The Effect of Export and Import on Economic Growth in Indonesia

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ABSTRACT

This research aims to examine the effect of export and import on economic growth. The data used are time series data consisting of export, import and economic in period 2004Q1-2018Q1. The test results using the autoregressive distributed lag model indicates that in the short and long run, there is the effect of export and import on economic growth. In the long run, every 1% of the decline in import lead to the 1.17% increase of the economic growth, while 1% increase in export lead to the 1.83% increase of the economic growth.

Keywords: Export, Import, Economic Growth, Autoregressive Distributed Lag Model
JEL Classifications: C130, F140, F430

1. INTRODUCTION

Theoretically, export can drive economic growth and market expansion. Export also serves as a source of foreign exchange to finance the import of industrial raw materials and capital goods needed domestically, especially for developing countries that run industrial policies with the substitution of imported raw materials and capital goods. This policy is carried out by a country, because self-produced raw materials and capital goods are considered inefficient. Or the country has not been able to produce it, due to the limited technology as a consequence of the lack of Research & Development (R&D).

Next, the population growth, particularly the middle class community has triggered an increase in demand of goods quality in the form of raw material import, so that the increase in the number of the middle class can encourage the import increase. This could affect the import increase production which in turn can encourage economic growth of added value that is produced in the production process. Meanwhile, export is needed as a provider of foreign exchange reserves and external sector balancer. On the other hand, import may negatively related with economic growth. This can happen when increase in export is higher than increase in import so that the balance of trade can be surplus and increase in GDP is way above increase in import. Contrary, effect of import on economic growth may also be negative, if deficit of the balance of trade resulted from smaller increase in export compared to increase in import. In this case, increase in import is greater than increase in GDP (Kramer, 2018).

In the case of Indonesia, based on factual data from Bank St Louis of the USA (FRBSL, 2018), relationship between export, import and GDP can be determined from trend in export (in IDR), impot (in IDR) and GDP (in IDR) where the trend in the long term of 2004Q1-2018Q1 increase and fluctuated as shown in Figure 1.

In Figure 1 shows that Increase in GDP and export seemed to be way beyond increase in import so that increase in the balance of trade contributed to increase in GDP.

Figure 1: GDP, Export and import trends for Indonesia in the period of 2004Q1-2018Q1
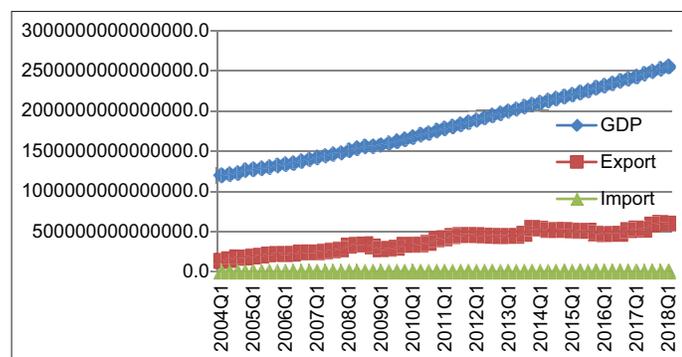
Source: Own processing., The data from frbsl (2018)

The influence of export and/or import on economic growth in a country has been investigated by previous researchers. The findings of previous researchers vary. Some of the different research results are: (1) export and import have positive effect on economic growth (Sun and Heshmati, 2012; Zaheer et al., 2014; Bakari, 2016), (2). export and/or import negatively affect economic growth (Pereira and Xu, 2000, Taghavi et al., 2012), (3). in the same period of time, there is an effect of export and/or import on economic growth in a country, while in other countries there is no effect of export and/or import on economic growth (El-Sakka and Al-Mutairi, 2000; Awokuse, 2006; Kristjanpoller and Olson, 2014); and (4) export and import do not affect economic growth (Albiman and Suleiman, 2016; Quaicoe et al., 2017). The different result among the researchers could be due to: (1) the different periods of research data, and (2) the different countries as the study took place. Subsequent question coming up is: "is there a short term and long term impact of export and import on economic growth of Indonesia in the period of 2004Q1-2018Q1?." If so, "Is the impact positive or negative?." The questions aroused since based on our best knowledge there is no research in the literatures about short term and long term impact of the two economic variables, i.e. export and import on economic growth in the case of Indonesia, especially research applying autoregressive distributed lag (ARDL) model for testing the impact.

