Models Spesification of Economic Growth: Evidence From Province in Sulawesi

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Abstract

This study aims to determine the model of economic growth in the Province in Sulawesi. Variable predictors are determined by referring to the Keynesian income concept namely consumption, government expenditure, investment, and net exports. Data uses panel data from six provinces and 2012-2017 years and be analyzed using the Stepwise Forwards Regression. The findings showed that the economic growth of the Province in Sulawesi is affected by several variables namely consumption, government expenditure, investment, and net export. Further, the findings prove the factors of government expenditure and investment significantly affect the economic growth of the province in Sulawesi. Recommendations on economic development policies to improve economic growth control factors for government expenditure and investment should get the attention of the province in Sulawesi.

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INTRODUCTION

Economic growth is a requirement that is needed in carrying out economic development. growth is also a major measure of development success. The ability of a country to produce goods and services will increase due to factors of production that always experience an increase in the number and quality. In the macro analysis, the level of economic growth achieved by a country is measured by the development of real national income achieved by a country or region. This diversity is one of the factors that led to the conception of developed and underdeveloped regions. According to Keynes, the economic growth of a country or region is determined by the amount of consumption, government, investment, and net exports.

Based on the cycle of the economic system in a region, direct relations between the real sector and the monetary sector. The flow of transactions that occur between producers and consumers consists of (1) the supply of factors of production; (2) income stream; (3) the flow of consumption needs expenditure; (4) the flow of consumption of goods and services. In fact, not all goods and services used for consumption and capital goods come from within the country but also partly from abroad. Therefore, in the economic cycle, regional expenditure or income is the sum of final household consumption expenditure, non-profit institutions, government, gross fixed capital formation, changes in inventory and exports and imports within a certain period of time.

According to BPS (2017) the calculation of Gross Regional Domestic Product (GRDP) to find out the amount of income received by the community in an area that will be the basis for measuring the welfare of a region. Revenues are created due to the production process, where the income will then be used by the community as a

source of financing for consumption. Revenues derived from production factor compensation will be distributed in the form of grants or transfers. In fact, the income generated by a region is not necessarily enjoyed and used entirely by the community in the region. This has implications for the occurrence of revenue streams between regions or the emergence of income flows that flow from one region to another. Gross Regional Domestic Product in terms of use or expenditure is a general description of the ability of a region to use its income for consumption as well as for savings/domestic investment and the ability to create income from trade transactions with other regions, including foreign (export and import). The same model of transaction flows also applies to activities in the process of distribution (primary distribution) and redistribution of income (allocation to other parties or transfers).

Calculation of GRDP from the usage side explains more about how income created through economic processes from various production sectors is used by various domestic institutions to meet their consumption needs eventually. In other terms, the GRDP according to this usage describes the use of most domestic products for the purpose of final consumption, or with other terms also referred to as the final output. The relationship between the income side and the expenditure side or end use of various goods and services products, both from domestic and imported production (including those exported) can be expressed in the Keynesian model.
Note:

Economic growth is analyzed by observing the total national income by calculating the total sum of aggregate demand consumption, investment, government expenditure, and the export and import sectors. The total amount of supply of goods in the economy will always be balanced by the overall demand for goods and this condition will cause no shortage of demand. This situation is caused by the different responses to economic policies reflected in consumer behavior (C), the business sector reflected in the pattern of investment behavior (I), the government sector reflected in government interference in the economy through government expenditure (G), the foreign sector reflected in export (X) and import (M) behavior. Furthermore, from the supply side, economic growth is influenced by labor. Solow and Swam suggest that economic growth depends on the supply of factors of production (labor, capital accumulation, natural resources, and the level of technological progress).

The Harrold-Domar growth model that evaluates the requirements for steady economic growth. Harrold-Domar provides an important role in the formation of investment in the process of economic growth of a country. Investment is considered an important factor because it has two characters or two roles simultaneously in influencing the economy, namely: (1) investment plays a role as a factor that can create income, meaning that investment affects the demand side; (2) investment can increase economic production capacity by increasing capital stock, meaning that investment will affect the supply side. In the long-term perspective, investment expenditure is not only able to influence aggregative demand, but also able to influence aggregative supply through changes in production capacity. The Solow economic growth model is designed to show how the growth of the capital stock, the growth of the workforce and the progress of technology interact in the economy and how it affects the output of goods and services of a country as a whole. Solow built a model of economic growth as an alternative to the concept of the Harrold-Domar growth model by removing assumptions that are considered dubious. In the long run, the savings rate in the economy is a measure of the capital stock at the level of production. The higher the savings level, the higher the level of

capital stock and the higher the level of output. In steady state, the growth rate of per capita income is determined by the exogenous level of technological progress. Technological advancements cause the value of various variables to increase simultaneously in a steady manner with balanced growth/balance growth.

