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The impact of government debt on pro equality growth: Evidence from lower middle-income countries

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ABSTRACT

Pro equality growth is a condition of increasing economic growth with a reduction in income inequality. Data shows that in the last three decades, actual governement debt has increased. The main focus of this study is to prove whether government debt can produce pro equality growth. Moreover, there are two objectives in this study: (i) to investigate the impact of government debt on economic growth; and (ii) to investigate the impact of government debt on income inequality. This study uses panel data from 21 lower middle-income countries between 1989 and 2017. Method used in this study is three stage least squares (3sls). The estimation results show that government debt, has not been able to realize pro equality growth. Government debt can stimulate economic growth, but income inequality worsened. Although debt can be used as an investment in productive activities, the use of government debt cannot increase the accessibility and productivity of the poor. There are direct and indirect effects between government debt and income inequality. On the other hand, there is only a direct effect between government debt and economic growth, and there is no indirect effect through the income inequality pathway.

Keywords : Government Debt; Growth; Income Inequality; Pro Equality Growth

1. INTRODUCTION

Each country strives to create better development, especially in terms of prosperity. Basically, prosperity and welfare can be interpreted as the achievement of government in meeting the needs of its people. Furthermore, the measure of achieving improved community welfare can be seen from two general indicators, namely the reduction in poverty and income inequality.

Poverty is categorized as the most serious problem in the world (Zaghdoudi & Hakimi, 2017) and has been the biggest challenge since long time ago (OECD, 2013). World Bank (2019) reports that the number of poor people in 2015, people with an income of less than $ 1.90 a day, is about 10 percent of the total world population. Meanwhile, inequality is a broader concept compared to poverty because it pays attention to a population (Haughton & Khandker, 2009). On one hand, poverty generally shows income levels below a certain poverty line. in this context, people are categorized as poor if they have an average per capita expenditure per month below the poverty line (Kuncoro, 2015). While inequality is more focused on the gap between high-income and low-income residents (Taylor, 2012). Specific to efforts to reduce inequality, there are at least two pathways that can be utilized, namely: (i) improving the quality of development, especially for the poor; and (ii) increasing pro poor and pro equality economic growth.

Conceptually, pro equality growth is different from economic growth in general. The ultimate goal of economic growth in general is to increase economic activity to the maximum without being followed by decreasing inequality (Todaro & Smith, 2011). But on pro equality growth, it is not only aimed at increasing economic activity, but also spread so that it can be obtained by the entire community. In addition, pro equality growth is dissimilar from inclusive growth. According to Winanda, Santoso and Ekawaty (2020), inclusive growth is a condition of increased economic activity accompanied by increased employment opportunities and greater income increases, especially for the poor. Thus, inclusive growth be able to alleviate poverty (Lee & Sissons, 2016).

Nevertheless, efforts to realize the acceleration of pro equality growth can run optimally when a government has a large fiscal capacity. The magnitude of fiscal capacity is very important in supporting the acceleration of growth programs, poverty alleviation, and expansion of labor absorption (Akanbi, 2013; Ambya, 2020). However, if a government is difficult to provide a budget, then external financing, such as government debt, becomes a strategic option to do (Papadia, 2018). Based on Keynes's concept of the multiplier effect (Elmendorf & Mankiw, 1998), economic growth can be increased due to increased in spending. Meanwhile, based on the neoclassical concept, debt can be considered as an investment so that it can drive economic growth. In this concept, economic growth is determined by the level of investment and investment costs (Olsson, 2013).

Many studies show positive and negative relationship between debt and economic growth, but there are no studies that discuss the impact of government debt on pro equality growth. Basically, the positive results of debt to development are due to two reasons (Ahlborn & Schweickert, 2018; Jayaraman & Lau, 2009; Spilioti & Vamvoukas, 2015). First, external financing, both debt and loans, can encourage economic growth and development when used productively and at a sustainable level. Second, an increase in debt can encourage growth if channeled into productive activities that generate high income. This indicates that good debt for development is a reasonable debt and should be directed to activities that have a high return and benefits.

On the other hand, debt also has the potential to be a barrier to development (Pattillo et al., 2011; Ramzan & Ahmad, 2014). Large levels of debt accumulation lead to lower growth. Debt is often used to be used for unproductive activities and even makes the debtor country fall into a debt trap, an external financing condition intended to pay off previous debts. Meanwhile, research on the impact of debt on inequality is rarely found. Even so, Zaghdoudi and Hakimi (2017) concluded that external debt can increase poverty. High levels of debt are seen as a barrier to sustainable economic growth and poverty reduction.

However, to accelerate growth, government debt is indeed needed especially for low middle-income countries (LMIC). According to World Bank (2019), countries are categorized as low middle income

when they have GNI in the range of 996-3895 USD per year. In general, LMIC is often burdened with complex budget management. Thus, managing a good government size becomes a necessity to create pro poor and pro equality growth (Whajah et al., 2019). In this case, good budget management will increase economic growth (Sabir, 2019).

Data shows that in the last three decades, actual governement debt has increased. Moreover, debt to GDP ratio tend to fall until 2007 and increased again afterwards, even increased sharply at the end of the period. Meanwhile, economic growth in low middle-income countries showed a fluctuating trend in the same period. While income inequality showed an upward trend in early stage and then decreased in later stage. It seems that increasing the ratio of government debt to GDP can influence economic growth and income distribution. On the one hand, increasing government debt slows economic activity, but can reduce inequality. Therefore, the main focus of this study is to prove whether government debt can produce pro equality growth.

