

The relationship between economic growth and macroeconomic indicators in Indonesia

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Abstract. This study aims to determine the relationship between macroeconomics variables, including investment, export, and e-money transactions towards economic growth in Indonesia. This research applied Vector Error Correction Model (VECM) in order to determine long-term and short-term relationships between the variables. This research used quarterly time-series data during 2010-2017 from the Central Bank of Indonesia, Statistics Indonesia and Investment Coordination Board in Indonesia. For the analysis purposes, the study used a stationary test, long-lag test, cointegration test, and a causality test. The empirical results of this study show that in both short and long terms, investment has a positive impact on economic growth in Indonesia, while export and e-money transactions have a negative impact on economic growth in Indonesia during the research period. These findings provide insights for future research on investments, as both physical investment and human investment may potentially boost economic growth.

Keywords: macroeconomic factors, export, e-money, economic growth, Indonesian economy.

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1. INTRODUCTION

Economic growth is an indicator which shows success and failure of government policies and economic development in a country. From the expenditure approach, it should consider various variables of consumption, investment, government spending and net exports. Chirwa and Odhiambo (2016) remarked that in developing countries the macroeconomic determinants of economic growth include foreign direct investment, fiscal policy, investment, trade, monetary policy, natural resources, reforms and geographic, regional, political factors and so forth. Indeed, Simionescu et al. (2017a); Korauš et al. (2017); Simionescu et al. (2017b) mentioned that economic growth of several European countries is affected by such factors as foreign direct investment, expenditure on education, expenditure on research and development, energy consumption in transport-based sectors and also the set of monetary variables.

Investment and economic growth have positive causality (Kholis et al., 2017). Also, Rizky et al. (2016) revealed that investment has a positive influence on economic growth. It implies that higher rates of investment, both foreign and domestic, may lead to enormous economic growth. In Indonesian context, investment showed an upward trend from 2009 to 2017. The realisation of investments, both foreign direct investment (FDI) and domestic investment (DI), was about IDR 679,8 trillion in 2017 (BKPM, 2018). The Investment Coordinating Board noted an increase in the value of foreign investment, the most substantial increase in investment being from Singapore, with the investment being equal to IDR 113,4 trillion, then goes Japan with the investment volume of IDR 66,5 trillion.

Technology also plays an essential role as a driver of economic growth. Electronic payment technologies affect economic stability of the financial sector in particular, and also effect on economic growth overall (Kumari & Khanna, 2017). Wulandari et al. (2016) remarked that electronic money provides several advantages such as reducing transaction costs, enhancing security level and providing ease of use. In the macroeconomic context, electronic money stimulates an increase in transactions, thus boosting public consumption, ultimately also boosting economic growth (Zandi et al., 2016). Furthermore, Slozko and Peo (2014) described the function of e-money as a driver of economic development on the sample of developed countries on European continent. However, these effects are not exactly the same in the case of developing countries. Oyewole et al. (2013) concluded that only the ATM variable has a significant positive influence on economic growth (GDP). Such instruments of e-payments as web payment (online payment), point of sale terminals, mobile payments and payment checks had a significant negative influence on the economic growth of Nigeria.

Economic growth always implies an increase in domestic production, the excess of domestic production will be traded at the markets, thus also supporting economic growth. This provides extra opportunities for those who want to expand their offer of goods to other continents (Jhingan, 2008). Purnawati and Fatmawati (2013) stated that under sluggish domestic market, the government would often consider export market as a way to support the achievement of a stable economy. Priyono and Wirathi (2018) stated that export in the province of Bali is one of the ways to reach region's economic growth through raising local revenues.

