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

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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, export, and economic growth in Indonesia over the period of 1981-2018. The results show a bidirectional causality between foreign direct investment (FDI) and economic (GDP) growth, a unidirectional causal relationship between export and economic growth, and the absence of a causal relationship between FDI and export. This paper finds evidence of FDI-led and export-led economic growth in Indonesia. These findings suggest that Indonesia should continue with policies intended to attract 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 the economic growth of any country, especially the developing ones. According to Blomstrom et al. (1992), FDI drives economic growth when the economy of the host country is developed. FDI serves as a channel through which new technology is transferred from one country to abroad and causes the international market to open. This open market makes exporters attempt to enter foreign markets through competition using innovation and production technology. FDI increases the exporting capability of the host country, causing a profit increase at foreign exchange mostly in developing countries.

There are numerous empirical studies on the impact of foreign direct investments and exports on economic growth in many countries using econometric approaches and methods in different time periods. The results of several studies concerning the impact of exports and foreign direct investments on the economic growth of the countries are diverse. Most of the results show that there is a positive causal relationship between
foreign direct investment and export on economic growth; either in short-run relationships, long-run relationships or both. (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 flow into developing countries including Indonesia. Apart from being one of the main economic forces in Southeast Asia, Indonesia is also a developing economic market in the world with a high level of consumption that attracts foreign investors to invest in Indonesia. It is interesting to examine the relationship between FDI, exports and economic growth in Indonesia.

This paper is structured as follows: In Section 2 briefly describes the Indonesian economy. Section 3 reviews the literature. Section 4 describes the data collection methodologies. In Section 5, empirical results are presented. Finally, conclusions are drawn in Section 5.

2. THE INDONESIAN ECONOMY

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

According to Central Bureau Statistic of Indonesia (2018), Indonesia’s total amount of exported goods represented 5.2% of its overall Gross Domestic Product in 2018 ($3.495 trillion valued in Purchasing Power Parity US dollars). The same figure in 2018 was 6.7%, which indicates a decreasing reliance of Indonesia’s total economic performance on exports.

Indonesia has abundant natural resources, including crude oil, natural gas, tin, copper, and gold. Its key imports include machinery and equipment, chemicals, fuels, and foodstuffs. Major exports include oil and gas, electrical appliances, plywood, rubber, and textiles.

Indonesia has shipped US$180.2 billion worth of goods around the globe in 2018. That dollar amount reflects a 2.4% gain since 2014 and a 6.8% uptick from 2017 to 2018. From a continental perspective, almost three-quarters (72%) of Indonesian exports by value were delivered to fellow Asian countries. Another 11.3% were sold to North American importers, closely followed by European customers at 10.6%. Smaller percentages were shipped to Africa (2.6%), Australia and other Oceania importers (2%), and Latin America (1.5%) excluding Mexico but including the Caribbean.

FDI flows in Indonesia reached USD 21 billion, an increase from 2017 (+6.8%) (UNCTAD World Investment Report 2019). FDI growth is associated with a set of economic policy packages that was implemented by the Indonesian government over the last couple of years. The government has introduced 14 stimulus packages mainly
focusing on deregulation, law enforcement and business certainty, interest rate tax cuts for exporters, energy tariffs cuts for labor-intensive industries, tax incentives for investment in special economic zones and lowered tax rates on property acquired by local real estate investment trusts. The country is the 16th recipient of FDI inflows in 2018, and the 5th one in developing Asia. The 2018 increase is mainly explained by intra-ASEAN investments (from Singapore). One of the biggest projects was in infrastructure in the new segments of the Jakarta Light Rail Transit. New SEZs also contributed to the increase. Indonesia lowered the minimum equity requirement for foreign investors and abolished the approval requirement for several business transactions involving foreign investors. FDI stock reached $226 billion in 2018, less than in 2017 (-2.2%) and represents 22.1% of the GDP. The largest recipients of FDI were the mining sector, machinery and electronics, electricity, gas and water supply and chemical and pharmaceutical industry. Singapore remained the largest source of investment, followed by China and Japan.

