_{1i}\Delta\boldsymbol{EXP}_{t-I} + \sum_{i=0}^{q} \boldsymbol{\alpha}_{2i}\Delta\boldsymbol{FDI}_{t-I} + \sum_{i=1}^{s} \boldsymbol{\alpha}_{3i}\Delta\boldsymbol{GDP}_{t-I} + \boldsymbol{\lambda}_3\mathbf{ECT}_{t-1} + \boldsymbol{\varepsilon}_t \quad \textbf{(14)}$$

where, ECT_{t-1} is the error correction term. The coefficient of the error correction term (ECT_{t-1}) is expected to be negative and statistically significant. Specifically, the coefficient on ECT_{t-1} indicates the adaptation speed, i.e., how fast the variables return to the long-run equilibrium. The results of estimation regarding the long- and short-run relationships of the variables from Equations (9) and (10) and those from Equations (12) and (13) are presented in Table 3.

In Table 3, the long-run coefficients on GDP are respectively 0.092 at lag 0 and 0.077 at lag 1 (significant at $\alpha = 0.01$) when FDI is the dependent variable. This indicates that a 1% increase in GDP is associated with a 0.092% and a 0.077% long-run increases in FDI at lags 0 and 1, respectively. The coefficient on EXP indicates that a 1% increase in EXP is associated with a 0.0175% decrease in FDI in the long run, which is consistent with the argument that the increased competition arising from the presence of Multinational Corporations (MNCs) may crowd out weaker domestic firms (Blomstrom *et al.*, 1992), thereby lowering the level of exports. However, the coefficient on EXP is statistically insignificant. For the short-run estimates, the sum of the coefficients on the lagged terms

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of GDP and EXP in first difference is not statistically significant, suggesting that GDP and EXP may not jointly influence FDI in the short run.

Table 3. Long-Run and Short-Run Analyses

Long Run analysis

Dependent Variable (FDI)			Dependent Variable (GDP)		
Variable	Coefficent	t-statistic	Variable	Coefficent	t-statistic
Constant	0.064316	0.063741	Constant	8.181313	
FDI(-1)	0.627060	5.556426***	2.585693**		
GDP	0.091819	0.0755*	GDP(-1)	0.267171	1.667488
GDP(-1)	0.077215	0.0623*	FDI	0.896176	1.682963
EXP	-0.017566	0.5249	FDI(-1)	0.955694	-2.026130*
R^2	0.698217		EXP	-0.404421	4.911821***
F-Statistic	18.50908***		EXP(-1)	0.239702	2.362179**
D-W stat.	2.377392		R^2	0.591019	
			F-Statistic	8.959645***	
Diagnostic Test:			D-W stat.	1.760883	
Normality	0.142430				
LM Test Serial	0.1341		Diagnostic Test:		
Heteroskedasticity	0.5256		Normality	0.353524	
			LM Test Serial	0.7970	
			Heteroskedasticity	0.4403	

Short run analysis

Dependent Variable (ΔFDI)			Dependent Variable (ΔGDP)		
Variable	Coefficent	t-statistic	Variable	Coefficent	t-statistic
Constant	0.070800	0.498506	Constant	0.229531	0.628322
ΔFDI(-1)	0.182521	1.108134	ΔGDP(-1)	0.200042	1.332785
ΔGDP	0.024362	0.420937	ΔFDI	1.408568	2.762455***
ΔGDP(-1)	-0.033379	-0.791605	ΔFDI(-1)	-0.256340	-0.623216
ΔEXP	0.013995	-0.336010	ΔEXP	-0.450231	-5.71128***
ECT(-1)	-0.461943	-3.35734***	ΔEXP(-1)	-0.162586	-1.726938*
			ECT(-1)	-0.733275	-3.81766***
R^2	0.324911		R^2	0.733275	
F-Statistic	2.887712**		F-Statistic	16.44950***	
D-W stat.	1.953889		D-W stat.	1.953889	
Diagnostic Test:			Diagnostic Test:		
Normality	0.945598		Normality	0.88132	
LM Test Serial	0.6013		LM Test Serial	0.1978	
Heteroskedasticity	0.5048		Heteroskedasticity	0.1199	

Notes : ***, ** and * indicate significance at the 1%, 5%, and 10% levels, respectively.