This research contributes empirical science in the economic field about the impact of export and import on economic growth in Indonesia in the period of 2004Q1-2018Q1. Therefore, this study aims to examine the effect of export and import on economic growth in Indonesia. The data used are time series data of export, import, and gross domestic product (GDP) as a proxy of economic growth of Indonesia. This time series data is a quarterly time series data that spans from 2004Q1 to 2018Q1. The ARDL model is used to test the effect.

2. LITERATURE REVIEW

The role of international trade as the trigger of economic growth is believed to be from classical economic theory and Hekscer-Ohlin theory with the argument that international trade can improve the efficiency of production factors, expand markets, and increased productivity (Sukirno, 2000). Endogen theory states that for the long term, developing countries can accelerate technology transfer from developed countries, increase economies of scale, specialization, and efficiency (Salvatore, 2013). Trade can also affect the dynamics of

economic growth in the short term (Mankiw, 2016). Therefore, in economic activity, export is catalysts in economic growth.

Some researchers have examined the relationship between export and economic growth. Hatemi and Irandoust (2000) examined the relationship between export and economic growth in the Nordic countries (Denmark, Finland, Norway, and Sweden). Granger causality test results show that in the long run, there is a two-way relationship between export and economic growth in countries: Finland, Norway, and Sweden. While in Denmark, export do not affect economic growth. Hatemi (2002) examined the causal relationship between export growth and economic growth in Japan using data in the period 1960-1999. Granger causality test results show that there is a two-way relationship between export and economic growth. He concluded that the expansion of export is an integral part of the process of economic growth in Japan. Elbeydi et al. (2010) examined the effect of export on economic growth in Libya using the VECM model and data spanning in the period 1980-2007. The test results indicate that export has a positive effect on economic growth. Dritsaki (2013) examined the relationship between export, government debt and economic growth in Greece. The VECM model test results and Granger causality tests on data that span in the period 1960-2011 show that in the short and long term, there is an effect of export on economic growth, while government debt and economic growth affect each other. Adeleye et al. (2015) examined the impact of international trade on economic growth in Nigeria. They found that export has a positive impact on economic growth in the long run.

Research on the relationship between import and economic growth has also been studied by previous researchers. Ugur (2008) investigated the relationship between import and economic growth in Turkey. The import variables are divided into three types: import of consumer goods, import of investment goods, and import of raw materials. The VAR test results on quarterly data that span from 1994Q1 to 2005Q4 indicate that these three types of import affect economic growth. Mishra (2012) examined the relationship between import and economic growth in India. He used the VAR model and data spanning in 1970-2010 to test the relationship. The test results show that in the long run, there is a two-way relationship between import and economic growth. Ali and Li (2016) examined the impact of import on economic growth in Pakistan. They used the ARDL model to test the effect. Their finding is that import affect economic growth.

Cetintas and Barisik (2009) examined the relationship between export, import and economic growth in 13 transitional countries (Armenia, Belarus, Bulgaria, Czech Republic, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Poland, Russia, Slovakia and Slovenia) using quarterly panel data which spans in 1995Q2-2006Q4. The results of panel causality analysis show that import affects economic growth, and export affects import. Sulaiman and Saad (2009) used data in the period 1960-2005 and the VECM model to examine the effect of export and import on economic growth in Malaysia. They found that in the short and long term, export have a positive effect on economic growth, while import negatively affect economic growth. Saaed and Hussain (2015) examined the impact of export and import on economic growth

