Optimum Government Size and Economic Growth in Indonesia: ARDL Model Approach

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ABSTRACT

This study aims to determine the optimal government spending by analyzing the long-term and short-term relationship between government size and economic growth in Indonesia. The method used in this study is the ARDL model with secondary data from the World Development Indicators in 1966-2021. The results of the analysis show that initially government size has a significant positive effect on economic growth in the short run. But, in the long term, when the government size variable is in the form of a quadratic to determine a non-linear relationship, it shows a negative relationship to economic growth with a safe limit expenditure of 57.9% of national income. This study is in accordance with the Armey curve hypothesis. The policy recommendation in this study proposes that the government needs to control the amount of the budget so that its expenditure does not exceed the threshold.

1. Introduction

Government Size is an indicator used to measure the government's final consumption in a certain period which includes all government spending on goods and services, including capital expenditures, personnel expenditures except military expenditures. Increasing government size will encourage economic growth. However, government spending that exceeds the threshold will hamper economic growth (Asimakopoulos & Karavias, 2016).

According to Akram and Rath (2020), Government size can encourage economic growth in several ways. First, government size spending can encourage economic growth through tax collection, foreign aid, and printing new money. Second, government size spending can hamper economic growth because of budget allocations that are not in accordance with fiscal needs and unproductive budget allocations, for example for the high budget for personnel expenditures compared to capital expenditures. In addition, government spending that is close to the maximum limit is even more inefficient and is not in an unbalanced condition. Therefore, the optimal size of government spending becomes an interesting issue in the implementation of a country's economic policy (Nirola & Sahu, 2019).
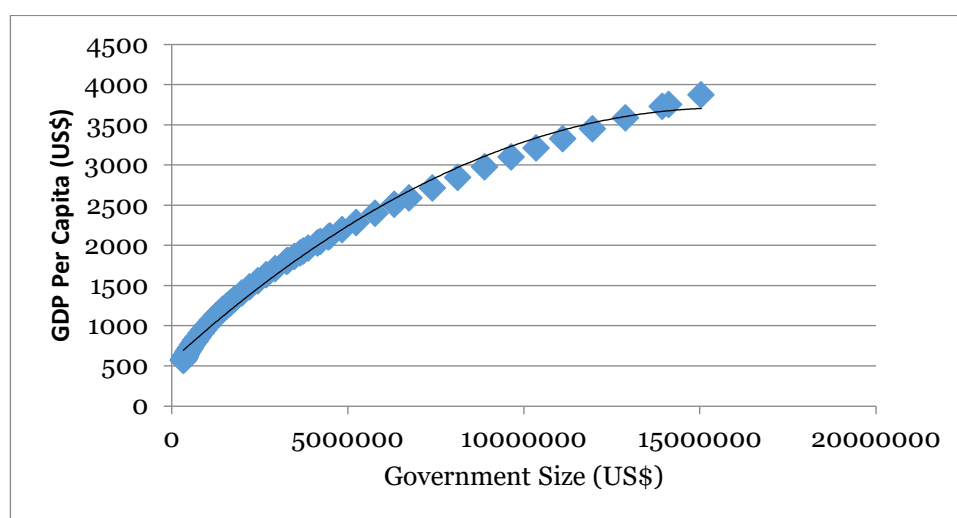

Figure 4.1. Corellation Government Size and GDP per Capita In 1966-2020
Source: World Governance Indicators, Data Processed

The correlation of government expenditure size to GDP per capita during the period 1966 to 2021 can be seen in Figure 4.1. The increase in government spending is directly proportional to the output of GDP per capita each year. This shows that government size spending is one of the factors in encouraging economic growth. However, the optimal size of government spending is limited to between 15% and 50% of national income (Friedman, 1997). When government spending exceeds the threshold, economic growth becomes negative. When government spending exceeds the threshold, economic growth becomes negative. Limit government size in OECD countries are range of 17% until 40% of GDP (Chobanov & Mladenova, 2009). However, maximum limit of government size in Turkey is 15% to 25% of GDP (Can & Aktaş, 2022).