When the dependent variable is GDP, the coefficient on FDI at lag 0 is statistically insignificant, while the same coefficient at lag 1 (0.956) is significant. This result indicates that a 1% rise in FDI is associated with a 0.956% rise in GDP. The long-run coefficient on EXP at lag 1 is 0.239 that is significant, implying that a 1% increase in export is associated with a 0.239% increase in economic growth. For the short-run estimates, the coefficient on FDI is 1.40 that is significant, suggesting that a 1% increase in FDI is associated with a 1.40% increase in economic growth. However, the coefficient on export is -0.45, suggesting that an 1 % rise in export is associated with a 0.45% fall in GDP.

The values of the significantly negative coefficients on ECT_{t-1} in the two functions are respectively -0.462 and -0.733, which confirms a long-run relationship among the variables considered in this study. This also implies that short-run deviations from the

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long-run equilibrium are corrected at annual rates of 46.2 % and 73.3%, respectively. The overall findings from the table suggest that both EXP and FDI play a positive and significant role in stimulating Indonesia's economic growth in the long run, but they have no impact on export in the short run. Finally, the diagnostic tests for the short-run model confirm that the basic model assumptions are all fulfilled. Note that the findings presented did not control for any possible structural breaks in the time-series data.

5.4. Stability Test in ECM

The existence of cointegration coming from Equations (6) and (7) does not necessarily imply that the estimated coefficients are statistically stable. That is why Pesaran *et al.* (1999, 2001) proposed a test for the stability of the estimated coefficients based on the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) developed by Brown *et al*. (1975). The error correction model represented by Equations (12) and (13) are chosen for the stability test of Brown *et al.* (1975). Graphical representations of the test are illustrated in Figures (3) and (4).

Figure 3. CUSUM and CUSUM of Square for Equation (12)

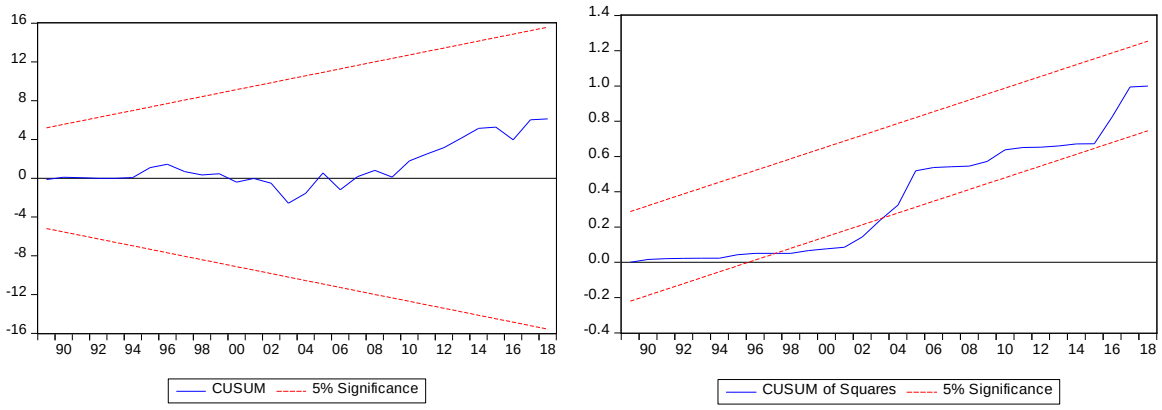
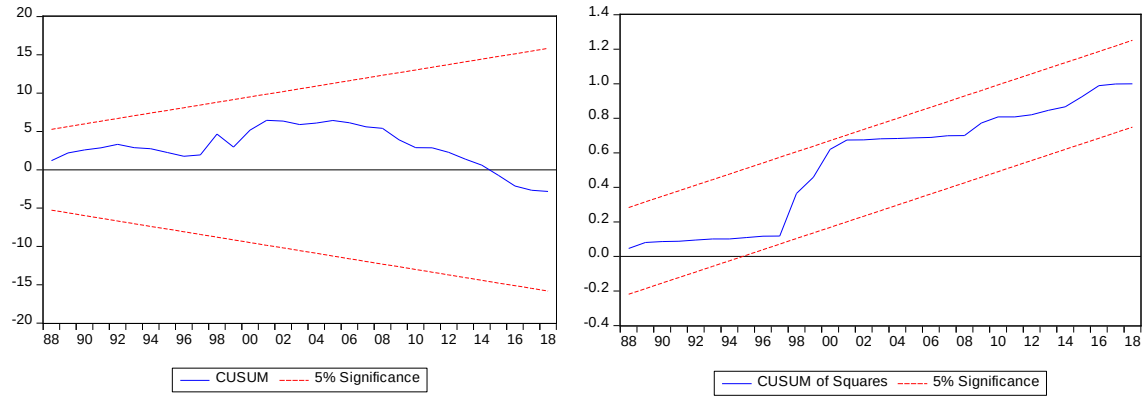


Figure 4. CUSUM and CUSUM of Square for Equation (13)



As it turns out from Figures (3) and (4), the CUSUM and CUSUMSQ statistics are all inside the critical bounds at the 5% level of significance, confirming that all the coefficients from the error correction model are statistically stable.