Figure 1. Export of Indonesia (% of GDP)

Source: World Bank

Based on the data from the Investment Coordinating Board (BKPM), FDI levels dropped 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 realization in the country. The Indonesian government was able to improve the overall atmosphere of the market in 2018 by consolidating political and economic stability and through structural reforms that have removed some investment risk.
3. LITERATURE REVIEW

A multitude of studies were conducted to examine the relationship between FDI, export and economic growth. Nevertheless, there is no general consensus on this issue. Most studies were conducted to examine bivariate relations between the pairs of FDI and GDP, GDP and exports or FDI and exports. The interrelationship between three variables in an individual country or group countries can be seen in the literature review below.

Liu, Burridge, and Sinclair (2002) investigate relationship causal links between trade, economic growth and inward foreign direct investment (FDI) in China using quarterly data from 1980:Q1 to 1997:Q4. They found bi-directional causality between three variables i.e. economic growth, FDI and exports. Likewise, Dritsaki, Dritsaki, and Adamopoulos (2004) using annual IMF data from 1960 to 2002 found there are long-run equilibrium relationships and a causal relationship between the examined variables (FDI, exports and economic growth) in Greece.

The other studies, Dritsaki and Stiakakis (2014) found that there is a bidirectional long-run and short-run causal relationship between exports and growth. But foreign direct investments do not have the expected positive impact on economic growth. This study was conducted in Croatia using the annual time series data period 1994-2012. Sunde (2017) examines economic growth as a function of foreign direct investment and exports in South Africa using annual time series data from 1990 to 2014. He found that both foreign direct investment and exports drive economic growth and there is unidirectional causality between economic growth and foreign direct investment and bidirectional causality between economic growth and exports. Singh (2017) examine the long-run relationship between foreign direct investment outflows, exports and aggregate measure of GDP in India for the time period 1980 to 2014 and found that all the variables are cointegrated when FDI outflows have been taken as a dependent variable also indicate there is a unidirectional causality running from exports to FDI outflows, exports and GDP running from GDP to exports. The result of this study also suggests that there are chain
relationships among the variables i.e., GDP causes export, and export in turn causes FDI outflows. Van, et al. (2017) found that there are bidirectional causality relationships among FDI, export and economic growth in Vietnam, and also found that FDI and export have a positive effect on economic growth in the same country. They used a VECM Model to analyze the data over the period of 1990-2015.

Alici and Ucal (2003) investigated the causal relationship among trade, FDI and economic growth in Turkey from 1987-I to 2002-IV. The result shows that there is only a unidirectional causality between export and economic growth, but it did not exist between FDI and economic growth. Likewise, Ahmad, et. al. (2004) found unidirectional causalities from exports to GDP and FDI to GDP for 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 unidirectional causality from real GDP to real exports in Brazil using quarterly data from 1970 to 2000. In addition, Chowdhury and Mavrotas (2006) found unidirectional causality from GDP to FDI for Chile, and bidirectional causality between GDP and FDI in the case of Malaysia and Thailand using data from 1969 to 2000. Sultanuzzaman et.al (2018) found that there is bidirectional causality between FDI and economic growth but the only unidirectional causal relationship between export and economic growth in Sri Lanka using annual time series data from 1980-2016. Romero (2015) found that there is one bidirectional causality relationship between FDI and GDP. They conducted the study in Mexico using annual time series data for the period 1989-2013.

Another study for group countries, Sandalcilar and Dilek (2017) found the existence of a two-way relationship among the variables i.e. FDI, Export, and GDP (Economic growth). Mahmoodi and Mahmoodi (2016) examined the causal relationship between foreign direct investment (FDI), exports and economic growth in two panels of developing countries (eight European developing countries and eight Asian developing countries). They found in European developing countries a bidirectional causality between GDP and FDI and a unidirectional causality from GDP and FDI to export in the short run. For Asian developing, there is bidirectional causality between export and economic growth in the short-run. Hsiao and Hsiao (2006) examine 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 FDI has unidirectional effects on GDP directly and indirectly through exports, and there is also bidirectional causality between exports and GDP for the group.