Numerous studies have looked at the relationship between macroeconomic factors and economic growth. However, most of them have shown different results in various countries (Sharma et al., 2018; Taufik et al., 2015; Antwi et al., 2013). Sharma et al. (2018) concluded that in the short run, the selected macroeconomic determinants have either a negative, or a positive influence on economic growth in India. Antwi et al. (2013) found the cointegration relationship between real economic growth and its macroeconomic factors in Ghana. However, in the context of Indonesia, there is little attention being paid to the selected macroeconomic indicators and economic growth. For instance, Taufik et al. (2015) remarked that there is no influence between investment and economic growth, but investment has an influence on

employment. In fact, there remains the question of how selected macroeconomic variables, including investment, export and electronic payments, affect economic growth in Indonesia. Therefore, the study aims to contribute to this growing area of research by exploring the relationship between the selected macroeconomic factors and economic growth in Indonesia.

2. LITERATURE REVIEW

Several major factors are driving economic development. Chirwa and Odhiambo (2016) remarked that in developing countries the macroeconomic determinants of economic growth include foreign direct investment, fiscal policy, investment, trade, monetary policy, natural resources, reforms and geographic, regional, political and so forth. Investments mean a trade-off between present consumption and future consumption. The form of investment may be physical investment and human resources investment. Simionescu et al. (2017) added that investment in education also contributes to the economic growth in a Nation. The aspects in measuring investment as follows: first, money factor (invested capital) and are expected, therefore to the concept of money needed votes. The second aspect of investment appraisal time to time this concept assess the acceptance, as well as spending the same amount of money in a different period. With the assessment will be formed then the difference in value that can be measured at the present value and future value. The third aspect is the investment benefits. This aspect of assessing the feasibility of an investment, whether to provide an advantage or not. The analytical tool used is the analysis of the cost-benefit ratio.

Another variable which has an impact on economic growth is export (Kartikasari, 2017; Ucan et al., 2016; Hameed et al., 2012; Jordan and Eita, 2007). By definition, export is the activity of the sale of goods or services from the customs area conformed to the regulations applicable law (Purnawati & Fatmawati, 2013). In a broader sense, export is the sale of goods or services that make a verified risk, because the company is not sale output on region country only. Export considered profitable for entrepreneurs in the country when the local market being lethargic. At the time of the export market is often still strong, the government considers that the export market will call for support for the achievement of a stable economy. Among the government's policy in the field of foreign trade by granting export procedures simplification for production facilities, and the elimination of export costs and the provision of export advice.

Furthermore, the potential economic factors which driving to economic growth is the presence of e-money. Numerous previous study showed various findings between e-money and economic growth (Soseco, 2016; Slozko & Pelo, 2014; Zandi et al., 2013). Bank Indonesia defined as a means of payment in electronic form where the value of the money stored in the electronic media specific. Differences with ATM and credit cards can fin at obligation customer account usage. How the operation of the electronic money, by depositing money before use to interest in transaction. When used, the value of money stored in server and the chip will automatically reduce the number of transactions. Charging can do at publisher electronic money card or a place that has worked for filling (top-up). The Bank for International Settlements (BIS) in Bank Indonesia is a means of payment in the form of products stored value or prepaid card that amount of money stored in the value of electronic equipment. Values obtained electronic circuitry exchange an amount of cash into electronic money. The advantages of e-money as multipurpose in payment purposes. Bilan et al. (2019) According to the paper Bank Indonesia (2006) visits of media used e-money card can be divided into two namely, the base product and software-based product. Lastly, Bilan et al. (2019) enhanced the role of information and communication technologies on economic growth.

3. METHODOLOGY

This type of research is quantitative research consisting of economic growth as the dependent variable and investment, export, and transaction volume of e-money as an independent variable. The study used quarterly data gathered from Statistics Indonesia (BPS), Central Bank of Indonesia and Investment Coordination Board. Furthermore, the data were analysed using E-Views 8. The analysis method of data using Vector Error Correction Model (VECM), which is derived VAR. These matters addressed to determine short term and long term between variables. Several stages of testing the test data using the unit root test to know the data is stationary or not stationary. Then, test models use 1) the determination of the optimal long lag systematic models, 2) cointegration relationship test exists determines the distance and close range of variables, 3) test to determine the VECM large independent effect variable against dependent on both long term and short term.