According to Keynes, Harrold-Domar, and Solow, the economic growth of a country or region is determined by the amount of consumption, government, investment and net exports. the focus in this paper is the extent to which consumption, government expenditure, investment, and net exports factors can predict changes in the economic growth of the province in Sulawesi. The focus of this paper is the extent to which consumption, government expenditure, investment, and net exports factors can predict changes in the economic growth of the province in Sulawesi. This study elaborates independent variables from research Sutawijaya (2013) export and investment, Swaramarinda & Indriani (2011) consumption expenditure and investment, Pangiuk (2017), investment and consumption expenditure to predict economic growth variables.

The results of empirical studies show that there are differences in conclusions in analyzing the influence of consumption, government expenditure, investment and net exports on economic growth. The study found government expenditure had significant effect on economic growth Harijono & Utama (2013); Olulu, Erhieyovwe, & Andrew (2014); Pangiuk (2017); Swaramarinda & Indriani, (2011); Sherifdeen & Michael (2016); Wahyuni, Sukarsa, & Yuliarmi (2014); Abdurrahman (2013); Yovo (1980). On contrary, Lebang, Rotinsulu, & Kawung (2017) found that government expenditure had an insignificant effect on economic growth.

Furthermore of the research, Harijono & Utama (2013); Olulu, Erhieyovwe, & Andrew (2014); Pangiuk (2017); Swaramarinda & Indriani (2011); Sherifdeen & Michael (2016); Wahyuni, Sukarsa, & Yuliarmi (2014); Abdurrahman (2013); Yovo, (1980) found that investment had a significant effect on economic growth. In contrast, Lebang, Rotinsulu, & Kawung (2017) found that investment had an insignificant effect on economic growth.

The research of Harijono & Utama (2013); Nizar, Hamzah, & Syahnur (2013); Eliza (2015); Abdurrahman (2013); Pangiuk (2017); Wahyuni et al. (2014) found that investment had a significant effect on economic growth, whilst Lebang et al. (2017) remarked that investment had an insignificant effect on economic growth. Household consumption, domestic investment and public expenditure for the long run and short run had a significant impact on economic growth (Ridzuan et al., 2014), while Kartikasari (2017) revealed that partially, export had an insignificant negative effect on economic growth.

Determination of the variables that will be used in the regression equation is an important step in making the regression model specifications to avoid errors in making a model. In various literature it is said that there are two errors related to the specification of regression models, namely (1) type I errors and (2) type II errors. The type I model specification error is a form of error that is related to accepting and rejecting the proposed hypothesis, namely the error of accepting the hypothesis that should be rejected. While the type II model specification error, namely rejecting the hypothesis that should be accepted.

The model specification error occurred due to several factors, including (1) Non-fulfillment of statistical requirements from the regression model. In the statistic of literature, it is said that the requirement for each independent variable in the regression equation is that there are at least 10 observational data available. If this requirement is not met, then it is likely to cause a model specification error. (2) Meet the rules of the classical assumption test. The classic assumption test is the initial

test of the regression model which will produce an unbiased and efficient estimator. If one of these rules does not meet the requirements required by the test, then it is likely to cause a specification error of the model made.

Based on of results research that is used as a reference in this study, there have not been found steps to formulate model specifications to predict economic growth using the Stepwise Regression method. Therefore, this study steps will be taken to formulate a regression model with the aim of obtaining an economic growth predictor have a significant influence.