in Tunisia. The Granger causality test results show that in the long term, there is an effect of export and import on economic growth. Trost and Bojnec (2016) examined the relationships between export, import and economic growth in Slovenia and Estonia using robust data spanning in the period 2000Q1-2014Q4. The Granger causality test results show that there is a two-way positive relationship between export and economic growth, and there is a one-way relationship from import to economic growth. Bakari and Krit (2017) examined the relationship between export, import and economic growth in Mauritania using data spanning in the period 1960-2015. The result of VAR model analysis shows that export have positive effect on economic growth, while import effect on economic growth is negative. The results of multiple regression analysis tools, they concluded that there is a positive influence of export and import on economic growth. The influence of import is greater than the effect of export. Bakari and Mabrouki (2017) examined the relationship between export, import and economic growth in Panama using data in the period 1980-2015. The econometric analysis used is the VAR model and Granger causality test. They found that export and import affected economic growth. Ali et al. (2018) used data in the 1970-1991 period and the Granger causality test to examine the effect of export and import on economic growth in Somalia. They found that export and import have an effect on economic growth.

Chen and Dong (2012) studied the impact of export, import, physical capital and labor stocks on economic growth using local non-linear kernel estimation and panel estimation methods in 31 provinces, municipalities and special autonomous regions in China. This panel data ranged in the period 1997-2008. They concluded that these four factors have a positive effect on economic growth. Mohsen et al. (2017) investigated the determinants of Syrian economic growth using data in the period 1980-2010. The variables observed were public sector investment, private sector investment, export, oil prices and population growth. The Granger causality test results show that in the short and long term, there is a two-way relationship between public sector investment, private sector investment, oil prices and economic growth. There is also a two-way relationship between export and economic growth in the short run. Meanwhile, in the long run, there is a one-way relationship from export to economic growth. Bakari (2018) investigated the relationship between export, import, domestic investment and economic growth in Japan. The results of multiple regression analysis indicate that export and domestic investment positively affect economic growth, while import do not affect economic growth.

3. DATA AND METHODOLOGY

3.1. Data
The data used in this study is quarterly time series data ranging from 2004Q1 to 2018Q1. The data consist of three time series: import (measured in IDR), export (measured in IDR) and the index of gross domestic product in constant price (measured in %). Gross domestic product is a proxy of economic growth. Data were obtained from the Federal Reserve Bank of St. Louis.

For the purposes of data analysis, variables (or time series) of import is represented by IMP, export is represented by EPO, and economic growth is represented by EGR. The three variables of IMP, EPO and EGR are natural logarithms.

3.2. Methodology
Research analysis in this study is based on economic theory outlined in the introduction section, where export and import can stimulate economic growth. In addition, in line with paradox of plenty, export can influence economic growth negatively (Torvik, 2009). Similarly, import can influence economic growth negatively (Kramer, 2018). Hence, the focus of this research is to investigate the impact of export and import on economic growth of Indonesia, both in the short-run and long run. Therefore, the model used to examine the effects of import and export on economic growth is the ARDL model proposed by Heij et al. (2004) and Pesaran and Shin (1999). The ARDL model has several analytical requirements, both requirements for the variables involved in the model as well as the requirements for the residual of the model. Therefore, examination of the effect of export and import on economic growth is done by several testing steps.

The first step is to test the stationarity of all variables. The stationary test used was the Augmented Dickey-Fuller (ADF) test developed by Dickey and Fuller (1981), and the Phillips-Perron (PP) test developed by Phillips and Perron (1988). The test criteria used are P-value of test statistic, either ADF test or PP test. In this case, a variable is stationary or integrated of order d, I(d), if the P-value of the test statistic is smaller than the significance level of 1%, 5% or 10%.