Stationarity Data Test

This study uses the Augmented Dickey-Fuller (ADF) to test the stationarity of data. If the value of absolute t-statistic is smaller than the critical value in the MacKinnon table at various levels of confidence (1%, 5%, and 10%), it indicates data is not stationary. Besides that, it can also be seen in the value of prob greater than 0.05 which also indicates that the data is not stationary. Conversely, if the ADF value is greater than the critical value of various confidence levels (1%, 5%, and 10%), then there is no unit root or stationary data. The ADF was formed in order to obtain the autoregressive equation as follows:

$$DX_t = a_0 + a_1T + a_2X_{t-1} + b_1DX_{t-1} + b_2DX_{t-2} \dots b_{t-1}DX_{t-1} + Ut$$

or

$$DX_t = a_0 + a_1T + a_2X_{t-1} + b_1\sum_{i=1}^m DX_{t-i} + Ut$$

Optimal Lag Test

VAR estimation is very sensitive to lag length used. If the lag in judicial stationarity too small, then the residuals of the regression unable to show the process of white noise so that the models can not accurately estimate the actual error. As a result of mistakes, standards are not estimated. However, if the lag is incorporated too much, it will reduce the ability to reject H0 as additional parameters that too much will reduce the degree of freedom. The testing lag also has the benefit of eliminating the autocorrelation problem, therefore, the use of optimal autocorrelation lag problem is no longer expected to arise.

Cointegration test

The existence of non-stationary variables can cause the most likely long-term relationship between the variables. Hence, cointegration test is required. Cointegration test is a test aimed at finding long-term and short-term between variables. In this study, Johansen cointegration tests used in the test for the existence of cointegration between the variables. The test developed by Johansen can be used to determine the cointegration number of variables (vectors). Johansen test can be seen with the autoregressive models as follows:

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{p-1} \Pi_i \Delta y_{t-i} + B\pi_t + \varepsilon_t$$

$$\Pi = \sum_{i=1}^p A_i - I, \Pi_i = -\sum_{j=i+1}^p A_j$$

Granger Causality Test

Granger Causality Test aims to determine the causal relationships between variables used in the study. The effect of causalisation is intended to see the effect of each variable toward another one by one instead of per group.

VECM Estimation

VECM models can be applied if the studied variables proved to have a cointegration relationship. If the cointegration test results indicate a long-term equilibrium relationship, the results of the relevant dynamic regression estimation are VECM models. It can be used as a method to determine the effect of the caused by a variable in the long term and short term. VECM can be formulated as follows:

$$\Delta Y = \beta_0 + \sum_i^n \beta_1 \Delta Y_{t-i} + \sum_i^n \beta_2 \Delta X1_{t-i} + \sum_i^n \beta_3 \Delta X2_{t-1} + \dots + \lambda EC_{t-i} + \epsilon_t$$

4. EMPIRICAL RESULTS AND DISCUSSION

4.1. Stationary Test Method ADF (Augmented Dickey-Fuller)

Unit root test is applied to determine the nature of data or non autocorrelation. To test the unit root using Augmented Dickey Fuller (ADF) that can be seen from the probability value (See Table 1).

Table 1

Augmented Dickey-Fuller test (ADF) on the First Level Difference

Variables	T-Statistic	Prob. *
Economic growth	0.3888	0.0000
Investment	0.4626	0.0000
Export	0.0012	0.0000
E-money	0.7779	0.0000

Source: Authors (2019)

Table 1 provides information about the Augmented Dickey Fuller Test on the first difference level. From the results, it can be seen that variables of economic growth, investment, volume of e-money transaction are not stationary at the current level for more than a critical value ($\alpha = 0.05$). Then, on 1st all variables different stationary on the critical value ($\alpha = 0.05$), it can be looked from the probability value is less than the critical value of the whole of 0000. Thus, it can be concluded that the stationary test variables different stationary in 1st without autocorrelation, and then during the test cointegration.

4.2. Optimal Lag Test

Testing optimal lag length on VECM aims to eliminate autocorrelation in the data. Parameters that can describe the optimal lag length criteria Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan Quinon (HQ).