METHOD

This research includes the type of research that analyzes the influence of independent variables on the dependent variable. The study uses Consumption, Government Expenditure, Investment, Net Exports as independent variable and Economic Growth as dependent variable. This research employed panel data with six Provinces (North Sulawesi, Central Sulawesi, South Sulawesi, Southeast Sulawesi, Gorontalo, and West Sulawesi) in Sulawesi and observation period for 2012-2017. Data analysis uses Stepwise Forwards Regression analysis. Hypothesis testing using t-test and F-test by comparing p-value with α (5%). The acceptance criteria for the hypothesis proposed if p-value t-statistics / F-statistics ≤ value α (5%). Determine the factors that influence Economic Growth using regression analysis with E-Views 9.0 program. To describe the relationship between independent variables with the dependent variable stated in the regression equation is:

$$GDP = \beta_0 + \beta_1 CS + \beta_2 GE + \beta_3 INV + \beta_4 NE + e \dots\dots\dots\dots. \quad (1)$$

Notes:
GDP   : Dependent variable (economic growth)
β_0 : Intercept
$\beta_1, \beta_2, \beta_3, \beta_4$: Regression of coefficient
CS, GE, INV, NE   : Independent   variable   (consumption,   government   expenditure,
                                   investment, net exports)
e   : Error term

The selection mechanism is started by not adding new variables in the calculation, then adding variables that have a probability value smaller than the variables added before. Every variable that has a probability value greater than the criterion (0.05) will be issued and after that, another variable is entered and the check continues to be repeated until all variables are entered.

RESULTS AND DISCUSSION

This study aims to determine the most appropriate estimation model to predict the economic growth of the province in Sulawesi using the Stepwise Forwards Regression method with all independent variable show Table 1.
The results of the analysis using the Stepwise Forwards Regression method do not use p-value criteria. To predict the economic growth of the province in Sulawesi is:

$$GDP = -2638380 + 0.189 \, CS + 1.509 \, GE + 1.845 \, INV + 0.075 \, NE \; \dots\dots.. \quad (2)$$

Notes:
GDP   : Economic Growth
CS, GE, INV, NE   : Consumption, Government Expenditure, Investment, Net Exports

Table 1. The result of Stepwise Forwards Regression Without p-value criteria

Variable	Coefficient	Std. Error	t-Statistic	Prob. value
CS	0.189	0.194746	0.972956	0.338
GE	1.509	1.007465	1.497418	0.144
I	1.845	0.21335	8.646106	0.000
NE	0.075	0.281737	0.265968	0.792
C	-2638380	4452372	-0.592578	0.558
R-squared	0.9860	F-statistic		545.82
Adjusted R-squared	0.9842	Probability (F-statistic)		0.0000

Source: Authors (2018)

The regression model in equation (2) and based on Table 1 can be seen that only investment variables have a significant influence on economic growth. While the consumption variable, government expenditure, and net exports have insignificant effects. In addition, the constant value is negative so it does not have meaning in the regression model. The regression model in equation (2) actually indicates a second model specification error, which is a hypothesis that should have been accepted but rejected. But if we keep the regression model used to predict, then will examine the classical assumption rules. The results of the classical assumption test, it is known that the regression model of economic growth deviates from the classical assumption rules, namely heteroscedasticity and multi co-linearity occur and the observation data is not normally distributed.

To resolve data abnormalities, a root test/Augmented Dickey-Fuller (ADF) test must be done. So that the results of the root test/Augmented Dickey-Fuller (ADF) test on all variables in the regression equation. The ADF test results for all of these variables are:

Table 2. Result Test of Augmented Dickey-Fuller (ADF)

	Variable	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	D(GDP)	-5.908	0.000
	D(CS)	-4.979	0.000
	D(GE)	-5.790	0.000
	D(INV)	-6.075	0.000
	D(NE)	-5.089	0.000
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

Source: Authors (2018)
Note: Null Hypothesis: D(GDP), D(CS), D(GE), D(INV), D(NE), has a unit root
    *MacKinnon (1996) one-sided p-values.

Furthermore, from the results of the ADF test, it is known that all the data variables in the regression equation are normally distributed in the first difference so that it has an impact on the change in the regression equation:

$$D(GDP) = \beta_0 + \beta_1 D(CS) + \beta_2 D(GE) + \beta_3 D(INV) + \beta_4 D(NE) + e \ \dots\dots\ (3)$$

From equation (3) another analysis is done by OLS Regression method and data of all variables in the regression equation use level one data difference. The results of the economic growth model are shown in Table 3.