According to Mehrara et al.’s (2013) study using panel techniques for estimating the causality among economic growth, exports, and FDI inflows for developing countries over the period of 1980 to 2008, there is strong evidence of bidirectional causality between economic growth and FDI inflows and the exports-led growth hypothesis is supported by the finding of unidirectional causality running from exports to economic growth in both the short-run and the long-run. The relationship between foreign direct investment, exports, and economic growth are also examined by Keho (2015). He conducted the study in 12 selected 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 export are positively related to FDI in four countries. The results of this study also reveal a short-run bidirectional causality between FDI and GDP and unidirectional causality running
from GDP to exports in Ghana, and a bidirectional causality between FDI and export in Benin. GDP causes export in Benin, Congo Democratic, and Gabon. FDI causes export in Cote d’Ivoire and Kenya. In the long run, both GDP and export cause FDI in Benin, Burkina Faso, Gabon, and Senegal. A bidirectional causality exists between FDI and GDP in Cameroon, Cote d’Ivoire, and South Africa, and between FDI, GDP and exports in Congo Democratic. There is a bidirectional causality between GDP and exports in Ghana, and between FDI and exports in Kenya.

The results from past empirical studies vary with the period studied, the econometric method used, and the presence of other related variables and the inclusion of interaction variables in the estimation. Bidirectional, unidirectional, and/or the absence of causality relations were found in these studies. The general results tend to show a positive relationship from FDI and export to economic growth (GDP), and indicate some interesting causality relationships among FDI, export, and economic growth (GDP) that are examined in this article.

4. DATA AND METHODOLOGY

4.1. Data

The data used for this study are annual data from 1981-2018. The variables used in this study are foreign direct investment net inflows (% of GDP), exports of goods and services (% of GDP), and the GDP growth (annual%) in Indonesia. All variables come from the World Development Indicators (WDI, 2019).

4.2. Methodology

This study used Bounds Test for cointegration and causality within the ARDL modeling approach was developed by Pesaran et al. (2001). The technique can be applied irrespective of the order of integration of the variables (irrespective of whether regressors are purely I(0), purely I (1) or mutually cointegrated). The other reason, this cointegration technique may not operate properly when the sample size is very small. This is specifically linked with the ECM models that are called VECMs. In advance, we tested the existence of a unit root.

4.2.1. Unit Root Test

For determining the order of integration of each variable since the ARDL uses each variable at the level at which it is stationary. To test the stationarity of the series, the article uses the Augmented Dickey Fuller (ADF) unit root testing procedure (Dickey and Fuller, 1979) and the Phillips Peron (PP) test (Phillips and Perron, 1988). In both the ADF and the PP tests, the size of the coefficient $\delta_2$ is the one that we want to determine in the following equation:

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

(1)

The ADF regression tests for the existence of unit root of $Z_t$ at all model variables at time $t$. The variable $\Delta Z_{t-1}$ reexpresses the first differences with $n$ lags and final $\varepsilon_t$ is the variable that adjusts the errors of autocorrelation. The coefficients, $\delta_0$, $\delta_1$, $\delta_2$, and $\beta_i$ are the ones estimated. The null and the alternative hypothesis for the existence of unit root in variable $Z_t$ is:
The other method is the Phillips Peron method, which corrects for serial correlation and heteroscedasticity in the error terms by directly modifying the test statistics without including lags (Enders, 2004). Thus, the equations and hypotheses to be tested are similar to the ones for the ADF above except that the lags of the variables are excluded from the models.

\[ \Delta Z_t = \delta_0 + \delta_1 t + \delta_2 Z_{t-1} + \epsilon_t \]  \hspace{1cm} (2)

4.2.2. Bound Test approach

This article applies the Bound test to examine the causality between FDI, export and economic growth in Indonesia because the applying this model has proved capable of generating more reliable estimates in the context of endogenous variables (Gujarati, 2009). The application of the ARDL Bound test correctly is useful for estimating and interpreting the dynamic relationship of economic variables (Dixit, 2014). This article chooses the lag length using Akaike information criterion; tests unit-roots of all variables by using the ADF and the PP tests; and conducts cointegration tests by applying the LR test technique propounded by Johansen (1995).

