



## The Antecedent of Domestic Investment in Indonesia: Auto Regressive Distributed Lag Approach

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Received: 09 January 2018

Accepted: 12 February 2019

DOI: <https://doi.org/10.32479/ijefi.7545>

### ABSTRACT

Investment is one of the important factor in a developing country's economy such as Indonesia which really needs the flow of investment to create jobs. The Investment comes from two sources, namely foreign investment and domestic investment. However, the foreign investment can cause problems for national companies in helping the country's economic development if there is no strict regulation from the government. These obstacles come from the financial of foreign investment as the sources to fund the long-term. Therefore, it is important for the government to empower domestic investment as one of the income sources in establishing an equitable economy. Although the current Indonesian economic situation has shown a positive direction, domestic investment growth has not shown a satisfactory increase yet. This problem for Indonesia, which currently more focuses on the growth of the national industry. Thus, this study aims to determine the determinants of macroeconomic variables on the development of domestic investment in Indonesia in the period 1996-2017. The method used in this study is the auto regressive distributed lag method. The results showed that inflation and interest rates had no effect on long run but had effect on a short-run in domestic investment. While the exchange rate had effect on both short and long-run in domestic investment and economic growth had effect on long run in domestic investment.

**Keywords:** Macroeconomic Variables, Domestic Investment, Auto Regressive Distributed Lag

**JEL Classifications:** E22, E43, O55

### 1. INTRODUCTION

Investment is an important component in a country's economy, including Indonesia that is a developing country. As a developing country, Indonesia needs funds from foreign and national investment to catch up with regional and global economic development. In overcoming the lag, the government made various policy efforts of creating policy to absorb investors in invest in Indonesia. These efforts were started in the early 1970s when the Law No. 6 of 1968 concerning Domestic Investment and Law No. 1 of 1967 concerning Foreign Investment had been published. Those act brought fresh air to the Indonesian people,

especially in increasing national income which is one of the indicator of a country's success in maintaining economic stability. The supportive economic condition of a country will certainly have a positive impact on investment, especially foreign investors.

With capital owned, foreign investment can help increase savings by opening various industrial sectors that bring progress in technological and skills. However, it does not bring such a big impact on a country with a large population like Indonesia due to a very small investment ratio. With this very small ratio, the Indonesian government renewed the policy by issuing Law No. 25 of 2007 concerning domestic investment and foreign investment

to attract national companies to invest and play a major role in the economy and development in Indonesia. By issuing this law, the realization of domestic investment has proven to increase. The total domestic investment in 1996-2007 increase from 224.469 billion Rupiah to 1.229.314 billion Rupiah. However, the increase in investment was not accompanied by an increase in job opportunities. Every 1% of the increase in economic growth after the issuance of Law No. 25 of 2007 only absorbs half of the labor force every year. This indicates that national companies prefer to use the advancement of the technological brought by foreign investors rather than employing Indonesian workers.

The decline in the labor force is in accordance with research conducted by Ghura and Goodwin (2000) and Phetsavong and Ichihashi (2012) which states that economic growth has no effect on investment in Asia and South America due to a decrease in efficiency for the increase of economic growth. The same thing was also found in a study conducted by Hussain and Haque (2016) in a study in Bangladesh which state that economic growth and investment are negatively related.

Other factors that determine investment are exchange rates and inflation. Exchange rates can be interpreted as the value of the domestic currency and foreign currency which is seen from the level and volatility (Goldberg and Kolstad, 2005; Froot and Stein, 1991). Exchange rates can affect the amount of investment and the allocation of investment in all countries (Goldberg, 1993). For developing countries, when the domestic currency is depreciated, the depreciation will be an economic burden for the country (Osinubi and Amaghionyeodiwe, 2009). One of them is economic instability that will bring negative impact to domestic investors when the investment costs is higher (Bahmani-Oskooee and Massomeh, 2010) and will have a positive impact on foreign investors in exploring with the support of big capital (Aizenman, 1992). Therefore, in protecting and increasing domestic investors, the government must create strict regulations and policies for foreign investors (Meier, 1966). According to Meier (1966), one of the right policies is to control the value of the domestic currency from the pressure of the foreign currency.

If there is no control and supervision of the exchange rate, the increase of price will occur domestically as the effect of depreciation of the domestic currency (Ball et al., 2012). The increase of prices or commonly known as inflation will result in slowness of economic growth (Babatunde and Shuaibu, 2011). The impact is that there is an imbalance between capital and savings held so that domestic investment cannot lift growth rates (Muritala, 2011).

