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An Analysis of the Effect of Consumption Spending and Investment on Indonesia's Economic Growth

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Abstract

This study aims to examine the effect of investment and consumption spending on Indonesia's economic growth. The data used is the quarterly time series data from the first quarter of year 2003 to the fourth quarter of year 2013, comprising consumption spending, investment and economic growth. For the purpose of analysis, the autoregressive distributed lag (ARDL) model is used. The result of the study reveals that there are long-run and short-run effects of consumption spending on economic growth. Meanwhile, the effect of investment on economic growth is not significant. The study also reveals that the increase in government spending on economic growth is 1.88% if the consumption spending rises by 1%.

Keywords: Consumption Spending, Investment, Economic Growth, ARDL Model.

JEL Classification: C13, E210, H31, O047.

1. Introduction

Economic growth refers to an increase in total income and per-capita income taking into account the growing population accompanied by fundamental changes in the economic structure of a country. A country experiences economic growth if there is an increase in the

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country's real gross national product. The economic growth serves as an indication of the success of economic development. It is related to the process of increasing the production of goods and services in the economic activities of society.

Samuelson and Nordhaus (2010) put forward the difference between economic growth and economic development. It is that the succes of the former is more quantitative that is the rise in standard of income and level of production output while the latter is more qualitative and in the form of input allocation in various sectors of the economy. According to Mankiw (2015), in macro-analysis the measurement of a nation's economy is gross domestic product (GDP) for which the nation's total income and expenditure for a given periode of time is gauged. In a two-sector economy the flow of expenditure comprises two components of aggregate expenditure which are household consumption and investment and thus can be formulated as Y = C + I, where Y is national income, C represents household consumption and I represents investment. To measure an economic growth the value of GDP based on constant price is employed in order for the obtained growth rate is a real growth that occurs due to an increase in production. According to Keynes' theory (Keynes, 2013), the amount of consumption spending is linked very closely to a nation's revenue in that it may affect the fluctuation of the nation's economy and it can be measured based on constant price.

Moreover, the consumption factor also affects an economic growth. One of the important figures that can be used for assessing the influence of consumption on a nation's economic growth is the national income or revenue (GDP) as it constitutes the ultimate value of goods and services produced in the territory of a country within period of one year. From the two-sector economy it is known that economic growth is directly proportional to household consumption which means as the consumption decreases, the economic growth also decreases. Thus spending made by consumer households are used to purchase various needs within a given year.

In addition to changes in consumption, another factor affecting an economic growth is investment (Sukirno, 2003). Furthermore, the investment is one of the components of GDP and hence the effect of investment on a nation's economy can be seen from the GDP. An

investment is affected by the level of capital return and interest rate. For this reason the capital owner will invest if the capital return level is greater than the interest rate and as the investment spending decreases, the GDP also decreases (Mankiw, 2015).

The continual investment made by society will increase economic activity and employment opportunities as well as increase national income and prosperity, all of which derives from three important functions of investment namely: (1) investment makes up one of the components of aggregat expenditure and that's why an increase in investment will increase aggregate demand, GDP and employment opportunities as well; (2) the increase in capital goods brings an increase in production capacity; (3) Investment is always followed by technological development. Meanwhile, Sukirno (2003) mentions that the investment development in Indonesia experienced the lowest level during 2003 which was 0.60 percent on average. This condition was possible due to the high interest rates in Indonesia as well as the economy of the country which had not been recovered so well post-recession of 1997/1998 that the investor's interest in making investment declined during that year.

According to Fajriah (2016), despite in the midst of sagging global economy, the growth of Indonesian economy this year is among the highest in the world that is 5.04 percent on average at the third quarter of year 2016. There are a number of issues affecting the Indonesia's economic growth and economic development such as: (1) the role of state budget is not yet optimal; (2) the unemployment rate remains high; (3) natural resources are not yet well managed; (4) Inflation rate; (5) transmigration programs do not go well; (6) Infrastructure is still minimal; and (7) Investment in manufacturing sector.

Ghani and Din (2006) point out that the public investment can determine the long-term economic growth through the provision of education, health, basic scientific research and physical infrustructure in Pakistan. Ghani and Din (2006) also find out in their research that the role of public investment in growing economy is largely driven by private investment and that no strong inference can be drawn from the effect of public investment and public consumption on Pakistan's economic growth.