Table 3. The Result of OLS Regression With Use Level One Data Difference

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	803990.1	2151885	0.373621	0.7113
D(GE)	5.365605	2.124201	2.52594	0.0171
D(INV)	1.648779	0.256945	6.416849	0.0000
D(CS)	-0.295731	0.380904	-0.776393	0.4436
D(NE)	-0.567267	0.81164	-0.698915	0.4900
R-squared	0.92385	F-statistic		90.98965
Adjusted R-squared	0.913697	Prob(F-statistic)		0.00000

Source: Authors (2018)

Data of all variables in the regression equation use level one data difference. To predict the economic growth of the province in Sulawesi is:

$$D(GDP) = 803990.1 - 0.2957D(CS) + 5.3656D(GE) + 1.6488\,D(INV) + 0.5673D(NE) \quad .... \quad (4)$$

From the regression equation with the data in the first difference (Equation 4), classical assumptions are tested back to the estimator and the test results meet the standard assumption. To get the specifications of the right economic growth model, the Stepwise Forwards Regression method is used. In this method using the p-value 0.05 criterion to select four predictor variables, namely Consumption, Government Expenditure, Investment, Net Exports. Based on equation (4) the classical assumption test is carried out the same as the previous stage. The classic assumption test results are still found by the symptoms of multicollinearity and serial auto correlation so that the resulting regression model is still not efficient and biased.

There is still a correlation between the variable consumption and government expenditure in the equation (4) regression equation so that it results in disruption of the bounded relationship. This results in no significant effect of several independent variables on the dependent variable. Furthermore, there are also symptoms of serial autocorrelation between the independent variables and their residues, and this also affects the disruption of the relationship between the independent variable and the dependent variable. The solution is to eliminate one of the correlated independent variables.

Because a method is needed to choose the independent variable that will be used to predict economic growth, that is by using Stepwise Forwards Regression method with the criteria $\alpha = 5\%$ or p-value 5%. The results of the specification analysis of the economic growth model are shown in Table 4.

Table 4. The result of Stepwise Forwards Regression With p-Value Criteria 0.05

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
C	466136.1	2085974.	0.223462	0.8246
D(INV)	1.523232	0.216899	7.022764	0.0000
D(GE)	3.922311	1.122208	3.495173	0.0014
R-squared	0.921481	F-Statistic		187.7718
Adjusted R-squared	0.916573	Prob.(F-Statistic)		0.0000

Source: Authors (2018)

The results of the analysis with Stepwise Forwards Regression method p-value criteria show that the regression equation to predict economic growth is:

$$D(GDP) = 466136.1 + 3.922\,D(GE) + 1.523\,D(INV) \quad (5)$$

Notes:
D(GDP)   : Economic Growth First Difference
D(GE, INV)   : Government Expenditure and Investment First Difference

The classic assumption test results of Equation (4) show that it meets the rules of classical assumption so that predictors are biased and efficient. The classic assumption test results from equation (5) show that it fulfills all the rules of classical assumption test so as to predict economic growth in Sulawesi Province in the period 2012-2017. To predict economic growth between provinces in Sulawesi, the predictor variable should use a variable government expenditure and investment. These two variables are recommended based on the results of the independent variable selection using the Stepwise Forwards Regression Method. The test results recommend that to predict the economic growth of a Province in Sulawesi it is better to use predictor variables of government expenditure and investment.

Descriptive Statistic Analysis
Table 5. Descriptive Statistical Analysis

Descriptive Statistics	Gross Domestic Regional Product (Trillion)	Government Expenditure (Trillion)	Investment (Trillion)
Mean	83.14	10.94	33.38
Median	67.28	10.19	25.82
Maximum	269.00	25.61	114.00
Minimum	2.59	3.55	6.00
Std. Dev.	74.86	6.76	31.01

Source: Authors (2018)

Table 5 provides the average gross domestic regional product value of 6 provinces in Sulawesi. It is about 10.94 trillion with the highest value of 269.00 trillion and the lowest 2.59 trillion and the median of 67.28 trillion and the standard deviation of 74.86 trillion. From the data, it is known that the distribution of regional product gross domestic values is normally distributed if using first difference data. Very different from the average gross domestic regional product, the average government expenditure value of 6 provinces in Sulawesi was 10.94 trillion with the highest value of 25.61 trillion and the lowest of 3.55 trillion and the median of 10.19 trillion and the standard deviation of 6.76 trillion. Furthermore, the average investment value of 6 provinces in Sulawesi was 33.38 trillion with the highest value of 114.00 trillion and the lowest of 6.00 trillion and the median of 25.82 trillion and the standard deviation of 31.01 trillion.