Beside economic growth, exchange rates, and inflation factor, interest rates also influence investment where investors will do investment if interest rates are low (Larsen, 2004). This is in accordance with the Keynesian theory which states that if interest rates are high, investors will be reluctant to invest, and when interest rates are low, investors will increase investment and will monitor the situation if the expected percentage of profit equals with the interest rates unless the company is engaged in social field.

However, from the results of several previous studies, there were differences of opinion. Interest rates negatively affect domestic investment which happened in the research conducted by Oshikoya (1994), and Hafeez and Safdar (2015) and interest rates positively affect which happened in the research conducted by Mallick (2002) and Hassan and Salim (2011). This difference will later be examined by the authors to see how far the development of domestic investment in Indonesia is. Accordingly, this article discuss the influence of economic growth, exchange rates, inflation, and interest rates toward domestic investment in Indonesia and the empirical relationship between the 4 macroeconomic variables and domestic investment in Indonesia both short term and long-term.

## 2. LITERATURE REVIEW

In decades, the literary of domestic investment has been very diverse, both researched in developing and developed countries, all of which have focused on increasing capital and have been linked to economic growth. Many factors influence domestic investment such as in a study conducted by Lesotlho (2006) which examines the relationship between interest rates, economic growth, investment credit in commercial bank, inflation, exchange rate and free trade on domestic investment in Botswana with the method. Error correction model (ECM) in the period 1976-2003. The results of research conducted by Lesotlho show that investment credit in commercial banks and real interest rates affect domestic investment in the short term while economic growth and exchange rates affect domestic investment in the long term.

Eshun et al. (2014) which examines the relationship between real interest rates, investment credit in commercial banks, exchange rates, money supply (M2), inflation rate and economic growth toward domestic investment in Ghana with the autoregressive distributed lag (ARDL) method in the period 1970-2010, it was found that interest rate had a negative effect for the long term while investment credit, exchange rate and inflation gave a positive effect for the long term. However, the money supply (M2) has no effect on both the short and long term because the Ghana central bank imposed a strict money policy in 2000-2009.

Naa-Idar et al. (2012) discusses the relationship of economic growth, private investment, investment credit in commercial banks, inflation, foreign debt, exchange rates, infrastructure and imports toward domestic investment in Ghana in the period 1960-2010 using the ECM. The results obtained in this study show that gross domestic product is positive and has no effect on the short term but affect the long run due to an increase in capital stock and provides a mechanism for making investment decisions so it can increase real growth. Different things are shown in exchange rates that have different results. In the short term, the exchange rate shows no positive effect but in the long run shows a negative effect. This is due to the depreciation of the exchange rate adding to import costs and raw materials for domestic investors. Other results such as investment credit show a negative effect on the short term, inflation show a positive effect both in the short and long term, foreign debt shows a negative effect on the short term, and exports show a positive effect in the short and long term.

Karagoz (2010) studies the relationship between economic growth, real exchange rates, investment credit ratios, private foreign debt, inflation, and trade openness toward domestic investment using ARDL in the period 1970-2005 in Turkey. The results show that all variables determinant of domestic investment are positively related in the long run. This shows that domestic investment has a dominant effect on Turkey's economic growth.

### 3. METHODOLOGY

For model specifications, this study uses ARDL where this model begins with a long-term relationship between domestic investment, economic growth, exchange rate, inflation, and real interest rates related to logarithmic form, with model estimation:

$$I_t = \beta_0 + \beta_1 G_t + \beta_2 EX_t + \beta_3 INF_t + \beta_4 R_t + \epsilon_t \quad (1)$$

Where  $I_t$  is the domestic investment,  $G_t$  is economic growth,  $EX_t$  is the exchange rate,  $R_t$  is the exchange rate,  $INF_t$  is the inflation and  $\epsilon_t$  is regression error term. In equation 1 is a form of multiple regression (OLS) without using logarithms. The main expectations of these parameters are  $\beta_1 > 0$ ,  $\beta_2 < 0$ ,  $\beta_3 < 0$ ,  $\beta_4 < 0$  or  $> 0$ . All data taken is quarterly data from 1996 to 2017 and taken from the Indonesian Economic - Financial Statistics database Bank Indonesia.

When using the ARDL method, heterocedasticity tests and multicolinearity tests were not apply because what is whether the result of the unit root tests the data is stationary or not stationary at the level (Dickey and Fuller, 1979). If the two series are non-stationary but interconnected, the two series can be co-integrated. Thus, the two co-integrated series have a long-term balance relationship.