This study aims to examine the effect of consumption and

investment on the economic growth of Indonesia using quarterly time series data over the period of 2003Q1 to 2013Q4. The econometrics model used is an autoregressive distributed lag (ARDL) model which developed by Pesaran and Shin (1999) and previously used by Nyasha and Odhiambo (2007), and Pata and Yurtkuran (2017).

2. Literature Review

Household consumption has a quite significant impact in determining the fluctuation of economic activity from time to time. The higher the quantity and quality of people's consumption, the more the production of goods and services to meet the demands of it. An individual's consumption is directly proportional to his/her income. The people's consumption in Indonesia continues to raise from year to year following the growth of population and so do the people's needs for goods and services.

Household consumption spending contributes the largest portion to the total of aggregate spending. Even if it is not a quality source of the growth of a country's economy, it always however occupies the largest share in the formation of the quantity of economic growth in various developing countries.

In his theory, Keynes (2013) believes that the marginal propensity to consume (MPC) the amount consumed out of an addition to income is between zero and one. The marginal propensity to consume is crucial to Keynesian recommendation of policies to reduce the increasingly widespread unemployment. The strength of fiscal policy to influence the economy as shown by the multiplier of fiscal policy emerges from the feedback between income and consumption.

In addition, Keynes (2013) states that ratio of consumption to income which is known as average propensity to consume falls as income increases. He believes that savings are luxury, so he hopes that the rich individuals save in a higher proportion of their income than do the poor individuals. Furthermore, he argues that income is the important determinant of consumption however it is not true of interest rate. He contends that the effect that interest rate has on consumption is only theoretical. In conclusion, in the short-run the effect of interest rate on individual's spending is secondary and relatively insignificant.

The continuity of development process or the long-run economic growth requires the existence of production activities in all sectors of the economy, through various investment activities; both funded through the government-owned and private-sector investment. The relationship between investment and economic growth among others is described in the Harrod-Domar model of economic growth. Harrod-Domar's theory propounds an economic growth model which is developed from Keynes'. The theory focuses on the decisive role of savings and investment in economic growth (Lincolin, 1987). Some of the assumptions used in this theory are that: (a) the economy is in full-employment and the capital goods in the community are used fully; (b) the economy consists of two sectors, i.e household and corporate sectors, meaning that the government sector and foreign trade are absent; (c) the amount of public savings is proportional to the that of national income, meaning that the saving function starts from the original point (zero); and (d) value of the marginal propensity to save (MPS) is fixed, and so are the ratio between capital and output (capital output ratio) and the ratio of capital output increment (incremental capital output ratio).

Harrod-Domar's theory was actually developed separately in the same period by E.S.Doma and R.F.Harrod. They considered the importance of investing in economic growth as it will increase the stock of capital goods that further allows ouput to rise. The source of domestic funds for investment purposes comes from the production saving (national income) (Jhingan, 2014). This is consistent with the research of M 'Amanja and Morrissey (2006) who found that investments, private share, public and import have a beneficial effect on per capita income and eventually on GDP. Meanwhile aid in the form of external lending nets was found to have a significant negative impact on long-run economic growth in Kenya.

The growth theory proposed by Harrod-Domar is an extension of Keynes's analysis of national economic activity. Harrod-Domar's theory essentially seeks to show the required condition for steady growth, which is the growth that will always create the full use of capital tools that will always prevail in the economy. Harrod-Domar's theory takes into account two aspects of capital formation in economic activity namely increasing public spending and enhancing the number

of capital tools in society. In Harrod-Dommar's capital formation is seen as expenditure that either will enhance the ability of an economy to produce goods or as an expenditure that will increase the effective demand of the whole society. Moreover, Harrod-Domar's theory assumes that the increase in such production ability will not necessarily create an increase in production and an increase in national income (Jhingan, 2014).

Furthermore, Harrod-Domar states that the increase in production and national income is not determined by an increase in society's capacity to produce, rather by an increase in their spending. It means that despite the capacity to produce of society rises, the national income will only grow and economic growth will then be created if the public spending rises. The analysis of Harrod-Domar aims to demonstrate the necessary conditions so that in the long-run the capacity to produce that increases from time to time (due to capital formation in the past) will always be fully utilized (Mankiw, 2015).