In addition to the government size variable, this study includes control variables, namely gross fixed capital formation, trade openness, and foreign aid. Gross fixed capital formation is a form of physical investment including factories, machinery, infrastructure development. Trade openness is an important component in encouraging economic growth through free trade without tariffs and quota barriers from the government. However, trade openness can hinder economic growth because policy makers need to improve quality of human capital and infrastructure in order to benefit from trade openness (Malefane & Odhiambo, 2021). Foreign aid is soft loans and grants given to developing countries as a source of external financing for domestic productive activities.

This study aims to determine whether the optimal size of government spending can increase or hinder economic growth in Indonesia in general. To answer the research objectives, this study uses the ARDL model. The estimation results obtained from the ARDL model are to determine the long-term and short-term relationship of the influence of government size on economic growth in Indonesia. In addition, we also want to know the maximum limit of government size spending on increasing economic growth in Indonesia. This research section is structured by presenting the results of the literature review, research methodology, discussing research results, and presenting conclusions.

2. Literature Review

Most studies find that government size has a negative effect on economic growth. studies Makin, Pearce, and Ratnasiri (2019), Altunc and Aydın (2013), Bozma, Başar, and Murat (2019), Vedder and Gallaway (1998), Miller (2018), Vasilev (2020), Abdillah, et al. (2020) show that Government size has a positive and significant effect on economic growth at the threshold limit. When government spending moves above the threshold, it will have a significant negative impact on the decline in economic growth. Olaleye, et al (2014) argues that the government should encourage efficiency in the allocation of resource development, government investment should synergize with private investment, careful fiscal policy should be pursued to expand and strengthen the revenue base to avoid costs due to financing distortions from government spending that continues to increase, create stability and economic conditions as well as a stable political environment, mobilize the people in economic activities if the country wants to focus on a long-term growth path. Research Santika and Qibthiyyah (2020) also states that high overnment size needs to be accompanied by an increase in resources to increase high economic growth.

Research Hajamini and Falahi (2018) analyzes the non-linear relationship between government size and economic growth in 14 developed European countries during 1995-2014. The method approach used in this study is panel threshold regression. The results showed that government size had a negative effect on economic growth. Meanwhile, the variables of gross fixed capital formation, government investment, private investment, working age population, imports and exports have a significant positive effect on economic growth. Research Winanto (2019) found that investment had no significant effect on economic growth in Ponorogo Regency in 2006-2015.

Although most studies state that government size has a negative effect on economic growth. However, some literature provides evidence that government size has a positive and significant impact on economic growth, such as research Lahirushan and Gunasekara (2015), Maulid, et al. (2021). Murshed, et al. (2018) states that the Armey curve hypothesis does not apply in lower-middle income countries (LMICs). Study Mose, et al. (2020) states that government spending needs to be increased whereas increasing central government budget allocation to local governments needs to be increased through local revenue collection. The low government size causes low economic growth in Kenya.

Research Herath (2012) shows that Sri Lanka's optimal point in 1959-2009 is 27%. In contrast to study Facchini and Melki (2011) proves that there is an inverse U-curve relationship in France which has an optimal level of 30% compared to other European countries which have an optimal level of government spending. Furthermore, research S.-T. Chen and Lee (2005) found that the optimal spending threshold in Taiwan was 22,8% during the 1979Q1-2003Q3 period. The high government size needs to be reduced in order to increase the efficiency of government spending so that economic growth increases.

Research Mwakalila (2019), Manasseh et al. (2022) shows that foreign aid has a significant negative effect on economic growth. In contrast to the results of research Onyibor, Bah, and Tomiwa (2018) which shows that foreign aid has a significant positive effect on economic growth in the 5 poorest countries in the world which includes Malawi, Burundi, Congo, Niger, Central African Republic during the period 1986 to 2015. Although foreign aid has a positive effect on economic growth, but the government should re-evaluate the foreign aid received on the use of sectoral allocations received to create higher efficiency and

strengthen prospective economic development in each country. According to DiPeitro and Anoruo (2012), excessive foreign aid must be reduced in order to increase economic growth.