If all data is stationary on 1<sup>st</sup> or 2<sup>nd</sup> difference, we will use the model error correction proposed by Engle and Granger (1987) to be the equation:

$$\begin{aligned} \beta_0 + \sum_{i=1}^m \beta_{1i} \Delta I_{t-i} + \sum_{i=0}^m \beta_{2i} \Delta G_{t-i} + \\ \Delta I_t = \sum_{i=0}^m \beta_{3i} \Delta EX_{t-i} + \sum_{i=0}^m \beta_{4i} \Delta INF_{t-i} + \\ \sum_{i=0}^m \beta_{5i} \Delta R_{t-i} - \gamma \epsilon_{t-1} + \mu t \end{aligned} \quad (2)$$

Where  $\Delta$  is a change from the dependent variable,  $\gamma$  is how fast the parameter of the coefficient,  $\epsilon_{t-1}$  is the previous period in the error correction term (ECT), where equation 2 is the relationship between variables in the short term and the derivative of equation 1. In the Engle-Granger method, all variables in equation 1 must be combined in the first degree,  $I(1)$ ; and ECT at degree 0,  $I(0)$  in order to make a close relationship. If some of the variables in equation 1 are not stationary then a new method is used, namely ARDL (Pesaran et al., 2001) which is a combination of Engle-Granger which replaces ECT in equation 2 with the equivalent equation 1.  $\epsilon_{t-1}$  is a substitution of merging slowness in all stated variable:

$$\begin{aligned} \beta_0 + \sum_{i=1}^m \beta_{1i} \Delta I_{t-i} + \sum_{i=0}^m \beta_{2i} \Delta G_{t-i} + \\ \Delta I_t = \sum_{i=0}^m \beta_{3i} \Delta EX_{t-i} + \sum_{i=0}^m \beta_{4i} \Delta INF_{t-i} + \\ \sum_{i=0}^m \beta_{5i} \Delta R_{t-i} + b_6 I_{t-1} + b_7 G_{t-1} + \\ b_8 EX_{t-1} + b_9 INF_{t-1} + b_{10} R_{t-1} + \mu t \end{aligned} \quad (3)$$

Next, from equation 3 it can transformed to accommodate one ECT period to be the equation:

$$\begin{aligned} \beta_0 + \sum_{i=1}^m \beta_{1i} \Delta I_{t-i} + \sum_{i=0}^m \beta_{2i} \Delta G_{t-i} + \\ \Delta I_t = \sum_{i=0}^m \beta_{3i} \Delta EX_{t-i} + \sum_{i=0}^m \beta_{4i} \Delta INF_{t-i} + \\ \sum_{i=0}^m \beta_{5i} \Delta R_{t-i} + \gamma \epsilon_{t-1} + \mu t \end{aligned} \quad (4)$$

Statistically,  $\mu$  is not just only estimated to be negative and significant in speed adjustment for each variable but also as a means of supporting co-integration of the variables (Pesaran et al., 2001). The Test procedure of the Bounds test is based on the F test and/or DW-Stat which is the initial method of using ARDL. Thus, the hypothesis does not contain co-integration,  $H_0: b_6 = b_7 = b_8 = b_9 = b_{10} = 0$  (Eq. 2), and alternative hypothesis  $H_1: b_6 \neq b_7 \neq b_8 \neq b_9 \neq b_{10} = 0$  which should be in equation 3. The F test is only used for variables that have a non-standard distribution (Halicioglu and Dell'Anno, 2009).

In equation 2 and 3 shows the short and long-term effects simultaneously after the initial regression (OLS). Short-term effects are shown in the coefficients of  $\beta_1$ - $\beta_5$  while those for long-term effects are shown in  $b_7$ - $b_{10}$  which are normalized at  $b_6$ - $b_{10}$  the dependent variable in the previous period.

## 4. DISCUSSION AND RESULTS

### 4.1. Empirical Results

#### 4.1.1. Unit root test

Before conducting the estimating, the first step that must be done is to see our time series data whether stationary or not using Augmented Dickey Fuller (ADF) through the root unit test from all variables. The results of the unit root test can be seen in Table 1.