If in the first step, it is found that the variable is stationary at the level or integrated of order zero, I(0), then the second step is to estimate the parameters of the ARDL model in the level. The ARDL model which states the relationship between IMP, EPO and EGR (Heij et al., 2004; Pesaran and Shin, 1999) is as follows

$$EGR_t = C_1 + \sum_{i=1}^{p} \alpha_{1i} EGR_{t-i} + \sum_{j=0}^{q} \beta_{1j} EPO_{t-j} + \sum_{k=0}^{r} \gamma_{1k} IMP_{t-k} + \varepsilon_{1t}$$

(1)

in wich C_1, α_{1i} (i = 1,2.,p), β_{1j} (j=0,1,…,q), γ_{1k} (k=0,1,…,r) are the coefficients of the variables. Residual is independent and identically distributed with and constant variance (Hassler and Wolters, 2006). Next, p, q and r are the length of the time lag. Equation (1) is called the ARDL (p, q, r) model. The length of this time lag is set based on the minimum value of Schwarz Criterion (SC). If in the long run, equilibrium can occur, dependent variables of EGR and independent variables EPO and IMP will be stable so that equation (1) will be

$$EGR_t = \frac{C_1}{1 - \sum_{i=1}^{p} \alpha_{1i}} + \frac{\sum_{j=0}^{q} \beta_{1j}}{1 - \sum_{i=1}^{p} \alpha_{1i}} EPO_t + \frac{\sum_{k=0}^{r} \gamma_{1k}}{1 - \sum_{i=1}^{p} \alpha_{1i}} IMP_t + u_t$$

(2)

where u_t is an error term. The multiple regression equation (2) is called the long-term equation where

$$\beta = \frac{\sum_{j=0}^{q}\beta_{1j}}{1-\sum_{i=1}^{p}\alpha_{1i}} \text{ and } \gamma = \frac{\sum_{k=0}^{r}\gamma_{1k}}{1-\sum_{i=1}^{p}\alpha_{1i}} \qquad (3)$$

is a long-term multiplier effect (Koop, 2013) or long-term coefficient (Pesaran and Shin, 1999) of independent variables EPO and IMP. If the coefficients of β and γ in (3) are significant at a sigficance level of 1%, 5% or 10%, then it is said that in the long run, there is the effect of export and import on economic growth with the multiplier effects of each β and γ (Koop, 2013).

Yet, if it is found in the first step that all stationary variables in the first difference or integrated of orde one, I(1), or combination of I(0) or I(1) and none are integrated I(2), then the second step is perform cointegration test by using ARDL bound test approach developed by Pesaran et al. (2001). This cointegration test uses the equation

$$D(EGR_t) = C_2 + \sum_{(i=1)}^{(p-1)}\alpha_{2i}D(EGR_{t-i}) + \sum_{j=0}^{q-1}\beta_{2j}D(EPO_{t-j})$$

$$+ \sum_{k=0}^{r-1}\gamma_{2k}D(IMP_{t-k}) + \delta_1 EGR_{t-1} + \delta_2 EPO_{t-1} + \delta_3 IMP_{t-1} + \varepsilon_{2t} \quad (4)$$

in which C_2, α_{2i} (i=1,2,…,p-1), β_{2j} (j=0,1,…,q-1), γ_{2k} (k=0,1,…,r-1), and δ_l (l = 1,2,3) are regression parameters, ε_{2t} is a residual, and D(EGR) is a first difference form of EGR. To test cointegration among EPO, IMP and EGR, the hypothesis formulation used is H_0: there is no cointegration, versus hypothesis H_1: there is cointegration. In this test, the test decision uses an F-statistic test or Wald-statistic test. If the test statistic value is less than the critcal value of the lower bound I(0), then the hypothesis H_0 is accepted. In this case, there is no cointegration between EPO, IMP and EGR. If the test statistic value is greater than the critical value of the upper bound I(1), then is accepted, meaning there is cointegration among, EPO, IMP and EGR. The cointegration testing will not provide certainty, if the test statistical value is between the critical value of the lower bound I(0) and the critical value of upper bound I(1). The level of test significance use a significance level of 1%, 5% or 10%.