Research Keho (2017) analyzes the effect of trade openness on economic growth in Ivory Coast in 1965-2014. The results show that trade openness has a positive effect on economic growth in both the short and long term. The study Sun and Heshmati (2010) analyzed the role of international trade on economic growth in 31 provinces of China in 2002-2007. The results show that trade openness has a significant effect on economic growth. Increased global participation helps China's economic growth to increase rapidly compared to other Asian countries.

3. Research Method

This study uses secondary time series data taken from the period 1966 to 2021. To see the cointegration relationship of the influence of government size, foreign aid and macroeconomic variables on economic growth in Indonesia using the Autoregressive Distributed Lag (ARDL) model. The steps taken in estimating the ARDL model include: unit root test, determination of maximum lag, F bound test, long-term estimation, short-term estimation. To produce a valid estimate, it is necessary to test the diagnostic and test validity. The data used is secondary data from the World Development Indicators report, including economic growth, government size, gross fixed capital formation, trade openness, foreign aid. The estimated variable has 55 observations (World Bank, 2022).

The long-term equilibrium model in this study is as follows:

$$\Delta GDP_t = \beta_o + \beta_1 \Delta GOV_t + \beta_2 \Delta GOV^2_t + \beta_3 \Delta GCF_t + \beta_4 \Delta OPEN_t \beta_5 \Delta ODA_t + \mu_t \dots\dots\dots (1)$$

The short-term equilibrium estimates in this study are:

$$\Delta GDP_t = \beta_o + \Sigma \beta_{1i} \Delta GDP_{t-i} + \Sigma \beta_{2j} \Delta GOV_{t-j} + \Sigma \beta_3 \Delta GOV^2_{t-k} + \Sigma \beta_4 \Delta GCF_{t-l}$$
$$+ \Sigma \beta_5 \Delta OPEN_{t-m} + \Sigma \beta_6 \Delta ODA_{t-n} + \gamma ECT_{t-1} + \mu_t \dots\dots\dots\dots (2)$$

Where GDP is the first difference from GDP per capita based on constant prices in 2015 as a proxy for economic growth. GOV is a government size that is proxied based on government final consumption expenditures including purchases of goods and services, except for government spending in the military sector. GOV^2 is a form of government size that is squared to see the non-linear relationship and to test the Armey curve hypothesis (Armey & Armey, 1995). GCF represents gross fixed capital formation. OPEN is trade openness and ODA is foreign assistance proxied from net official development assistance which consists of loans from OECD/DAC to developing countries to improve development and people's welfare. GCF, OPEN, and ODA were control variables in this study. Meanwhile, the calculation of the optimal government size (GS) expenditure is as follows:

$$GS = \beta_1 / -2\beta_2 \dots\dots\dots\dots\dots (3)$$

Where β_1 is a parameter of the government size variable, while β_2 is a parameter of the government size variable that has been squared.

4. Results and Discussion

In the ARDL model, the unit root test is not required to produce data that is stationary at the level or the first difference level. However, in this study, a stationary test was still carried out to ensure that the data used were not stationary at the second difference level so as not to produce an erratic regression.

The Augmented Dickey Fuller (ADF) and Phillips-Peron (PP) Indonesia stationarity tests were carried out at the level and first difference levels. The addition of the PP test in this study is because the PP test has the advantage of including elements of structural changes that occur in the data. The results of the stationarity test of the data in this research model can be seen in Table 1 as follows:

Table 4.1. Testing ADF and PP Unit Root Test

Level I (0)	ADF Unit Root		PP Unit Root	
	Intercept and Trend	Probability	Intercept and Trend	Probability
ΔGDP	-1,601	0,780	-1,046	0,929
GOV	-0,486	0,981	-0,729	0,966
GOV²	1,943	1,000	-1,755	1,000
GCF	-1,600	0,780	-0,920	0,946
OPEN	-2,742	0,224	-2,620	0,273
ODA	-1,651	0,759	-2,891	0,172
First difference I (1)	ADF Unit Root		PP Unit Root	
	Intercept and Trend	Probability	Intercept and Trend	Probability
ΔGDP	-5,115	0,000***	-5,067	0,000***
GOV	-6,631	0,000***	-6,786	0,000***
GOV²	-6,903	0,000***	-7,114	0,000***
GCF	-5,896	0,000***	-4,692	0,001***
OPEN	-8,602	0,000***	-9,032	0,000***
ODA	-12,372	0,000***	-15,201	0,000***

Source: Analyzed by Eviews12
Note: ***, ** ,* are significant at 1%, 5% and 10%.

From the results of the stationarity test of the data in Table 4.1, it can be seen that all variables are not stationary at the level level. However, at the first difference level, including entering the intercept and trend equation test, it shows that all the proposed variables are stationary. This can be seen from the ADF t-statistics and PP adj t-statistical values for these variables which are greater than the Mackinnon Critical Value at an error of 1% with an absolute value. At the first difference level, the variables of economic growth (ΔGDP), government size (GOV), square of government size (GOV²), gross fixed capital formation (GCF), trade openness, trade openness (OPEN), and foreign aid (ODA) has a significant effect on the degree of confidence 99% or α=1%. Thus, all proposed variables can be used for further regression testing.

Table 4.2. Maximum Lag Selection

Model	Max Lag	Lag order
ΔGDP = F (GOV, GOV², GCF, OPEN, ODA)	(4,4)	(4,4,2,0,2,4)

Source: Analyzed by Eviews12

The selection of lag in this research model can be seen in the smallest AIC value of the 20 best models offered by the AIC criteria. The AIC approach provides a picture that is closest to reality. The selected lag criteria are ARDL (4,4,2,0,2,4), meaning that the dependent variable of economic growth (ΔGDP) is 4 lags, the independent variables are government size (GOV), square of government size (GOV2), gross fixed capital formation (GCF), trade openness (OPEN), and foreign aid (ODA) lag 4,2,0,2, and 4.

To detect the existence of a long-term cointegration relationship by comparing the F stat value with the critical value bounds. Table 4.3 shows that the F stat value is above the I (1) bound, which is 38,603 > 3,00, so it can be concluded that the variables in this study have long-term cointegration.

Table 4.3. F-Bounds Test Model ARDL

Test Statistic	Value	Signif.	Lower I (0)	Upper I (1)
F-statistic	38,603	10%	2,08	3,00
K	5	5%	2,39	3,38
		1%	3,06	4,15

Source: Analyzed by Eviews12

Table 4.4 shows that in the long term, GOV, GOV^2 and OPEN variables have no significant effect on economic growth. Meanwhile, the GCF and ODA variables have a positive and significant relationship to economic growth in Indonesia. This research is in accordance with the study Hajamini and Falahi (2018) and Onyibor et al. (2018).

The long-term estimation results in Table 4.4 show that the foreign aid variable (ODA) has the largest coefficient, meaning that foreign aid is the dominant factor in encouraging economic growth (ΔGDP), provided that it is used for productive activities such as development projects. Foreign aid of 1% will increase economic growth by 6,7% and significant at 5% because *p-value* obtained is equal to 0,022 < 0,05 (Ho was rejected). Furthermore, an increase in gross fixed capital formation (GCF) by 1% will increase economic growth (ΔGDP) by 5,8%. This means that the addition of fixed assets needs to be done, such as the development of physical and non-physical infrastructure, including the budget for health and education. This is expected to encourage economic growth in the future. This findings supports the findings of Hajamini and Falahi (2018), while rejecting the findings of Winanto (2019).