These results show that domestic investment, inflation, and real interest rates are stationary at the level  $I(0)$  of 5% while for economic growth and exchange rate are not stationary at the level  $I(0)$  of 5%. In

**Table 1: Unit root test**

Variable	Level		First difference	
	ADF	PP	ADF	PP
LINV	-3.460	-5.545*	-3.462	10.482*
LG	-3.465	-1.477	-2.897	9.932*
LEX	-3.460	-3.036	-3.461	-7.045*
INF	-3.461	-6.006*	-3.462	-6.865*
R	-3.462	-4.477*	-3.462	-7.773*

Indicates ADF t-stat significant at 5% level. All variables are stationer at first difference

first difference, all variables are stationer at the level I(1) of 5%. As such, this is in accordance with the standard of the ARDL method.

**4.1.2. Test for long run relationship between variables**

After stationary data at the level, (I the equation 3 is estimated with the results shown in Table 2.

In Table 2 shows AIC, SC, and HQ are the smallest values from the model, this results shows that lag one is the best model of ARDL (1,1). To see a long-term relationship between variables used F-statistic where the F-stat bound test is 5.696, computing the critical upper bound value by Pesaran et al. (2001) at the 95% level of 3.79-4.85. The result is the F statistic value is greater than the critical upper bound values. That is, all variables have a relationship into the long run.

**4.1.3. Diagnostic test**

The next step in the ARDL model is to determine whether there is a serial correlation, homoscedasticity, and normal distribution.

**Table 2: Results of ARDL (1,1) variable dependent LINV**

Variable	Coefficient	Standard error	t-Stat
C	-4.937	2.550	-1.936
LINV(-1)	0.534	0.083	6.419
LG	1.185	0.281	4.209
LEX	-1.010	0.330	-3.061
INF	0.045	0.064	0.695
INF(-1)	0.101	0.052	1.923
R	0.026	0.058	0.408
R(-1)	0.123	0.058	2.130
R <sup>2</sup>	0.820	SC	1.959
Adj R <sup>2</sup>	0.805	HQ	1.856
F-statistic	53.400	DW	1.887
AIC	1.737	F-stat bound test	5.696

Source: Eviews 10. ARDL: Autoregressive distributed lag

**Table 3: Diagnostic test**

Test	Null hypothesis	Obs R <sup>2</sup>	P
Serial correlation	No correlation	4.1169	0.1276
Heteroskedasticity	Homoskedasticity	36.9824	0.3775
Jarque - Bera	There is normal distribution	22.0523	0.0000

Source: Eviews 10

Based on the Table 3 shows that in this model there is no serial correlation, homoscedasticity, and normal distribution.

**4.1.4. Stability analysis**

Next is to see whether the results are stable or not by looking at the graph of the CUSUM test in Figure 1 and CUSUM square test in Figure 2.

Figures 1 and 2 shows that the blue line is between 2 red lines which means that it is in a stable position. With the absence of serial correlation, homoscedasticity, and normal distribution in the model and the model stability, the results show that the long run relationship on domestic investment in Indonesia is indeed influenced by 4 macroeconomic variables (economic growth, exchange rate, inflation and interest rates) simultaneously.

**4.1.5. Long run results**

After all variables are proven to have a long-term relationship. The results of long-term estimation of this model are shown in Table 4.

From the results shown in Table 4 it shows that economic growth has a positive effect on the long run and exchange rate has a negative effect on the long run.

**4.1.6. Short run results**

Then estimate the third equation by using the ECM model to determine the short-term relationship between variables. The results are shown in Table 5.

From these results it shows that the coefficient of the ECT (ECT (-1)) is -3.42 and it is statistically significant at the 5% level, which means the Engle-Granger specification model used in this study is a set of relate variables and can explain causality both in the short and long run.

**4.2. Discussion**

**4.2.1. Short run analysis**

From the results of the study (Table 5), it was found that economic growth lowered the level of investment (Hussain and Haque, 2016). This is due to the existence of an old bureaucracy, especially in terms of permits that can hinder distribution (Meier, 1966). In