The parameters estimation of the ARDL model in the first deference is the third step taken when in the cointegration testing in the second stage it is found that there is no cointegration among EPO, IMP and EGR. Conversely, if the cointegration testing in the second stage is found that there is cointegration among, EPO, IMP and EGR, then the third step is to estimate the parameters of the error correction model (ECM) of the equation

$$D(EGR_t) = C_3 + \sum_{i=1}^{p-1}\alpha_{3i}D(EGR_{t-i}) + \sum_{j=0}^{q-1}\beta_{3j}D(EPO_{t-j})$$

$$+ \sum_{k=0}^{r-1}\gamma_{3k}D(IMP_{t-k}) + \theta EC_{t-1} + \varepsilon_{3t} \qquad (5)$$

in which C_3, α_{3i} (i=1,2,…,p-1), β_{3j}(j=0,1,…q–1), γ_{3k} (k = 0,1,…,r–1) are the equation parameters of (5). The coefficient θ is the error correction and ε_{3t} is residual. The parameters and are also called

short-term coefficients of EPO and IMP. If these coefficients are significant, then it is said that in the short run, there is the effect of export and import on economic growth. Whereas, if θ is significant, then there is a long-run effect of export and import on economic growth. The effects are corrected by θ ×100% in the next quarter.

The final step is to test the homogeneity, autocorrelation and normality of residual regression equation. Homogeneity tests, autocorrelation tests and residual normality tests of residual were also performed to ensure that homogeneity, normality and no autocorrelation of residual of the ARDL equations were met. Homogeneity test, autocorrelation test, normality test used in this study are White test, LM test, and Jarque Berra test. We also tested the stability of the long-term coefficients and in equation (3) using the CUSUM test developed by Brown et al. (1975).

4. FINDINGS AND DISCUSSION

4.1. Unit Root Test
The statistical values in Table 1 summarize the estimated statistical values of the ADF test and the PP test. In Table 1, the P-value of the test statistic are also included. If P-value is greater than the significant level of 1%, 5% or 10%, then it is said that the variables are stationary. The variables EGR and IMP are stationary at first difference or integrated of order one, I(1). Meanwhile, the variable EPO is stationary at level and also stationary at first deference. Thus, independent variables of the ARDL(p, q, r) model are integrated in combination of I(1) and I(0).

4.2. Cointegration Test
Firstly, the ARDL(p, q, r) model is estimated. The length of the time lag is determined based on the SC information criteria so that the ARDL(4,4,4) model is obtained. The next step, the parameters of the cointegration equation model (4) are estimated, then the F-test statistical value is calculated. The test statistical value of the F-statistic and the critical values of the lower bound I(0) and upper bound I(1) are summarized in Table 2.

In Table 2, it appears that at a 5% significant level, the statistical value of the F-statistic (11.091) is greater than the critical value of upper bound I(1) (6.977) at a 1% level of significance. Thus, there is a cointegration among export (EPO), import (IMP) and economic growth (EGR).

4.3. Long Run and Short Run Estimation
The estimation results of the parameters in equation (2) and the parameters in equation (5) are summarized in Table 3. It appears in Table 3, in Panel A, that EPO and IMP are significant at a significance level of 1% and 5%. This means that there is a long-run impact of import and export on economic growth. The coefficient of EPO is positive, and this means export have a positive effect on economic growth. Each 1% increase in export of economic growth rose 1.83%. Meanwhile, the IMP coefficient is negative. It means that import negatively affect economic growth, where every 1% of the decline in import, the economic growth rose 1.17%. In Table 3, Panel B, it also appears that the coefficients of D(EPO(−1)), D(EPO(−2)), D(EPO(−3)), D(IMP), D(IMP(−1)), D(IMP(−2)) and D(IMP(−3)) are significant whereas