The ARDL models used in this study are the following:

\[ \Delta FDI_t = \beta_{01} + \sum_{i=1}^{p} \alpha_{1i} \Delta FDI_{t-i} + \sum_{i=0}^{q} \alpha_{2i} \Delta GDP_{t-i} + \sum_{i=1}^{r} \alpha_{3i} \Delta EXP_{t-i} + \mu_{1t} \]  \hspace{1cm} (3)

\[ \Delta GDP_t = \beta_{02} + \sum_{i=1}^{p} \alpha_{1i} \Delta GDP_{t-i} + \sum_{i=0}^{q} \alpha_{2i} \Delta FDI_{t-i} + \sum_{i=1}^{r} \alpha_{3i} \Delta EXP_{t-i} + \mu_{2t} \]  \hspace{1cm} (4)

\[ \Delta EXP_t = \beta_{03} + \sum_{i=1}^{p} \alpha_{1i} \Delta EXP_{t-i} + \sum_{i=0}^{q} \alpha_{2i} \Delta FDI_{t-i} + \sum_{i=1}^{r} \alpha_{3i} \Delta GDP_{t-i} + \mu_{3t} \]  \hspace{1cm} (5)

Where \( \Delta \) denotes the first difference operator and \( \epsilon_{1t}, \epsilon_{2t} \) and \( \epsilon_{3t} \) are error terms assumed to be independently and identically distributed.

We choose the optimal length of lags from the first difference of dependent variables based on the minimum value of the Akaike criterion, according to the following models:

\[ \Delta FDI_t = \beta_{01} + \sum_{i=1}^{p} \alpha_{1i} \Delta FDI_{t-i} + \sum_{i=0}^{q} \alpha_{2i} \Delta GDP_{t-i} + \sum_{i=1}^{r} \alpha_{3i} \Delta EXP_{t-i} + \mu_{1t} \]  \hspace{1cm} (6)

\[ \Delta GDP_t = \beta_{02} + \sum_{i=1}^{p} \alpha_{1i} \Delta GDP_{t-i} + \sum_{i=0}^{q} \alpha_{2i} \Delta FDI_{t-i} + \sum_{i=1}^{r} \alpha_{3i} \Delta EXP_{t-i} + \mu_{2t} \]  \hspace{1cm} (7)

\[ \Delta EXP_t = \beta_{03} + \sum_{i=1}^{p} \alpha_{1i} \Delta EXP_{t-i} + \sum_{i=0}^{q} \alpha_{2i} \Delta FDI_{t-i} + \sum_{i=1}^{r} \alpha_{3i} \Delta GDP_{t-i} + \mu_{3t} \]  \hspace{1cm} (8)

Where, \( \Delta FDI_t, \Delta GDP_t \) and \( \Delta EXP_t \) the dependent variables, \( \alpha_1, \alpha_2 \) and \( \alpha_3 \) the long-run coefficients, and \( (p,q,s) \) the optimal length of lags of the ARDL model.

According to Pesaran et al. (2001), F test for joint significance of the coefficients of the lagged level of variables. The null hypothesis of no cointegrating among the variables in equations (3), (4) and (5) are:

\[ H_0: \delta_{11} = \delta_{21} = \delta_{31} = 0 \] against the alternative hypothesis of cointegration

\[ H_1: \delta_{11} \neq \delta_{21} \neq \delta_{31} \neq 0 \]

and

\[ H_0: \delta_{12} = \delta_{22} = \delta_{32} = 0 \] against the alternative hypothesis of cointegration

\[ H_1: \delta_{12} \neq \delta_{22} \neq \delta_{32} \neq 0 \]
and

$$H_0: \delta_{13} = \delta_{23} = \delta_{33} = 0$$ against the alternative hypothesis of cointegration

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

Two sets of critical values for a given significance level can be determined. The first critical value is obtained on the assumption that all variables included in the ARDL specification are I(0), while the second level is obtained on the assumption that the variables are I(1).