**Figure 1: CUSUM test**

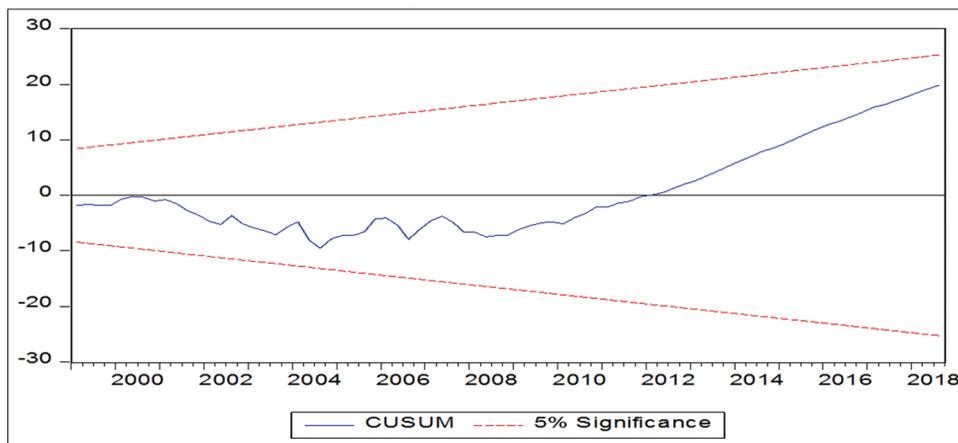


Figure 2: CUSUM of squares

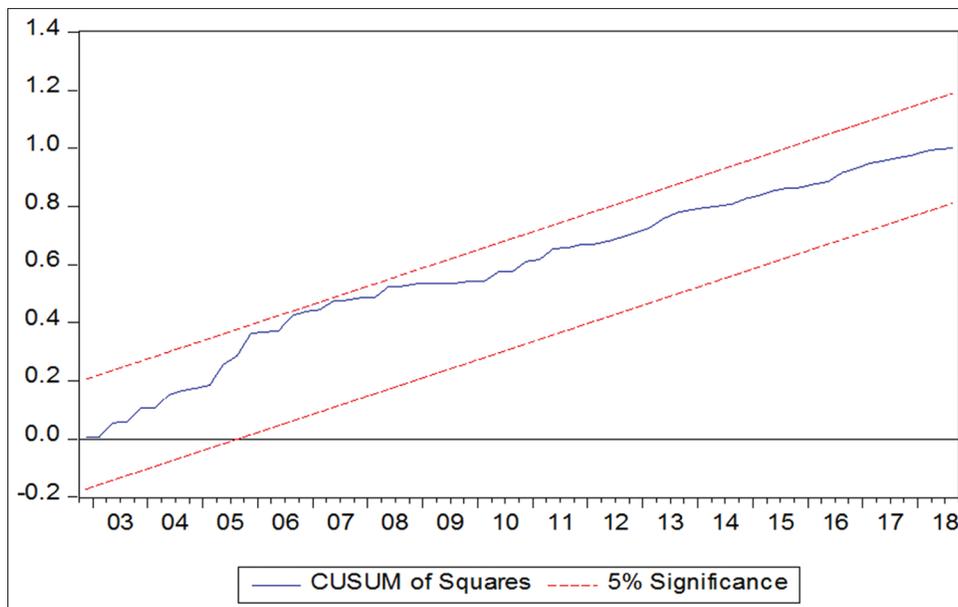


Table 4: Results of long-run ARDL (1,1) variable dependent LINV

Variable	Coefficient	Standard error	t-Stat
C	-2.008	2.17	-0.925
LG	0.849	0.234	3.628
LEX	-0.695	0.298	2.328
INF	0.056	0.046	1.24
R	0.056	0.05	1.118
R <sup>2</sup>	0.808	AIC	1.753
Adj R <sup>2</sup>	0.797	SC	1.919
F-statistic	71.054	DW	1.964

Source: Eviews 10. ARDL: Autoregressive distributed lag

Table 5: Short run results ARDL (1,1) variable dependent LINV

Variable	Coefficient	Standard error	t-Stat
C	0.012	0.072	0.166
D (LINV(-1))	0.555	0.192	2.891
D (LG(-1))	-0.307	1.030	-0.298
D (LEX(-1))	0.946	0.641	1.477
D (INF(-1))	0.071	0.050	1.416
D (R(-1))	0.088	0.053	1.671
ECT(-1)	-0.971	0.223	-4.366
R <sup>2</sup>	0.243	AIC	1.776
Adj R <sup>2</sup>	0.186	SC	1.975
F-statistic	4.282	DW	2.120

Source: Eviews 10. ARDL: Autoregressive distributed lag

addition, factors of monetary policy issued by the government such as interest rates of investment credit can change investment decisions (Djajić et al., 1999). Thus, domestic investors in Indonesia look more at the level of profit in the long term.

For the short run, the results of exchange rate are inversely proportional to long run investment where the exchange rate adds the increase of domestic investment. This result is also supported in the researches conducted by Oshikoya (1994) and Augustine (2014). Investment rises because the domestic

currency fluctuations can still be assessed by companies a small risk (Frimpong and Marbuah 2010) and there are monetary policy in maintaining the economic stability that support investors in investing (Oshikoya, 1994; Augustine, 2014).