Table 1: ADF test and PP test

Variable	ADF test statistic		PP test statistic	
	Constant	Constant and trend	Constant	Constant and trend
EGR	−1.6944	−0.9717	−2.0463	−0.8668
D (EGR)	−2.7190***	−8.1770*	−7.7309*	−8.2061*
EPO	−1.9360	−2.7780	−2.7417***	−3.0993
D (EPO)	−5.5908*	−5.7031*	−5.5128*	−5.5827*
IMP	−1.5394	−2.4895	−1.9323	−2.3424
D (IMP)	−4.7712*	−5.1915*	−5.1809*	−5.2650*

*, **, *** are significant at 1%, 5%, 10%

Table 2: Bound test for cointegration

Sample (T)	Number of explanatory variable (k)	F-statistics	Critical value			
			I (0)		I (1)	
			1%	5%	1%	5%
111	2	11.091	5.707	3.987	6.977	5.090

Source: Own processing

Table 3: Estimation of long-run and short-run coefficient

Variable and constant	Coefficient	t-Statistics	P-value
A. Long-run estimation, dependent variable: EGR			
EPO	1.8327	3.0253	0.0044
IMP	−1.1704	−2.1351	0.0393
B. Short-Run Estimation, Dependent Variable : D (EGR)			
C	−0.1747*	−5.4326	0.0000
D (EGR(−1))	−0.2751*	−3.2770	0.0022
D (EGR(−2))	−0.0545	−0.6244	0.5361
D (EGR(−3))	−0.2117**	−2.5233	0.0159
D (EPO)	0.0066	0.9815	0.3326
D (EPO(−1))	−0.0306*	−4.1854	0.0002
D (EPO(−2))	−0.0152**	−2.3730	0.0228
D (EPO(−3))	−0.0118***	−1.9018	0.0648
D (IMP)	0.0157**	2.5227	0.0160
D (IMP(−1))	0.0330*	4.9701	0.0000
D (IMP(−2))	0.0142**	2.2375	0.0312
D (IMP(−3))	−0.01612**	−2.6607	0.0114
EC(−1)	−0.0174*	−5.9181	0.0000

*, **, *** are significant at 1%, 5%, 10%.

only the coefficients of D(IMP), D(IMP(−1)) and D(IMP(−2)) are positive while coefficients of other variables are negative. Thus in the short run, there is an influence of export and import on the economic growth. The EC coefficient (−0.0174) is also significant. This means that the long-term equilibrium deviation between export, import and economic growth is slowing down about 1.17% in the following quarter. Table 3 panel B also shows that current economic growth is affected negatively by previous economic growth starting from first quarter to third quarter in the past.

4.4. Residual diagnostic and regression coefficient stability test

Three P-value values of the three tests: LM test, Arch test, and Jarque-Berra test were 0.102, 0.923 and 0.128 respectively. Thus, the residual of ARDL model is normally distributed with a constant variance and does not have autocorrelation.

The graph plot of the stability test of the regression equation coefficients in (2) using the CUSUM test is shown with Figure 2. It is shown in Figure 1 that the CUSUM and CUSUM Square test statistics graphs of the regression equation parameters are between

the two boundary lines at a significance level of 5%. This means that the coefficient of regression equation is stable in the period of time 2004Q1-2018Q3. The estimation results of the parameters in equation (2) and the parameters in equation (5) are summarized in Table 3. It appears in Table 3, in Panel A, that EPO and IMP are significant at a significance level.