5. EMPIRICAL RESULTS

5.1. Unit root test analysis

We have applied ADF by Dickey and Fuller (1979), P-P by Philips and Perron (1988) unit root tests and the results are presented in Table 1.

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>MODEL</th>
<th>AUGMENTED DICKEY FULLER TEST (ADF)</th>
<th>PHILLIPS PERRON TEST (P.P)</th>
<th>DECISION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I(0)</td>
<td>I(1)</td>
<td>I(0)</td>
</tr>
<tr>
<td>FDI</td>
<td>Constant</td>
<td>-2.328519(0.1688)</td>
<td>-4.161200(0.0027)**</td>
<td>-2.461847(0.1328)</td>
</tr>
<tr>
<td></td>
<td>Trend</td>
<td>-2.523516(0.3157)</td>
<td>-4.088116(0.0151)**</td>
<td>-2.687235(0.2473)</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>-1.593794(0.1034)</td>
<td>-4.196105(0.0001)**</td>
<td>-1.677706(0.0879)</td>
</tr>
<tr>
<td>GDP</td>
<td>Constant</td>
<td>-4.600349(0.0007)**</td>
<td>-4.634096(0.0006)**</td>
<td>-4.530508(0.0046)**</td>
</tr>
<tr>
<td></td>
<td>Trend</td>
<td>-4.530508(0.0046)**</td>
<td>-4.634096(0.0006)**</td>
<td>-2.309313(0.0221)**</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>-2.309313(0.0221)**</td>
<td>-2.309313(0.0221)**</td>
<td>-2.309313(0.0221)**</td>
</tr>
<tr>
<td>EXP</td>
<td>Constant</td>
<td>-1.807313(0.3711)</td>
<td>-9.194025(0.0000)**</td>
<td>-2.834802(0.0632)</td>
</tr>
<tr>
<td></td>
<td>Trend</td>
<td>-2.837253(0.1938)</td>
<td>-9.205593(0.0000)**</td>
<td>-2.815160(0.2011)</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>-0.482520(0.4998)</td>
<td>-9.326407(0.0000)**</td>
<td>-0.650749(0.4285)</td>
</tr>
</tbody>
</table>

Source: Author own’s computation

Note:
1. ***, ** and * show significant at 1%, 5%, and 10% levels respectively.
2. The numbers within parentheses are probability value

The result of Table 1 above indicates that FDI and EXP (export) variables are stationary at first differences with constant and trend. Meanwhile, GDP is stationary at level. This denotes that the series are integrated null (I(0)) and first-order I(0).

5.2. Cointegration analysis

After testing the stationary of the series, we apply ARDL (Autoregressive Distributed Lag) bound testing approach developed by Pesaran et al. (2001) to investigate cointegration for long-run relationships between foreign direct investment, export and economic growth of Indonesia.

The results of ARDL cointegration test are presented in Table 2.

<table>
<thead>
<tr>
<th>Estimates model</th>
<th>Bound Test for Cointegration Test</th>
<th>Diagnostic Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Optimal lag length</td>
<td>F-Statistic</td>
</tr>
<tr>
<td>FFDI (FDI/GDP,EXP)</td>
<td>(1,1)</td>
<td>7.619811</td>
</tr>
<tr>
<td>FFDI (GDP/FDI,EXP)</td>
<td>(1,1,1)</td>
<td>7.669627</td>
</tr>
<tr>
<td>FFDI (EXP/FDILDP)</td>
<td>(1,1)</td>
<td>2.630154**</td>
</tr>
</tbody>
</table>

Source: Author own’s computation

Note: ** show that there is no cointegration
Table 2 shows that there are two cointegrating vectors (F-statistics seem to exceed upper critical bounds at 5%) confirming the existence of long-run relationship among the variables in equations 3 (FDI as dependent variable) and 4 (GDP as dependent variable). Meanwhile, for equation 5 (EXP as the dependent variable), there is no existing cointegration. The ARDL models fulfill the assumptions of normality, autoregressive conditional heteroskedasticity, functional forms and serial correlation of models.