Table 4.4. ARDL Long Term Coefficient Estimation Results

Variables	Coefficient	Probability
D(GOV)	9,330	0,885
D(GOV^2)	5,730	0,226
D(GCF)	5,870	0,000***
D(OPEN)	5,980	0,529
D(ODA)	6,700	0,022**

Source: Analyzed by Eviews12
Note: ***, **,* are significant at 1%, 5% and 10%.

The next stage is to test the short-term coefficient. The results of the analysis can be seen in Table 4.5. The estimation results show that the variables GDP growth at lag 2 (D(GDP(-2),2)), government size squared (D(GOV^2,2)), government size squared at lag 1 (D(GOV(-1)^2,2)), government size lag 3 (D(GOV(-3),2)), foreign aid at lag 1 (D(ODA(-1),2)), foreign aid at lag 2 (D(ODA(-2),2)), foreign aid at lag 3 (D(ODA(-3),2)), and ECT(-1) have a negative and significant relationship to economic growth (ΔGDP). While the variables GDP growth at lag 3 (D(GDP(-3),2)), government size (D(GOV),2)), government size lag 1 (D(GOV(-1),2)), trade openness lag 1 (D(OPEN(-1),2)), and foreign aid (D(ODA,2)) have a positive and significant relationship to economic growth. In contrast to the variables GDP growth lag 1 (D(GDP(-1),2)), government size lag 2 (D(GOV(-2),2)), and trade openess (D(OPEN,2)) have no significant effect on economic growth in the short term. Short term estimation results conclude that the lag length in independent variables (government size, foreign aid, trade openness) are very influential for determining increase or decrease in GDP growth.

From the estimation results of the short-term ARDL coefficient, it can be seen that the variable D(ODA,2) has the largest coefficient of 1,350. If the ODA variable increases by 1%, then there is an increase in economic growth of 1,35%. However, with the addition of the 3rd lag, the coefficient of the ODA variable is negative. This means that the continuous use of foreign aid will have a negative impact on economic growth in Indonesia. The finding of this study agrees the findings Mwakalila (2019), Manasseh et al. (2022), while rejecting the findings Onyibor et al. (2018), DiPeitro and Anoruo (2012).

Table 4.5 shows that the government size (GOV) variable has a significant positive effect on economic growth in the short term. However, when the government size variable is included in the form of a quadratic/non-linear (GOV^2), it shows that the increase in government consumption has a negative impact on economic growth. This is in accordance with the theory of the Armey curve hypothesis, which states that high government spending will actually hinder economic growth. The value of the coefficient D(GOV^2,2) which means that an increase of 1% will decrease growth by -1.01%. this findings supports the findings Makin et al. (2019), Altunc and Aydın (2013), Bozma et al. (2019), Vedder and Gallaway (1998), Miller (2018), Vasilev (2020), Abdillah et al. (2020) while rejecting the findings

research Lahirushan and Gunasekara (2015), Maulid et al. (2021), Murshed et al. (2018), Mose et al. (2020), Hajamini and Falahi (2018).

The analysis of the trade openness variable (OPEN) does not have a significant impact on economic growth. However, in the 1st lag the variable D (OPEN(-1),2) has a positive impact on economic growth. The positive impact of trade openness in the first lag, which means that economic growth will grow by 9,19% within one year after implementing trade openness. It means trade openness takes time to have an impact on increasing GDP. This can be interpreted because trade openness is a variable that is highly dependent on the reduction of trade barriers. this findings supports the findings of Keho (2017), Sun and Heshmati (2010).

Table 4.5. ARDL Short Term Coefficient Estimation Results

Variables	Coefficient	Probability
D(GDP(-1),2)	-0,140	0,115
D(GDP(-2),2)	-0,309	0,000***
D(GDP(-3),2)	0,140	0,052*
D(GOV),2)	1,170	0,003***
D(GOV(-1),2)	1,020	0,016 **
D(GOV(-2),2)	1,200	0,575
D(GOV(-3),2)	-5,080	0,008***
D(GOV^2,2)	-1,010	0,003***
D(GOV(-1)^2,2)	-9,260	0,006***
D(OPEN,2)	-4,460	0,244
D(OPEN(-1),2)	9,190	0,024**
D(ODA,2)	1,350	0,017**
D(ODA(-1),2)	-3,630	0,000***
D(ODA(-2),2)	-3,740	0,000***
D(ODA(-3),2)	-2,340	0,000***
ECT(-1)	-0,938	0,000***
R-squared	0,953	
Adjusted R-squared	0,935	

Source: Analyzed by Eviews12
Note: ***, ** ,* are significant at 1%, 5% and 10%.