The neoclassical growth models focus on population growth, capital accumulation, technological advancement and interacting output in the process of economic growth. There are four assumptions underlying the Solow-Swan (neoclassical model) (Sumitro, 1994):

1. Labor (population) that grows at a certain rate
2. The existence of a production function that applies to each period
3. There is a tendency to save (propensity to save) by community expressed as a certain proportion of output.
4. All public savings are invested.

For the long-run equilibrium, the neoclassical model will be achieved when per capita capital reaches a stable level, meaning it no longer changes in value. If capital is constant, then a long-run equilibrium is reached. This is the hallmark of the first equilibrium position. The second is the rate of growth of output, capital and labor. In the long-run equilibrium position the rate of output growth can be inferred from the characteristic that the per capita output is constant and the population grows according to the assumption. The output per capita is defined as the total output growing at the rate of population on yearly basis. The third relates to stability of the equilibrium position. The equilibrium position of the Solow-Swan model is stable,

in the sense that if the economy is by any chance not in an equilibrium position, then there will be forces that tend to bring the economy back in an equilibrium position for long term. The fourth concerns consumption and saving (investment) level. The level of per capita saving (investment) of the equlibrium position is constant. What is unsaved will then be consumed and so the per capita consumption is also constant in the equilibrium position. The fifth relates to rewards earned by each factor of production or the aspect of income distribution. Since there are only two kinds of factors of production (capital and labor), the total output will be completely divisible between the owners of capital and that of labor (Boediono, 1994).

3. Data and Methodology

3.1 Data

The time series data used in this study consists of three types that are consumption spending (*CON*), net direct investment (*INV*) and gross national product (*EGR*), all of which are quarterly data from the period of the first quarter of year 2003 to the fourth quarter of year 2013. *EGR* was used as economic growth proxy. Unit of *CON* is billion rupiah, *INV* is US Dollar, *EGR* is billion rupiah (current price) .These three time series data were obtained from Federal Reserve Bank of St. Louis. All the data was not transformed into natural logarithms as much in the literature as some of the *INV*'s series values were negative.

3.2 Methodology

Prior to testing the effect of consumption spending and investment on economic growth, a first step taken was to test data stationer or integrated of order. Two stationary tests were used, i.e. Augmented Dickey-Fuller (ADF) test, and Phillips-Perron (PP) test. The ADF test was developed by Dickey and Fuller (1979), while the PP test was developed by Phillips and Perron (1988). In the ADF test, the noise variable (white noise) of the equation is assumed to be indipendent with zero average and constant variance. Meanwhile, in the PP test, the interference variable is autocorrelated. The ADF test follows the statistic-τ distribution, whereas the PP test follows the PP-statistical distribution. With both types of test, then a time series is stationary, or integrated of order d (I(d)), if the test statistic is less than its critical value.

A second step was to test the cointegration between consumption spending and economic growth. The cointegration test used was the ARDL bound test developed by Pesaran and Shin (1999) and Pesaran et al. (2001). The ARDL model associated with the cointegration test, is:

$$D(EGR_t) = \alpha_1 + \sum_{i=1}^{p-1} \beta_{1i} D(EGR_{t-i}) + \sum_{j=0}^{q-1} \gamma_{1j} D(INV_{t-j}) + \sum_{k=0}^{r-1} \delta_{1k} D(CON_{t-k}) + \theta_1 EGR_{t-1} + \theta_2 INV_{t-1} + \theta_3 CON_{t-1} + \varepsilon_{1t} \quad (1)$$

where ε_{1t} is error term, α_1, $\beta_{1i}(i = 1, 2, \dots, p-1)$, $\gamma_{1j}(j = 0, 1, \dots, q-1)$, $\delta_{1k}(k = 0, 1, \dots, r-1)$, dan $\theta_l(l = 1, 2, 3)$ is regression parameter. The cointegration test was done by testing the significance of coefficient θ_l $(l = 1, 2, 3)$ in equation (1) using Wald-statistics or F-statistics. In other words, the null hypothesis $H_0: \theta_1 = \theta_2 = \theta_3 = 0$ (there is no cointegration) versus alternative hypothesis $H_1: \delta_l \neq 0, l = 1, 2, 3$ (there is cointegration). If the F-statistic is less than the lower critical bound statistic I(0), then H_0 is accepted, or there is no cointegration between consumption spending, investment and economic growth. On the contrary, If the F-statistics is greater than the upper critical bound statistic I(1), then H_0 is rejected, or there is cointegration between consumption spending, investment and economic growth. Both the values of lower critical bound I(0) and of upper critical bound I(1) were taken from Narayan (2005) since the sample of this study is T=42 observation.