5.3. Estimation of Long run and short run relationship

Next, we examine the long-run relationship among the variables of the model using the following equations:

\[ \begin{align*}
FDI_t &= \beta_{01} + \sum_{i=1}^{P} \delta_{1i} FDI_{t-i} + \sum_{i=0}^{Q} \delta_{2i} GDP_{t-i} + \sum_{i=1}^{s} \delta_{3i} EXP_{t-i} + \epsilon_{1t} \quad (9) \\
GDP_t &= \beta_{02} + \sum_{i=1}^{P} \delta_{1i} GDP_{t-i} + \sum_{i=0}^{Q} \delta_{2i} FDI_{t-i} + \sum_{i=1}^{s} \delta_{3i} EXP_{t-i} + \epsilon_{2t} \quad (10) \\
EXP_t &= \beta_{03} + \sum_{i=1}^{P} \delta_{1i} EXP_{t-i} + \sum_{i=0}^{Q} \delta_{2i} FDI_{t-i} + \sum_{i=1}^{s} \delta_{3i} GDP_{t-i} + \epsilon_{3t} \quad (11)
\end{align*} \]

Moreover, a dynamic error correction model can arise from the bounds of ARDL testing through a simple linear transformation. The dynamic error correction model incorporates the short-run dynamics with the long-run equilibrium. The dynamic unrestricted error correction model is expressed as follows:

\[ \begin{align*}
\Delta FDI_t &= \beta_{01} + \sum_{i=1}^{P} \alpha_{1i} \Delta FDI_{t-i} + \sum_{i=0}^{Q} \alpha_{2i} \Delta GDP_{t-i} + \sum_{i=1}^{s} \alpha_{3i} \Delta EXP_{t-i} + \lambda \Delta ECT_{t-1} + \epsilon_t \quad (12) \\
\Delta GDP_t &= \beta_{02} + \sum_{i=1}^{P} \alpha_{1i} \Delta GDP_{t-i} + \sum_{i=0}^{Q} \alpha_{2i} \Delta FDI_{t-i} + \sum_{i=1}^{s} \alpha_{3i} \Delta EXP_{t-i} + \lambda \Delta ECT_{t-1} + \epsilon_t \quad (13) \\
\Delta EXP_t &= \beta_{03} + \sum_{i=1}^{P} \alpha_{1i} \Delta EXP_{t-i} + \sum_{i=0}^{Q} \alpha_{2i} \Delta FDI_{t-i} + \sum_{i=1}^{s} \alpha_{3i} \Delta GDP_{t-i} + \lambda \Delta ECT_{t-1} + \epsilon_t \quad (14)
\end{align*} \]

where ECT\(_{t-1}\) is the error correction term

The coefficient of the error correction term (ECT\(_{t-1}\)) should be negative and statistically significant. This coefficient shows the adaptation speed, in other words, we could say that shows how fast the variables return to the long-run equilibrium.

The results of the long and short-run relationship of the variables of our model in equations 9 and 10, as well as equations 12 and 13, are given in Table 3.

From the results of Table 3. When FDI as the dependent variable, When FDI is the dependent variable, the long-run coefficient for GDP is 0.092 and 0.077 at lag 1 and significant at \(\alpha = 0.01\). This indicates that a 1% increase in GDP is associated with a 0.092% and a 0.077% at lag1 increase in FDI in the long run. But, the coefficient for EXP is -0.0175 and is not significant. This indicates that a 1% increase in FDI is associated with a 0.0175% decrease in EXP in the long run. This 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. In the case of short-run estimates, the sum of the coefficients on the lagged differences terms is not significant for GDP and EXP. This indicates that GDP and EXP may not be promoting FDI in the short run.