The coefficient of the ECT(-1) variable is -0,93 and is significant. This means that 93% of the disequilibrium that occurs between GDP and GOV, GOV^2, GCF, OPEN, and ODA will be corrected again within one period (one year). The coefficient value of ECT(-1) of -0.93 gives an idea that long-term balance will be achieved in a relatively short time. The negative sign of the coefficient indicates that there is a correction mechanism for the deviation of the long-term balance.

Based on Table 5 shows that the adjusted R-squared value is 0,935. That is, the variable GDP can be explained by the independent variables GOV, GOV^2, GCF, OPEN, ODA by 93,5%, while the rest is influenced by other variables outside the model by 0,06%.

Table 4.6. Optimal Government Consumption Expenditures (%)

Country	Optimal Government Expenditure
Indonesia	0,579

Source: World Governance Indicators, Data Processed

Table 4.6 shows that Indonesia's optimal government spending is 0,57%. The calculation results are obtained from the distribution of the parameter β_1 of 1,170 against $2\beta_2$ of -2(-1,010) from the short-term coefficient estimation results. This shows that the maximum threshold for Indonesian government spending is 0,57%. If government spending is greater than 0,57%, it will have a negative impact on economic growth. Therefore, the government needs to maximize government spending to increase capital expenditure, which will increase the multiplier effect on employment and encourage economic growth. This findings of this study rejects the findings Herath (2012), Facchini and Melki (2011), S.-T. Chen and Lee (2005).

Table 4.7. Diagnostic Test Results

Serial Correlation (p-value)	Normality (p-value)	Heteroscedasticity (p-value)
1,7090 (0,4255)	0,4392 (0,8028)	12,3315 (0,9302)

Source: Analyzed by Eviews12

The next stage after estimating the ARDL model is to carry out diagnostic tests and stability tests. The aim is to avoid errors in interpretation and conclusion. Diagnostic tests were carried out using the Breusch-Godfrey Serial Correlation LM test, Normality test, and White Test. Diagnostic tests were carried out to ensure that the ARDL model above met the classical assumptions. The results of the ARDL model diagnostic test can be seen in Table 4.7.

Table 4.7 shows that the ARDL model in this study has met the requirements of classical econometric assumptions. The results of the autocorrelation test in Table 4.7 show the prob chi-square value of 0,4255 > 0,1, so it can be concluded that there is no autocorrelation problem. From the results of the Jarque Berra normality test, it shows that the error term is normally distributed because the p-value is 0,8028 > 0,1. Meanwhile, the heteroscedasticity test shows that there is no heteroscedasticity problem in the model because the p-value Obs*R-square is 0,9302 > 0.1. This means that the model obtained is a valid and robust model.
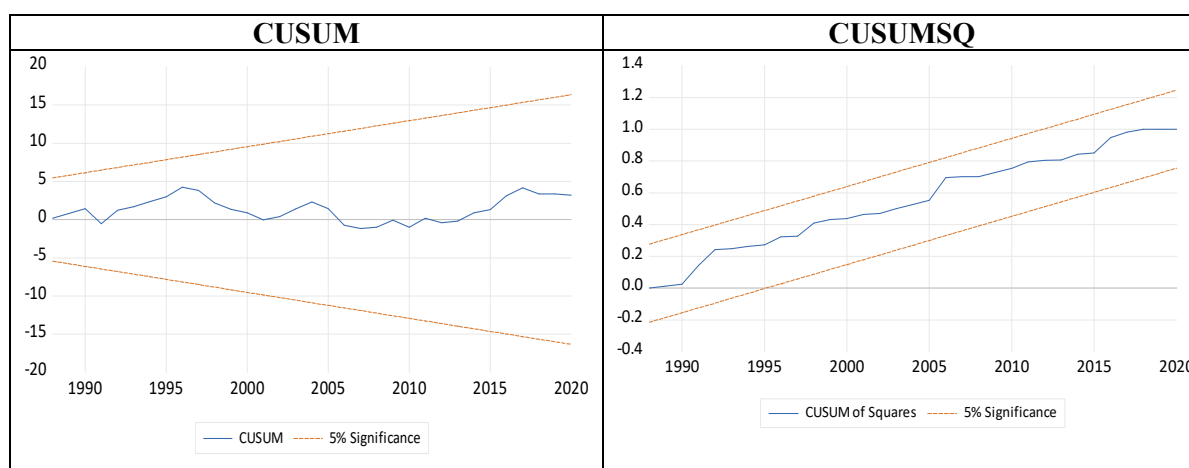