If there is cointegration between consumption spending, investment and economic growth, then a third step is to estimate the long-term and short-term coefficients of consumption spending and investment. The long-term coefficients are derived from equation (2) when variables of consumption spending, investment and economic growth are in equilibrium:

$$EGR_t = \alpha_2 + \sum_{i=1}^{p} \beta_{2i} EGR_{t-i} + \sum_{j=0}^{q} \gamma_{2j} INV_{t-j} + \sum_{k=0}^{r} \delta_{2k} CON_{t-k} + \varepsilon_{2t} \quad (2)$$

where α_2, $\beta_{2i}(i = 1, 2, \dots, p)$, $\gamma_{2j}(j = 0, 1, \dots, q)$, $\delta_{2k}(k = 0, 1, \dots, r)$, ε_{2t}

are error terms, and *p*, *q*, *r* are the length of time lag. Long term coefficients of investment and consumption spending are:

$$\gamma = \frac{\sum_{j=0}^{q} \gamma_{2j}}{1-\sum_{i=1}^{p} \beta_{2i}} \text{ and } \delta = \frac{\sum_{k=0}^{r} \delta_{2k}}{1-\sum_{i=1}^{p} \beta_{2i}} \quad (3)$$

Equation (2) is called the ARDL(*p*, *q*, *r*) model where *p*, *q* and *r* are the length of the time lag. The long-term coefficients γ and δ are called multiplier effect of investment and consumption spending (Koop, 2006). Therefore, if the long-term coefficients are statistically significant, then it is said there is an effect of consumption and investment spending on economic growth (Murthy and Okunade, 2016). Based on this, the Granger causality test is not conducted. Furthermore, short-term coefficients are obtained from the error correction model (4), as follows:

$$D(EGR_t) = \alpha_3 + \sum_{i=1}^{p-1} \beta_{3i} D(EGR_{t-i}) + \sum_{j=0}^{q-1} \gamma_{3j} D(INV_{t-j}) + \sum_{k=0}^{r-1} \delta_{3k} D(CON_{t-k}) + + \alpha EC_{t-1} + \varepsilon_{3t} \quad (4)$$

where α_3, $\beta_{3i}(i = 1, 2, \dots, p-1)$, $\gamma_{3j}(j = 0, 1, \dots, q-1)$, δ_{3k} $(k = 0, 1, \dots, r-1)$, α

is variable coefficient in regression, EC_{t-1} error correction variable, ε_{3t} is error term, and $D(EGR) = D(EGR_t) = EGR_t - EGR_{t-1} = EGR - EGR(-1)$ is the first difference of *EGR*. If the coefficients of equation (4) are statistically significant, then it is said there is a short-term effect of investment and consumption spending on economic growth. Time series EC_t is obtained from the regression equation:

$$EC_t = EGR_t - C - \gamma INV_t - \delta CON_t$$

where $C = \frac{\alpha_2}{1-\sum_{i=1}^{p} \beta_{2i}}$, γ and δ has been stated on (3).

4. Results

4.1 Stationary Test

The result of statistical estimation of ADF test and PP test is

summarized in Table 1. From the Table 1 it appears the *CON* and *EGR* variables are stationary at first difference or integrated of order one, I(1). Meanwhile, the *INV* variable is stationary at level or integrated of order zero, I(0).

Table 1: Unit Root Test

Variable	ADF test statistics		PP test statistics	
	Without trend	**With trend**	**Without trend**	**With trend**
CON	5.11498	-1.93235	5.04891	-1.95796
D(*CON*)	-4.93752*	-7.29550*	-4.97869*	-7.27271*
INV	-1.61381	-5.09507*	-2.72842**	-5.12501*
EGR	3.85624	-2.18996	3.36002	-2.73717
D(*EGR*)	-3.91881*	-4.77600*	-3.91881*	-4.74014*

Source: Own processing
Note: *, ** are significant at 1%, 10%.

4.2 Cointegration and Effect Test

The result of the F-statistics estimation and the critical value related to the estimation of equation (1) is shown in Table 2. From the table it appears that the F-statistic value is 4.181. If we compare this statistic value with the criterion value or the upper bound value I(1) (3,585) then at the level of significance of 10% there is a cointegration relationship between variables of investment and consumption spending as well as economic growth.