Inflation variables in this study showed positive results and not significant in short run. It is in line with Ullah et al. (2012), and Were (2001). Inflation can increase domestic investment in the short run because investor see opportunities where the Indonesian people are very consumptive in both imported goods and consumer goods so that the opportunity for investors to get large profits will be very possible. This is also supported by the results of this study where exchange rate can increase domestic investment.

In this study also found that interest rates have a positive effect on domestic investment. This results is conducted by Bahmani-Oskooee and Massomeh (2010) and Frimpong and Marbuah (2010). Interest rates have a positive effect because they are also supported by exchange rates and inflation which have a positive effect on this study. This is not accordance with Keynesian theory which states that increasing interest rates will reduce investment.

4.2.2. Long run analysis

From the results shown in Table 4 it shows that economic growth has a positive effect on the long run. This result is in line with researches conducted by Bahmani-Oskooee and Massomeh (2010), Frimpong and Marbuah (2010), and Michael and Aikaeli (2014), With a positive coefficient it shows that when the economic growth is high and stable, domestic investors will show their interest in investing which is due to the increase of goods and services (Augustine, 2014), government policies that support investors (Al-Sadig, 2013; Pastor and Sung, 1995) and projected profits (Eshun et al., 2014; Assa and Edriss, 2012).

On the other hand, the results of this study are not in line with what was found by Muzurura (2016) who research in Zimbabwe. In this

research, economic growth reduced investment in the short and long run. According to him, this happened because the Zimbabwean government reduced investment costs in infrastructure including providing credit interest rates in agriculture, the government's failure to regulate fiscal and monetary policies, the descent of the savings from 28% in 1995 to 5% in 2008 from total national income and the occurrence of hyperinflation in 2007 was 231 million%.

The results of the exchange rate results in this study show a negative relationship to domestic investment in the long run. This is in line with researches conducted by Hussien (2000) and Solimano (1989). The exchange rate can reduce the level of domestic investment in the long run due to depreciation of the domestic currency against foreign currencies. Long-term currency reductions can burden the costs of input and imported raw materials that used for the investors domestically (Naa-Idar et al., 2012; Assa and Edriss, 2012; and Bahmani-Oskooee and Massomeh, 2010).

Inflation variables in this study showed positive results that are not significant in long run and it is in line with Acosta (2005), Augustine (2014), and Were (2001). Inflation can increase domestic investment in the long run and the investors are not affected at all by increase of the inflation although this study showed positive economic growth. This is because consumers prefer to save their money (Augustine, 2014) or buy goods that can sold to get cash back such as gold, jewelry or deposits rather than spending it for the daily needs consumption (Hafeez and Safdar, 2015).

Lastly, there is the real interest rate variable where this study found that real interest rates were positively related (Lesotho, 2006 and Osinubi and Amaghionyeodi, 2009) and not significant on domestic investment in the long run. Thus, the government must be serious in making policies by lowering the deposit rates so that domestic investment will increase significantly (Augustine, 2014). By this insignificant relationship, domestic investors do not respond because it will increase the production costs for the long run (Hassan and Salim, 2011). On the other hand, the research that we found was contradicts Eshun et al., 2014 which studies investment in Ghana. In their research, they found interest rates to be negatively related in the long run.

## 5. CONCLUSION

Like other developing countries, in Indonesia investment is one of the important factors in increasing economic growth., The development of domestic investment in Indonesia began to show improvement after the issuance of Law No. 25 of 2007 concerning Domestic Investment and foreign investment. However, domestic investment in Indonesia is still very weak. In this article determinants of domestic investment in Indonesia during the period 1996-2017 both in the short and long run have been found.

Using the ARDL model, this study found that the economic growth, inflation and real interest rates variables show a positive relationship and the exchange rate is negatively related in the short run. However, inflation and real interest rates do not give a

significant impact on increasing domestic investment in Indonesia. Thus, the government needs to give moral appeal to banks in Indonesia to reduce investment loan interest rates and maintain political stability in order to increase domestic investment.

Meanwhile for the long term, this study found that only the exchange rate variable can increase domestic investment, the economic growth, real interest rates, and inflation even reduce the interest of domestic investors. This happens because the licensing bureaucracy made by the government, especially the local government, is not pro-investment. Thus, the results found prove that domestic investment in Indonesia focuses more at the long-run investment. This is because according to investors the prospect for Indonesia's economic growth in the future is more profitable to get maximum profit or results.

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