Figure 4.2. Stability Diagnostic CUSUM and CUSUMQ
Source: Analyzed by Eviews12

The next test is the stability test of the model using CUSUM and CUSUMQ. From the results of the CUSUM and CUSUMQ tests, it can be seen that this research model is in a stable state throughout the observation period. This can be seen from the CUSUM and CUSUMQ plots which are still included in the 5% critical bounds interval.

Diagnostic tests and stability tests have been carried out on the ARDL model and show that this model can be used in bounds testing cointegration. Bounds testing cointegration is carried out using the Wald Test method. The results of this test can be seen in Table 4.8.

Table 4.8. Wald Test Estimation Results

Test Statistic	Value	Probability
F-statistic	571,177	0,000***

Source: Analyzed by Eviews12
Note: ***, ** ,* are significant at 1%, 5% and 10%.

The statistical F values in Table 4.8 above will be compared with the critical values found in Pesaran, et al. (2001). The F-statistic value obtained is 571,177 with a probability value of 0,000. The critical value table used is the CI(v) table. The critical values at the 1% significance level were 3,93 for I(0) and 5,23 for I(1). This means that there is a cointegration relationship from the influence of government size, foreign aid and macroeconomic variables on economic

growth in Indonesia (ΔGDP). This is because the F-statistic value obtained is greater than the critical value. In other words, the null hypothesis which states that there is no long-term relationship from this model is rejected.

5. Conclusion

The estimation results of the long-term coefficient of the ARDL model show that gross fixed capital formation and foreign aid have a significant positive effect on economic growth. Meanwhile, government size and trade openness variables have no significant effect on economic growth. The results of this study are in line with a study conducted by J. Chen (2020) and Malefane & Odhiambo (2021).

Based on the short-term estimation results, it shows that government size has a significant positive effect on economic growth. The government size variable in the form of a square shows a significant negative relationship. This shows that high government spending causes a decrease in economic growth and this study is in accordance with the Armey curve hypothesis. Foreign aid has a significant positive effect, but at lag 1 to lag 3 Foreign aid has a negative effect on economic growth. Meanwhile, openness has no significant effect on economic growth, but at lag 1 it has a significant positive effect on economic growth.

The results of the calculation of the optimal government expenditure of 57,9% indicate that the Indonesian government spending threshold should not exceed 57,9% of national income. This resulted in a decrease in the rate of economic growth. High government spending causes people's purchasing power to decrease due to high tax burdens, inefficient budgets due to government programs that are not well targeted, and causes crowding out because the government is aggressive in printing government bonds with high interest so that many banking funds are sucked into the government sector. This causes economic growth to decline.

The policy recommendations in this study propose that the government needs to control the budget so that spending does not exceed the 50% threshold of national income so that economic growth does not decline, foreign aid is used for the productive sector so as not to be trapped in a debt overhang, add fixed assets such as infrastructure development, and create trade openness.

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