

# Relationship between GDP, Foreign Direct Investment and Export Volume: Evidence from Indonesia

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**Abstract**—Using time-series and co-integration test from 1981 to 2013, this manuscript examines the long-run relations between FDI, GDP and export volume of Indonesia. The impact of Indonesian export volume and FDI on Indonesian GDP were measured in this article, it has been found that export volume and FDI have significant influence on economic growth of Indonesia. In addition, according to Johansen co-integration test, there is long-run relationship between GDP, FDI and export volume of Indonesia. The empirical findings are consistent with other academic articles.

**Index Terms**—International economics, international trade, GDP, FDI, export volume.

## I. INTRODUCTION

As one of the main economic power in South East Asia, Indonesia is facing a stable economic growth through this decade which lies between 4% - 6%. Today, Indonesia is the world's fourth most populous nation, the world's 10th largest economy in terms of purchasing power parity (PPP). Badan Pusat Statistic (2016), Indonesia has a trade surplus because of its rapid export of goods such as coal briquettes, palm oil, petroleum gas, crude petroleum and rubber which are the main exports of Indonesia. According to Central Bureau of Statistics in Indonesia, in 2016 Indonesia has a monthly average of 1 billion US\$ trade surplus [1].

Indonesia is also an emerging market economies of the world with massive consumption rate so that it attracts foreign investors to invest in Indonesia. The presence of Indonesia in some international trading organizations such as G-20 (Group of twenty) and ASEAN (Association of Southeast Asian Nations) gives a better economic prospect of Indonesia which is good for future investment. About the Foreign Direct investment (FDI), the impact of FDI (Foreign Direct Investment) on economic growth has been argued considerably in the development and economic growth literature for many years. The inflows of FDI have a potential for increasing the rate of economic growth in a country. These inflows of physical capital resulting from FDI could also increase the rate of economic growth. The

FDI inflows into a country are also often linked with the economic prosperity issue. FDI now plays an important role in the internationalization of business. Profound changes have taken place both in terms of size, scope and methods of FDI in the last decade. These changes occur due to technology, easing restrictions on foreign investment and acquisitions in many countries, and the deregulation and

privatization of many industries. The development of information technology systems and cheap global communication enables management of foreign investments much more easily.

Meanwhile the FDI in Indonesia, the Foreign Investment Act (1/1967) issued to attract foreign investment to build the national economy. Investment Coordinating Board (BKPM) is the authority to give approval for all FDI in Indonesia. Since 2010, FDI in Indonesia showed a rapid increase. Since then, Indonesia started to go and perch on the radar screen of foreign companies. The attractiveness of Indonesia as the market began to attract foreign companies to invest in Indonesia. The evidence is when Indonesia was able to face the global crisis of 2008-2009 by recording a positive growth of 4.6 percent in 2009. Only Indonesia, China and India recorded positive growth during the global financial crisis.

This paper attempts to assess the relationship between GDP of Indonesia, Foreign Direct Investment and Export Volume. Also we wanted to test which variable gives more impact on the GDP of Indonesia, whether it is the FDI or the export volume.

## II. LITERATURE REVIEW

According to Hsiao (2006) there is long term relationship between GDP, FDI and Export volume. The findings of them are totally consistent with results of Johansen co-integration test [2]. According to Choong, Yusop and Soo (2004) the presence of FDI inflows creates a positive technological diffusion in the long run only if the evolution of the domestic financial system has achieved a certain minimum level [3]. They investigate the patterns of foreign direct investment (FDI) and economic growths are investigated among select developed and East Asian countries. They added that their study provides fresh ability to absorb the advantages inflows is mainly dependent on the host country, notably with regard sector development. According to Johnson (2006) FDI inflows have a positive effect on host country economic growth for developing but not for developed economies. Also the domestic investments have a positive effect on economic growth both in developed and developing economies.

He assumed that the direction of causality goes from inflows of FDI to host country economic growth. However, economic growth could itself cause an increase in FDI inflows. Economic growth increases the size of the host country market and strengthens the incentives for market seeking FDI [4]. According to Carkovic and Levine (2002) FDI inflows do not exert an independent influence on economic growth. Thus, while sound economic policies

may spur both growth and FDI, the results are inconsistent with the view the FDI exerts a positive impact on growth that is independent of other growth determinants [5]. According to Helpman, Melitz and Yeaple (2003), They predicts that foreign markets are served more by exports relative to FDI sales when trade frictions are lower or economies of scale are higher. To these factors our model adds a role for the within-sectoral heterogeneity of the productivity levels of firms, which induces a size distribution of firms that also affects exports versus FDI sales. Using data on exports versus FDI sales of U.S. firms in 38 countries and 52 industries, they estimated the effects of trade frictions, economies of scale and within-industry dispersion of firm size on exports versus FDI sales. They show a robust cross-sectorial relationship between the degree of dispersion in firm size and the tendency of firms to substitute FDI sales for exports. The size of this effect is of the same order of magnitude as trade frictions [6].