Table 2

Optimum Lag Test Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	36.98275	NA	1.59e-06	-1.998954	-1.817560	-1.937921
1	157.1868	203.9828	2.91e-09	-8.314356	-7.407383 *	-8.009188 *
2	175.3641	26.43976 *	2.67e-09	-8.446317	-6.813763	-7.897012
3	193.5208	22.00807	2.65e-09 *	-8.577023 *	-6.218890	-7.783583

Source: Authors (2019)

From Table 2, the test results are known optimal lag lowest values are in the FPE for 2,67e-90. There are two options on the length of the optimal lag 1 or 3. If the lag of the model will be difficult to estimate, then selected the third lag as the optimal lag length.

4.3. Johansen Cointegration Test

Testing cointegration aimed to find a long-term relationship between variables. Using the strong testing methods Johansen Cointegration, cointegration relationship variables if it can be concluded there is a long-term relationship between variables.

Table 3

Cointegration Test (Johansen's Cointegration Test)

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
hypothesized No. of CE (s)	Eigenvalue	Max-Eigen Statistics	0:05 critical Value	Prob. **
none *	0.717775	40.48145	27.58434	0.0004
At most 1 *	0.513633	23.06544	21.13162	0.0267
At most 2	0.342183	13.40266	14.26460	0.0682
At most 3 *	0.117926	4.015237	3.841466	0.0451
Max-eigenvalue test indicates 2 cointegrating eqn (s) at the 0:05 level				
* Denotes rejection of the hypothesis at the 0:05 level				
** MacKinnon-Haug-Michelis (1999) p-values				

Source: Authors (2019)

Table 3 informs the results of the cointegration test. In general, the model has viewed of trace statistic value that is greater than the critical value of 5 percent. Based on the analysis above shows that there are two cointegration ushered the four variables in the study at the 5 percent significance level. Therefore it can be seen in Table 3 that there are two that have a relationship cointegration rank. Therefore, the model VECM in this study can be used for further analysis.

4.4. Test Vector Error Correction Model (VECM)

Vector Error correction model estimates a long-term and short-term advance of the dependent with the independent variable. In the test of VECM, economic growth became dependent variable while investment, e-money and export became independent variabel. VECM test suggested drafting a coherent from the dependent variable and ending on the variable attachment away with the dependent variable. The results of testing the model Vector Error Correction Model is provided in Table 4.

Table 4

The Results of Vector Error Correction Model Both in the Short Term and in The Long Term

Variables	Coefficient	T-statistics
Short Term Relationship		
CointEq1	-0.284088	-4.47208
D (LGDP _ (- 1))	-0.422460	-2.48688
D (LGDP _ (- 2))	-0.307261	-1.63388
D (LGDP _ (- 3))	0.208638	1.06016
D (LINV (-1))	0.053484	0.21669
D (LINV (-2))	0.219324	1.22631
D (LINV (-3))	0.141094	0.74154
D (LVOL_EX (-1))	-0.087477	-0.83696
D (LVOL_EX (-2))	-0.085680	-0.77533
D (LVOL_EX (-3))	-0.037837	-0.36405
D (LE_MONEY (-1))	-0.172186	-2.29496
D (LE_MONEY (-2))	-0.113834	-1.52830
D (LE_MONEY (-3))	-0.084873	-0.88859
C	0.034785	1.49833
Long Term Relationship		
LINV (-1)	2.459105	4.51641
LVOL_EX (-1)	-0.394477	1.48907
LE_MONEY (-1)	-0.701233	-3.97579

Source: Authors (2019)

Table 4 informs the results of Vector Error Correlation Model both in the short term and long term relationship. From the table, it can be seen that in the long-term, there are variables that have a significant effect on the real level of 5 percent which is a variable volume of e-money. The estimation results indicated that a short-term variable volume of e-money on the lag one significant negative effect. The level of five per cent if there is an increase of 1 percent in the third quarter of the previous, it will decrease the rate of GDP of 2.29 percent in the current year.