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5.5. VECM Granger Causality

After identifying the long-run relationship among the variables, we examined the direction of the causality using the ECM-ARDL model. Table 4 reports the findings concerning the directions of the estimated long- and short-run causalities.

Table 4. Causality Results

Dependent Variable	Optimal lag length	Short Run (F-stat)			Long Run ECT_{t-1}			
		ΔFDI	ΔGDP	ΔEXP		ΔFDI ECT_{t-1}	ΔGDP ECT_{t-1}	ΔEXP ECT_{t-1}
ΔFDI	(1,1,0)		4.367673**	3.731712	-4.928301***		3.013307***	
ΔGDP	(1,1,1)	2.157858*		16.13046***	-4.949073***	2.072554 **		-5.721227***
ΔEXP	(1,0,1)	1.152826	15.26692		-2.895447		-3.2383821**	

Source: Author own's computation

The results as reported in Table 4 show a significant bidirectional causal relationship between economic growth and FDI in both the short run and the long run. There is also a unidirectional relationship between export and economic growth in the short run. However, there is not any causality relationship between export and FDI. The next section will discuss possible policy implications and draw conclusions.

6. CONCLUSIONS AND RECOMENDATIONS

With special reference to Indonesia, this study examines the dynamic relationship between foreign direct investment (FDI), export, and economic growth. The relationships among these economic variables are particularly important in policy formulation concerning the economic development of emerging economies like Indonesia. Being one of the main economic forces in Southeast Asia, it is important to understand whether Indonesia's existing policies for promoting inward FDI and export are effective in enhancing the country's economic growth, and whether the country's economic growth, in turn, enhances its FDI and export. This study applied the ARDL approach to test for the existence of a long-run relationship between FDI, export, and economic growth, while the direction of causality was tested by a VECM. The results from a cointegration test show that there are two cointegrated vectors among the three variables, which confirms the existence of a long-run relationship between inward FDI, export, and economic growth.

Taken together, findings from this study support the FDI-led growth and the export-led growth hypotheses in the case of Indonesia. More specifically, the finding of a bi-directional relationship between FDI and economic growth implies that FDI and economic growth are mutually reinforcing. However, the relationship between export and economic growth is unidirectional. Moreover, the causality patterns indicate that export is a channel through which FDI impacts economic growth, while the negative long-run relationship between FDI and export suggests that FDI may lower economic growth in the long run by reducing exports. A negative effect of FDI on export is possible if the domestic export-oriented sectors are adversely affected by their direct competition with inward FDI from multinational corporations producing similar goods and services.

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Findings from this study yield several policy implications. First, in the short term, Indonesia should continue with its existing policies aiming at promoting inward FDI and export as a means to boost economic growth. Moreover, these policies will be more effective if they are better coordinated with other policies, such as those for improving the quality of the country's economic, legal, and political institutions, especially those for simplifying investment regulations. Long-term economic reforms aiming to improve the country's Stability Index, Ease of Doing Business (EODB) Index, Corruption Perception Index (CPI), and Global Competitiveness Index (GCI) are likely to make the country more attractive to foreign investors, which will promote inward FDI and long-term economic growth.

Second, while policies for promoting export are crucial for improving the long-run economic development, a stand-alone policy focusing on FDI may not be effective in improving the competitiveness of the domestic exporting sector. Accordingly, Indonesia also needs to consider alternative policy options to improve the country's export performance, such as better financial development and exchange rate management to improve the financial ability of Indonesian exporters and the competitiveness of the country's exports.

Third, the absence of a positive linkage between FDI and export does not necessarily mean that FDI is not playing a role in promoting export. We suggest that the FDI promotion efforts will be more effective if such efforts diversify the types of FDI attracted to the country. For instance, Indonesia's FDI policies can be explicitly linked backward to upstream sectors like the agriculture sector to reduce the technological gap between domestic firms and multinational corporations though technology transfer. In other words, to enhance the role of FDI in promoting Indonesia's economic growth, FDI policies should be formulated to attract the types of foreign investment that are complementary to country's economic structure.

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