### III. METHODOLOGY AND DATA ANALYSIS

According to the results of multivariate regression model of three variables at Table I, the effect of export volume and FDI have huge significance on GDP which is consistent with Yao's findings [7]. There is no autocorrelation problem because according to Fig. 1 residuals distributed randomly.

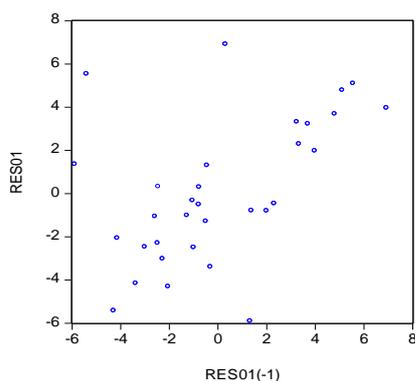


Fig. 1. Residual graph.

TABLE I: THE RESULTS OF MULTIVARIATE REGRESSION ANALYSIS

Dependent Variable: GDP				
Method: Least Squares				
Sample: 1981 2013				
Included observations: 33				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXP_VLM	2.067799	0.762158	2.713084	0.0109
FDI	2.146825	0.438638	4.894296	0.0000
C	-59.13066	15.36725	-3.847838	0.0006
R-squared	0.6590	M dependent var		34.169
Adjusted R-squared	0.6363	S.D.dependentvar		5.6296
S.E. of regression	3.3949	Akaike info crt		5.3689
Sum squared resid	345.77	Schwarz criterion		5.5050
F-statistic	28.995	Durbin-Wtsstat		1.9924
Prob(F-statistic)	0.0000			

According to the Augmented Dickey Fuller (ADF) test results at Table II, Table III and Table IV above the data are not stationary. Converting the data from non-stationary I (0) to stationary I (1), (Table V, VI and VII) the series have

been transferred in the Johansen co-integration test. The results demonstrate that there is a long-term relation between FDI, Export Volume and GDP. According to Table VIII below, there is a long-term relationship between the variables of FDI, Export Volume and GDP.

TABLE II: ADF TEST OF GDP (BEFORE CONVERTING THE DATA FROM NON-STATIONARY TO STATIONARY)

Null Hypothesis: GDP has a unit root		
Exogenous: Constant		
Lag Length: 0 (Automatic - based on SIC, maxlag=8)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.265010	0.1889
Test critical values:	1% level	-3.653730
	5% level	-2.957110
	10% level	-2.617434
*MacKinnon (1996) one-sided p-values.		

TABLE III: ADF TEST OF EXPORT VOLUME (BEFORE CONVERTING THE DATA FROM NON-STATIONARY TO STATIONARY)

Null Hypothesis: EXP_VLM has a unit root		
Exogenous: Constant		
Lag Length: 0 (Automatic - based on SIC, maxlag=8)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.787593	0.3796
Test critical values:	1% level	-3.653730
	5% level	-2.957110
	10% level	-2.617434
*MacKinnon (1996) one-sided p-values.		

TABLE IV: ADF TEST OF FDI (BEFORE CONVERTING THE DATA FROM NON-STATIONARY TO STATIONARY)

Null Hypothesis: FDI has a unit root		
Exogenous: Constant		
Lag Length: 0 (Automatic - based on SIC, maxlag=8)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.934750	0.3129
Test critical values:	1% level	-3.653730
	5% level	-2.957110
	10% level	-2.617434
*MacKinnon (1996) one-sided p values.		

TABLE V: ADF TEST OF GDP (AFTER CONVERTING THE DATA FROM NON-STATIONARY TO STATIONARY)

Null Hypothesis: GDP1 has a unit root		
Exogenous: Constant		
Lag Length: 0 (Automatic - based on SIC, maxlag=7)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-8.406736	0.0000
Test critical values:	1% level	-3.661661
	5% level	-2.960411
	10% level	-2.619160
*MacKinnon (1996) one-sided p-values.		

TABLE VI: ADF TEST OF EXPORT VOLUME (AFTER CONVERTING THE DATA FROM NON-STATIONARY TO STATIONARY)

Null Hypothesis: EXP_VLM1 has a unit root		
Exogenous: Constant		
Lag Length: 0 (Automatic - based on SIC, maxlag=7)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.993746	0.0000
Test critical values:		
1% level	-3.661661	
5% level	-2.960411	
10% level	-2.619160	
*MacKinnon (1996) one-sided p-values.		