However, in the long term, investment variables and e-money affect economic growth. Investment positively affects the economic growth that is equal to 2.459105, which means if there is a one percent increase in investment, there will be an increase in the growth rate of 2.459105 percent. Further, the e-money variables negatively affect economic growth rate that is equal to 0.701233. It implies that when there are e-money increase by one percent, there will be increas the economic growth rate of 0.701233 percent.

Based on the analysis, it can be stated that the variable investment has a positive effect both in the long-term and short-term. Indeed, these findings support the previous study by Paramita and Purbadharmaja (2015) which mentioned that a significant positive relationship between the variables of investment and economic growth. Similarly, Muazi and Arianti (2013) found that domestic and foreign investment in the short and long term has a positive and significant effect on economic growth in Central Java. Momongan (2013) remarked that Foreign Direct Investment and Domestic Investment are significant for economic growth in North Sulawesi. The increase in investment stimulates of economic growth as a result of obeying the consumption pattern consumptive Indonesia, resources are cheap and abundant, as well as some infrastructure development in Indonesia. Investment, especially on infrastructure sector takes more than a year to complete, where profits will be created if the realization of the investment is carried out. Therefore investment does not affect Indonesia's economic growth in the short term.

In contrast, the export variable has an insignificant negative relationship both in the long term and short term. It implies that export will lead to a decline in commodity export due to growth in the form of primary goods that have a low elasticity of demand for industrial goods than in developed countries. Then the price of export primer goods by developing countries affected by the fluctuations of the world economy. These results in line with Aliman and Purnomo (2001) which found that Indonesia's real income level is not influenced by the high value of real exports, but economic growth has a significant effect on the export value. Similarly, Suharjon et al. (2017) about the relationship between exports and imports in the agricultural sector does not influence on economic growth. Therefore, to the global market crisis resulted in a decrease in sales of primary goods. Indeed, research by Kartikasari (2017) stated that Indonesian exports had a negative effect on economic growth. Indonesian industrial export commodities are dominated by input factors from imports of raw goods.

In the other hand, the relationship between e-money and economic growth showed a negative relationship either in the short term or in the long term. Negative relationship due to e-money is not directly related to the growth. This finding agreed with the previous study by Lintang Sari et al. (2017) which stated that e-money has an impact on the decrease in interest rates. It means that a low savings interest rate will make people want to hold money more for transactions so that the money supply is available to increase and will have an impact on inflation again.

Hence, the influence of e-money transactions the interest rate will also have an impact on money supply and inflation directly. Furthermore, Hartini and Utomo (2017) mentioned that inflation would cause a decline in economic growth. In addition, Oyewole et al. (2013) described in the Nigerian state of e-money has no effect and negatively related to the pace of development of State of Nigeria. In Nigeria, the development of e-payment, in addition to ATM, is less attractive to the public. The result of this study is in opposite with Kumari and Khanna (2017) study, which stated there is a positive effect of e-money development on economic growth.

5. CONCLUSION

From these findings, it can be concluded that both in the short term and long term, investment has a positive impact on economic growth in Indonesia. It is reasonable because many domestic and foreign investment realization in Indonesia in the field of construction carried out over one year while in the long-term, the realization of the investment by government is directed to develop public goods. In contrast, export has no effect on economic growth both in the long term and short term. In the long-term, Indonesian export is influenced by global economic conditions that will reduce the value of the commodity and volume of export. While in the short term, Indonesian export relies on raw material inputs, as well as semi-finished for industrial purposes will be exported, that will result in annual net export distress. In the other hand, e-money variables have a significant effect on the short term, but it has negatively related to economic growth in the long term. In the short term, the volume of e-money in the first quarter of the year will reduce economic growth with an increase in money supply due to the phenomenon of the new year and Christmas. The scope of this study was limited in terms of macroeconomic indicators, and the data gathered only until 2017. These findings provide the following insights for future research on investments, both physical investment and human investment that potentially boost economic growth. In addition, the existing information and communication technologies need to be explored comprehensively.

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