Hypothesis Testing
The results of the model feasibility test show that government expenditure and investment have a determination coefficient of 0.9214, which means that both variables can predict economic growth of 92.14% and the remaining 7.86% is explained by other variables outside the model. Based on the results of the hypothesis test proved that Government Expenditure and Investment have Significant Effect on Economic Growth both partially and simultaneously.

From Table 4 it is known that the p-value of the F-statistical variable of Government Expenditure and Investment is 0.0000 and this value is smaller than 0.05. Thus, it can be concluded that at a 95% confidence level it can be stated that Government Expenditure and Investment has a significant effect on Economic Growth in the Sulawesi provincial for the 2012-2017 period. This phenomenon is in line with the results of research which concludes that government expenditure and

investment have a significant influence on economic growth. The results of this study are in line with some of the results of previous studies and contracts with the results of previous studies.

The Effect of Government Expenditures on Economic Growth

The effect of Government Expenditure on Economic Growth is 3.922. From Table 4 it is known that the p-value of the t-statistical variable of Government Expenditure is 0.0000 and this value is smaller than 0.05. Thus, it can be concluded that at a 95 per cent confidence level it can be stated that Government Expenditure has a significant effect on the provincial Economic Growth in Sulawesi for the 2012-2017 period.

The results of the study in line with the Keynesian model illustrate the relationship between the income side and the expenditure or end use of various goods and services products, which in this case is the Regional Gross Domestic Product is a function of government expenditure. Government expenditure is one component of the Regional Government Budget on the expenditure side. Regional Government Budget as a form of government fiscal policy will influence the national economy. Through Regional Government Budget, it can be seen the direction, goals and priorities of development that are being and will be implemented by the government.

Regional Government Budget greatly influences regional economic conditions. In developing countries such as Indonesia, the role of government is large, changes in the Regional Government Budget have a major influence on the economy. The Regional Government Budget has a large influence on the production sector. The influence of the Regional Government Budget can be seen from the application of tax revenue and government expenditure policies. Governments that take budget deficit policies (in terms of planned government expenditures are greater than government revenues), will reduce tax rates or increase government spending (among others in the form of subsidies). Both of these will increase income and people's purchasing power. As a result, people's total demand for goods and services tends to increase. Increased demand will encourage the business sector to increase production capacity. The increase in production capacity in the long term will encourage regional economic growth.

The results of the study found that government expenditure has significant effect on economic growth in line with research Harijono & Utama (2013); Olulu, Erhieyovwe, & Andrew (2014); Pangiuk (2017); Swaramarinda & Indriani (2011); Sherifdeen & Michael (2016); Wahyuni, Sukarsa, & Yuliarmi (2014); Abdurrahman, (2013); Yovo (1980). The opposite is not in line with research (Lebang, Rotinsulu, & Kawung, 2017).

The Effect of Investment on Economic Growth

The effect of Investment on Economic Growth is 1.523. From Table 4 it is known that the p-value of the t-statistical variable of Investment is 0.0014 and this value is smaller than 0.05. Thus, it can be concluded that at a 95 per cent 6 confidence level it can be stated that Investment has a significant effect on the provincial Economic Growth in Sulawesi for the 2012-2017 period.

The results of this study in line with the Keynesian model illustrate the relationship between the income side and the expenditure or end use of various goods and services products, both from domestic and imported products (including those exported) which in this case are Gross Domestic Regional Products are a function of capital increase fixed gross/investment. On the other hand, it strengthens Harrold-Domar growth theory which evaluates the requirements of

steady economic growth. Harrold-Domar provides an important role in the formation of investment in the process of economic growth of a country. Investment is considered an important factor because it has two characters or two roles simultaneously in influencing the economy, namely: (1) investment plays a role as a factor that can create income, meaning that investment affects the demand side; (2) investment can increase economic production capacity by increasing capital stock, meaning that investment will affect the supply side. In the long-term perspective, investment expenditure is not only able to influence aggregative demand, but also able to influence aggregative supply through changes in production capacity.

Furthermore, the Solow theory growth explains how the growth of the capital stock, labor force growth, and technological advances interact in the economy and how it affects the output of goods and services of a country as a whole. In the long run, the level of savings in the economy is a measure of the capital stock at the level of production. The higher the savings level, the higher the level of capital stock and the higher the level of output.