Table 2: ARDL Bounds Test

Number of sample (T)	Number of explanatory variable (k)	F-statistics	Critical Value	
			I(0)	I(1)
			10%	10%
42	2	4.181	2.835	3.585

Source: Own processing
Note: Critical values are extracted from Table in Appendix of Narayan (2005).

The length of time lag on equation (2) is determined based on the Schwarz Criterion (SC) so as to obtain the ARDL(2.0,0) model. The

results of the long-term coefficients of equation (3) as well as the short-term coefficients of model (4) are summarized in Table 3. As shown in Table 3, the long-run coefficient of consumption expenditure is 1.88456. This coefficient is significant 1%, whereas the coefficient of investment variable is not significant. It means that there is a long-term influence of consumption spending on economic growth and there is no effect of investment on economic growth.

Furthermore, the value of short-term coefficient of consumption spending variable is significant 5%. This means, in short term, there is an influence of consumption spending on economic growth. The error correction coefficient is negative (-0.35794), meaning the influence of consumption spending on the economic growth is corrected 0.36%.

Table 3: Estimation of Long-Run and Short-Run Coefficients

Constant and variable independent	Coefficient	t-Statitics	p-value
Panel A : Cointegration form (short-run coefficient) Dependent variable : *D*(*EGR*)			
D(*EGR*(-1))	0.31027**	2.31723	0.0261
D(*CON*)	0.67456*	3.76463	0.0006
D(*INV*)	0.00000	0.20316	0.8401
EC(-1)	-0,35794*	-3.65977	0.0008
Panel B: Long-run coefficient Dependent variable : *EGR*			
CON	1.88456*	41.90797	0.0000
INV	0.000002	0.20229	0.8408
C	-76061.80257*	-2.89418	0.0063

Source: Own processing

Note: *, ** are significant at 1%, 5%

4.3 Coefficient Stability Test and Residual Diagnostic for Regression Equation

To check out the stability of coefficients for regression equation by graphs, we used CUSUM test and CUSUM Squares test developed by Brown et al. (1975). The graphs are shown in Figure 1 below:

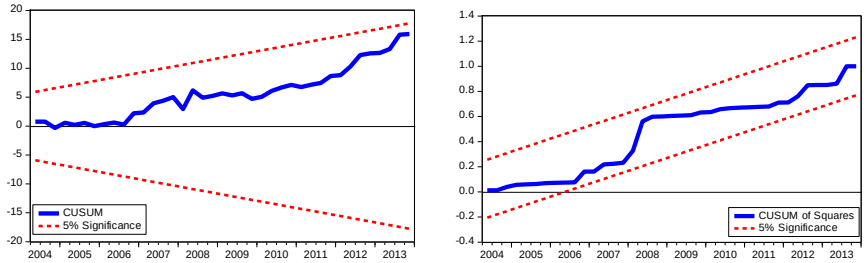

Figure 1: CUSUM Test (Left) and CUSUM Squares Test (Right) of Residual
Source: Own processing

The red dotted lines show a critical limit of 5% significance. It appears in the picture that the residual recursive line is within the critical limit of 5%. Thus it can be concluded that the coefficients of the regression equation are stable. Moreover, the results of autocorrelation test with Breusch-Godfrey LM test indicate that the residual of ARDL(2,0,0) model is independent of autocorrelation as the p-value statistic of this test is 0.732 greater than 5%. Furthermore, the results of the homoscedastic test using White test shows that the residual variance of the ARDL(2,0,0) model is constant (homoscedastic) since the p-value statistic of this test is 0.895 greater than 5%. The residual distribution was normally distributed as the p-value satistic of the Jarque-Bera test is 0.180 greater than 5%.

5. Conclusion

The aim of this study is to examine the effect of investment and consumption spending on economic growth. To this end, there are three types of data collected covering consumption spending, investment and gross national product as the proxy of economic growth. All the data is the quarterly data spanning from the period of the first quarter of year 2003 to the fourth quarter of year 2013. To determine the effect of investment and consumption spending on economic growth, ARDL model is used.

The result of analysis using ARDL bound approach indicates that there is cointegration between consumption spending, investment and economic growth. The test result shows that there are long-run and short-run effects of consumption spending on economic growth. The economic growth rises by 1.88% if the consumption spending rises by 1%. Furthermore, there is no effect of investment on economic growth over the period of 2003Q1-2013Q4.

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