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level  
 \* denotes rejection of the hypothesis at the 0.05 level  
 \*\*MacKinnon-Haug-Michelis (1999) p-values

In this research the VAR model is used to make detailed analyze the trend of three variables. The FDI, trade volume and GDP were determined as endogenous variables, lag order begin from lag 1 to the end of lag 2, which demonstrates the VAR. Furthermore, after implementing inverse roots of characteristic polynomial, whole the features of root mean remains within the circle therewith. In this manner, the model is a stationary VAR at Fig. 2 which gives an opportunity to using the impulse response analysis and variance decomposition. Afterwards, impulse response model is carried out to analyze the tenor of the relationships between signified variables. The results show that the effect of FDI is relatively more than export volume on GDP (See Table IX). The Results are consistent with the multivariate regression analysis above. The result of impulse response is consistent with the variance decomposition (See Fig. 3 and Table IX).

Inverse Roots of AR Characteristic Polynomial

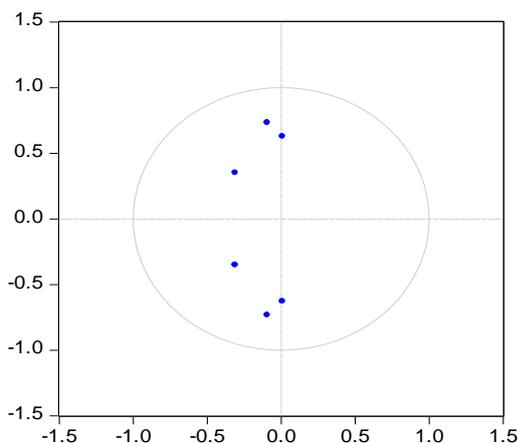


Fig. 2. VAR Analysis.

TABLE VII: ADF TEST OF FDI (AFTER CONVERTING THE DATA FROM NON-STATIONARY TO STATIONARY)

Null Hypothesis: FDI1 has a unit root		
Exogenous: Constant		
Lag Length: 2 (Automatic - based on SIC, maxlag=7)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.388821	0.0000
Test critical values:		
1% level	-3.679322	
5% level	-2.967767	
10% level	-2.622989	
*MacKinnon (1996) one-sided p-values.		

TABLE IX: VARIANCE DE COMPOSITION

Period	S.E.	EXP_VLM1	FDI1	GDP1
1	3.843439	1.589579	33.68226	64.72816
2	4.268165	1.364900	35.58795	63.04715
3	4.393427	5.313319	33.64969	61.03699
4	4.443809	7.087460	32.92591	59.98663
5	4.450234	7.291722	32.83131	59.87697
6	4.467486	7.745151	32.59855	59.65629
7	4.468371	7.744115	32.61035	59.64553
8	4.470307	7.806024	32.58326	59.61072
9	4.470584	7.805171	32.58877	59.60606
10	4.470906	7.817022	32.58408	59.59889

TABLE VIII: JOHANSEN CO-INTEGRATION TEST OF GDP, EXPORT VOLUME AND FDI IN INDONESIA

Sample (adjusted): 1984 2013				
Included observations: 30 after adjustments				
Trend assumption: Linear deterministic trend				
Series: EXP_VLM1 FDI1 GDP1				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.759594	86.92617	29.79707	0.0000
At most 1 *	0.567974	44.16339	15.49471	0.0000
At most 2 *	0.468920	18.98530	3.841466	0.0000

Response of GDP1 to Cholesky One S.D. Innovations

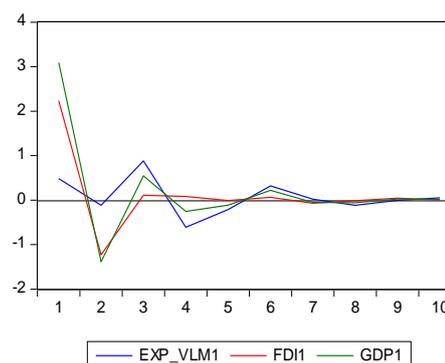


Fig. 3. Impulse response analysis.

#### IV. CONCLUSION

The results of this article appear that there is a long-term relationship between GDP, FDI and export volume from 1981 to 2013 in Indonesia. The finding of this manuscript is consistent with Hsiao's (2006), Choong, Yusop and Soo's (2004) results. In addition, Cetin (2014) expressed that the other crucial parameters of economic growth is total amount of academic article which triggers GDP of China. It can be

demonstrated that majority of the fundamental scientific and technical journals were adapted to industry and implemented for export. In order to have more innovative export based on economic growth and sustainable long-term relation among China's economic growth and scientific, journal rates [8].

Johnson (2006) demonstrated that FDI inflows have a positive impact on host country GDP for enhancing but not for developed economies. The domestic investments have a positive influence on GDP both in developed and developing economies as well [4]. There are kinds of variables that affects both GDP and export volume. Kalayci and Yazici (2016) indicate that there is a long term relationship between GDP, export volume and civil aviation. Depending on that fact, they also specifies the growth of the USA's GDP contributed to the R&D budged and due to that circumstances, the government invest more in the transportation infrastructure [9].

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