By referring to the two theories, the results of the study prove that investment has a significant influence on economic growth. This means that the higher the investment value, the higher the rate of economic growth in Sulawesi province where if the investment value increases by 1 Million, it will increase economic growth/gross domestic regional product of 1.523 Million. The results of the study found that investment has a significant influence on economic growth in line with research Harijono & Utama (2013); Nizar, Hamzah, & Syahnur (2013); Eliza (2015); Abdurrahman (2013); Pangiuk (2017); Wahyuni et al., (2014). The opposite is not in line with research (Lebang et al., 2017).

The results of this study are in line with the descriptive analysis of the variables of government expenditure and investment in the economic growth of provinces in Sulawesi as shown in the picture below.
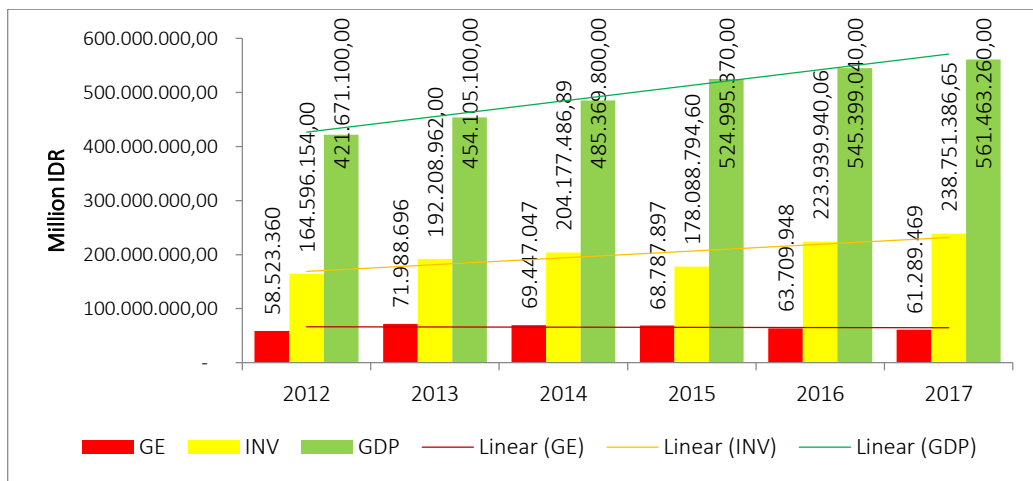

Figure 1. The Relationship of Government Expenditure, Investment, Economic
Source: Authors (2018)

Figure 1 depicts information about the relationship between government expenditure, investment and economic. Based on the figure, it can be seen that the increase in the value of government expenditure and investment in line with the increase in economic growth is shown by the trend direction of the three variables so that it can be said that descriptively there is a positive relationship between government expenditure and investment with economic growth. In 2012-2017 the investment value shows an upward trend every year. In 2012-2014 the investment

value added amounted to 39,581 trillion and the value added of government expenditures amounted to 10,924 trillion and in the same period there was an increase in the value of gross regional domestic products of 63,698 trillion.

Then in the period 2015-2017, the investment value and gross regional domestic product experienced an increase of 60,663 trillion and 36,468 trillion, but expenditure decreased by 7,498 trillion. The decline in the value of government expenditure is caused by the division of districts into provinces in Central Sulawesi and South Sulawesi and the division of several sub-districts into districts in Central Sulawesi in the period 2015-2017. However, in general, it can be concluded that in the 2012-2017 period the value of government and investment expenditures showed a tendency to increase and this phenomenon is in line with the development of gross regional domestic product values which have an increasing trend.

CONCLUSION

Based on the results of the analysis and discussion, to predict the average Economic Growth using the Keynes model it is recommended to use a variable Government Expenditure and Investment. Both of these variables significantly influence the Economic Growth of the province in Sulawesi. Therefore, to increase provincial economic growth in Sulawesi, it is hoped that the provincial government can increase the allocation of government expenditure and spur investment in both domestic and foreign investment. This study only analyzes the general and general government investment and investment. Therefore, it is expected that researchers can further study the components of the two variables more specifically. For example the components of government expenditure in the fields of education, health, workforce and others. Likewise with public investment, including investment in industry, trade and others.

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