When the dependent variable is GDP, coefficient FDI is 0.89 and is not significant, but at lag 1 the coefficient is 0.956 and it is significant. This result indicates a 1% increase in FDI is associated with a 0.956% increase in GDP. The coefficient long run of EXP is 0.239 and significant at lag 1. This indicates that a 1% increase in export is associated...
with a 0.239% increase in economic growth. In the case of short-run estimates, the coefficient is 1.40 and is significant. It indicates that a 1% increase in FDI associated with a 1.40% increase in economic growth, but it is not happening in the coefficient of export is -0.45, which indicates that an increase of 1% export associated with 0.45% decrease on export.

The negative and statistically significant estimation of ECTt-1 in both functions at 0.462 and 0.733 respectively show a short-run relationship among the variables of the model under study. This means that in the short run the deviations from the long-run equilibrium are corrected at 46.2% and 73.3% respectively each year. Overall results suggest that both EXP and FDI play a positive and significant role in fostering economic growth in Indonesia in the long run, but have no impact on export in the short-run. Finally, all the diagnostic tests in the short run model do not seem to have any problem. The result presented above is possible that in the long-run estimates may not apply to all years under consideration. This may be the case, for instance, if there were structural breaks in the time-series data used, resulting in changes in relationships among the variables.

### Table 3. Long-Run and Short-Run analysis

<table>
<thead>
<tr>
<th>Variables (FDI)</th>
<th>Coefficient</th>
<th>t-statistic</th>
<th>Variables (GDP)</th>
<th>Coefficient</th>
<th>t-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.064316</td>
<td>0.063741</td>
<td>Constant</td>
<td>8.181313</td>
<td>2.585693***</td>
</tr>
<tr>
<td>FDI(-1)</td>
<td>0.627060</td>
<td>5.556426***</td>
<td>GDP(-1)</td>
<td>0.267171</td>
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<th>Coefficient</th>
<th>t-statistic</th>
<th>Variables (ΔGDP)</th>
<th>Coefficient</th>
<th>t-statistic</th>
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Source: Author own's computation
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 stable. This is why Pesaran et al. (1999, 2001) suggested the test of the stability of the estimated coefficients in the estimated models using the tests of Brown et al. (1975), which are known as the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ).

The error correction model of equations 12 and 13 are chosen in order to apply the stability tests of Brown et al. (1975). The relative graphical representations of these tests are illustrated in Fig. 3, 4 and 5, 6.

As it arises from the above figures, all the plots of statistics CUSUM and CUSUMSQ are inside the critical bounds at a 5% level of significance, which entails that all the coefficients in the error correction model are stable.

5.5. VECM Granger Causality

After the long-run relationship among the variables, we examine the direction of causality using the ECM-ARDL model.
Table 4 reports the results on the direction of long and short run causality.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Optimal lag length</th>
<th>Short Run (F-stat)</th>
<th>Long Run ECT&lt;sub&gt;t-1&lt;/sub&gt;</th>
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<td>-4.949073***</td>
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</table>

The results of Table 4 show that there is a bidirectional in the short run and long run and a strong causal relationship between economic growth and foreign direct investment. For export and foreign direct investment, there is no causality relationship between them. There is a unidirectional relationship between export and economic growth in the short run. The relevant knowledge regarding the direction of causality between the variables could assist in the design of the proper economic policy.