4.5. Discussion

Results of this study is parallel with the theory stating that in the long run, export affect economic growth positively, where export is the source of revenue of the state that can stimulate economy. While, import negatively affect economic growth because import is the state expenditure to buy imported goods, where, increase in export is higher than increase in import (Kramer, 2018). Increase in Indonesia's import is way smaller than export and GDP as illustrated by Figure 1 in introduction section. Discrepancy between increase in export and import is assumed to be resulted from the change in exchange rate of Indonesia's currency (IDR) against foreign currency, which needed to be investigated. Furthermore, the coefficient of export variable (1.8327) is greater than the coefficient of import variable (−1.1704), which reveals that in the long run, i.e. in the period of 2004Q1-2018Q1, influence of change in export on economic growth is stronger than influence of change in import on economic growth of Indonesia. Therefore, export is the source of economic growth of Indonesia in the long-run which parallel with Heckser-Ohlin theory (Sukirno, 2000; Salvatore, 2013), where Indonesian advantage is natural resource commodity. However, in the short run, export contribution to economic growth is not significant. Meanwhile, short-run impact of import on economic growth is positive from the current time to three quarters in the past. This finding is line with put forward by Mankiw (2016). Thus, import is important for the dynamic of Indonesia's economy only in the short-run. This is due to the fact that most of imported goods to Indonesia are mostly raw materials for industries that don't need too much time in processing. Processing of raw materials of industries is aims at increasing the added value, especially to provide consumer goods for higher class of Indonesian community.

Empirically and partially, the results of this study stating that export influence economic growth positively, parallel with several

Figure 2: CUSUM Test (left) and CUSUM Square test (right) of coefficient stability of the ARDL model
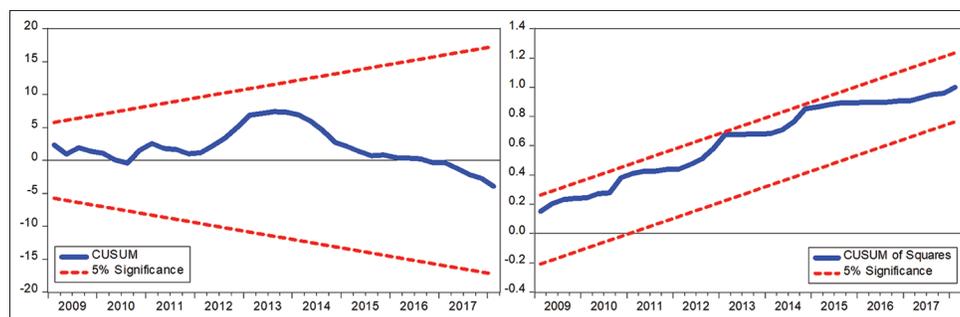
previous researches results, i.e. Sulaiman and Saad (2009), Elbeydi et al. (2010), Adeleye et al. (2015), Trost and Bojnec (2016), Bakari and Krit (2017) and Bakari (2018). Furthermore, the result of this research stating that import affect economic growth negatively, parallel with findings of Sulaiman and Saad (2009), Bakari and Krit (2017). While in totality, the findings stating that in the long run, export affect economic growth positively and import affect economic growth negatively are consistent with findings of Sulaiman and Saad (2009), and Bakari and Krit (2017). Moreover, result of this research is inconsistent with findings of El-Sakka and Al-Mutairi (2000), Khalili-Agraghi and Souri (2004), Awokuse (2006), Kristjanpoller and Olson (2014), Albiman and Suleiman (2016), Quaicoe et al. (2017), and Bakari (2018) who found that export and import or both don't have any impact on economic growth. The discrepancy is assumed to resulted from: (1) social and economic condition of the country being studied, and; (2) time series' period date used in the research or both (Adam et al., 2017, Millia et al., 2020).

5. CONCLUSION

The purpose of this research is to examine the effect of export and import on economic growth. This study uses quarterly time series data that spans in the period 2004Q1-2018Q1. This data consists of export, import and GDP as a proxy of economic growth. The model used to test the effect is the ARDL model.

The results of ARDL model analysis show that in the short and long term, there is the effect of export and import on economic growth. In the long run, every 1% of the decline in import lead to the 1.17% increase of the economic growth while 1% increase in export lead to the 1.83% increase of the economic growth.

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