6. CONCLUSION AND RECOMMENDATION

This study examined the dynamic relationship among foreign direct investments, exports and economic growth in Indonesia for the annual period 1981-2018. The relationships among these variables are increasingly important in policy debates concerning the economies of the developing countries. As apart from being one of the main economic forces in Southeast Asia, Indonesia is a country that attracts investors to invest in Indonesia. Indonesia also experienced relatively tend stable growth rates as compared to the other Southeast Asian countries for the last two decades. It is informative to understand therefore whether policies promoting FDI and exports may have been beneficial to economic growth in Indonesia, and, whether economic growth, in turn, has impacted FDI and exports. For the existence of the long-run relationship among the variables, we used the ARDL model, while the direction of causality was tested with VECM. The results of cointegration showed that there are two cointegrated vectors which certify the existence of a long-run relationship among the variables examined.

Overall, the findings of this paper indicate that the FDI-led growth hypothesis and the Export-led growth hypothesis hold in the case of Indonesia. The results concerning the role of FDI and exports are even. The finding of a bi-directional relationship and strong causal relationship between FDI and economic growth suggests that not only does FDI fostering economic growth, but, economic growth, in turn, promotes FDI. But the finding between export and economic growth there is only a unidirectional relationship. In other words, FDI and economic growth reinforce each other, but it does not happen between exports and economic growth. The results indicate that FDI and exports appear to be important in promoting sustainable economic development in Indonesia. On the other hand, causality patterns indicate that export is a channel through which FDI impacts economic growth, but the negative long-run estimates between FDI and exports suggest that FDI may lower economic growth in the long run through dampening the level of economic growth.
exports. The diminishing effect of FDI on exports is possible if the domestic export-oriented private sector is adversely affected by direct competition with MNCs producing similar products. The other issue is the restricted production capability or the lack of contemporary technology in the Indonesian industry (or both) resources is a significant and well-recognized constraint facing in general.

The findings in this study have several policy implications. Firstly, Indonesia should continue policies promoting FDI and exports as a means of boosting economic growth. Even more, these policies may be more effective if they are linked to other policies that promote economic growth. In this regard, improving the quality of economic, legal and political institutions may be particularly important. Policies that aim to simplify investment regulations, improve the Stability Index, Ease of Doing Business (EODB) index, Corruption Perception Index (CPI) and Global Competitiveness Index (GCI) are likely to make the economy more attractive to foreign investors and thereby bring in more FDI, which in turn promotes economic growth. Such policies are also likely to increase export levels by decreasing economic barriers that may both hinder the expansion of existing export-oriented firms and discourage potential new domestic entrants. The World Bank’s EODB index measures the Ease of Doing Business in a country. A lower EODB index ranking indicates a more business-friendly environment relative to other countries. The Corruption Perception Index (CPI) from Transparency International measures the perceived level of corruption which exists in an economy. A lower CPI ranking suggests relatively less perceived corruption compared to other countries. Both the EODB and CPI rankings suggest more targeted policy efforts are needed to address these declines, which may be negatively impacting economic growth.

Secondly, while policies that promote exports are crucial for improving long-run economic development, a policy focus on FDI as a means of improving the competitiveness of the domestic export sector may not be stand-alone effective. Accordingly, Indonesia may need to consider other complementary policy options. To the extent that export prices are not competitive, better exchange rate management, for instance, may make the price of exports more attractive to external markets. If access to adequate financing, for instance, is inhibiting the formation of new export-oriented firms or inhibiting the expansion of current firms, policies that promote the development of the financial sector may be important in promoting the export sector.

Finally, the finding that FDI is not currently beneficial to the domestic export sector does not mean that FDI cannot play an important role in the expansion of that sector. Rather, FDI promotion efforts may be more effective if explicitly linked to policies encouraging the development of backward linkages. For example, policymakers may need a different approach such as diversifying the types of FDI that they are attracting. Attracting more agriculture-processing FDI may reduce the technological gap between MNCs and local firms in Indonesia, and as such, encourage the expansion of the agricultural products, and expand the agricultural products and by-products for export. In other words, policies that attract the types of FDI that are complementary to Indonesia’s economic structure may be particularly beneficial to exports, and as such, may enable FDI to have a greater positive role in economic growth.
REFERENCES