Basically, an increase in pro equality welfare is one of the benchmarks of development success. The slow reduction in the income inequality gap indicates that the distribution of development still tends to be exclusive. On the other hand, low economic growth indicates low economic activity. For this reason, extra effort is needed in narrowing inequality and accelerating economic growth. Moreover, specifically, there are two objectives in this study: (i) to investigate the impact of government debt on economic growth; and (ii) to investigate the impact of government debt on income inequality.

Theoretical explanations for possibly growth effects of government debt mainly focus on two views, namely: (i) neoclassical and (ii) Keynesian. Both approaches show that government debt may promotes economic growth.

Important points in the neoclassical growth model are the amount of capital accumulation per capita, depreciation costs, and population growth. If related to debt, it can be said that debt can increase capital accumulation. So based on the neoclassical concept, debt policy will increase economic growth. Figure 1 shows how government debt can increase economic growth in a neoclassical view.

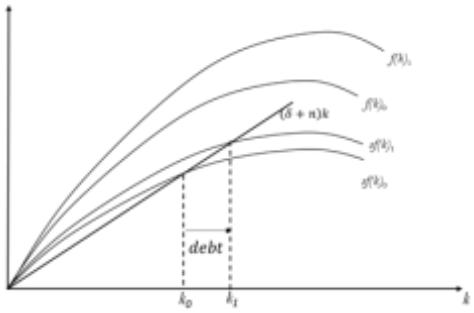

Figure 1: How Government Debt Increases Economic Growth in Neoclassical View
Source: Olsson, 2013

Based on Figure 1, capital stock (k_0) is a condition of balance between the amount of investment ($sf(k)_0$) and depreciation ($(\delta + n)k$). This capital stock indicates that the economy is at a equilibrium level, where the addition of capital stock is a dynamic change in the use of capital or depreciation. At this point, government debt, a component of investment, will change the balance condition to be higher (k_1). Thus, it can be said that the economy is developing.

Meanwhile, an important point in the Keynesian view is that there is a need for the role of government in the economy through fiscal policy, either with tax instruments or increasing government spending. Basically, fiscal policy is an attempt by the government to stabilize and increase economic activity (Akanbi, 2013). To understand how an increase in aggregate demand as the main instrument in driving the economy can be traced through mathematical equations. Where, it can be seen that expenditure (E) is the identity equation of household consumption (C), investment (I), government expenditure (G), and net exports (NX). Interaction with other variables causes the expenditure to change into a modified identity equation as shown in the following equation:

$$E^p = C(Y - T) + I^p + G + NX \quad (1)$$

Expected expenditure (E^p) is a derivation of four components, namely: (i) consumption related to income that is ready to spend, usually called disposable income ($C = f(Y - T)$), (ii) expected investment (I^p), (iii) government expenditure (G), and (iv) net exports (NX). Furthermore, Equation (1) can be rewritten as follows:

$$E^p = c_0 + c_1(Y - T) + I^p + G + NX \quad (2)$$

$$E^p = c_0 + c_1 Y - c_1 T + I^p + G + NX \quad (3)$$

$$E_0^p = c_1 Y + c_0 - c_1 T + I^p + G + NX \quad (4)$$

$$E_0^p = c_1 Y + b \quad (5)$$

Equation (5) shows that variable b functions as a constant, whereas C_1 is slope. Furthermore, if debt is an instrument of government expenditure, then the debt modifies the slope. So, Equation (5) will change as follows:

$$E_1^p = c_1 Y + b + debt \quad (6)$$

Based on Equation (5) and Equation (6), illustratively it can be described as follows:

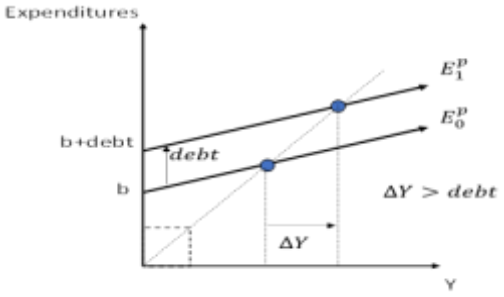

Figure 2. How Government Debt Increases GDP in Keynesian Approach
Source: Elmendorf and Mankiw, 1998

Based on Figure 2, it can be seen that debt can be sought when giving a multiplier G to GDP. This description explains that debt in the Keynesian concept will increase output to be even greater. So, the debt can be continued. However, the size of the inequality is very dependent on the difference in income of the rich and the poor. Thus, efforts to overcome inequality can be done by improving the capacity of the poor so that their productivity increases. In this case, it can be said that poverty is the root problem of inequality.

The role of debt in reducing inequality can be traced to the impact of debt on poverty. Modifying the conception of Nurkse's poverty cycle, government debt causes fiscal capacity to increase. The increase has an impact on increased public spending. In this case, public spending is usually in the form of education spending, health spending, or infrastructure spending. In essence, public spending is aimed at increasing the accessibility of the poor. Moreover, increasing the accessibility of the poor will lead to increased productivity. The greater productivity has a greater income impact. In turn, increased income causes the proportion of the tendency to save (marginal propensity to save / MPS) to be even greater. Thus, a large MPS causes greater investment activity. Therefore, the population that was originally poor slightly increased capital accumulation. If the growth is faster than the change in income of the rich, then income inequality will be smaller. The higher government debt will have an impact on poverty reduction. However, it needs to be underlined that the role of government debt can reduce poverty and even reduce the level of inequality as long as the debt is utilized optimally. In this context, optimal is a condition where government debt is earmarked for productive activities and the results of these activities are obtained more by the poor.

2. METHOD

The type of data used is the data panel which combines observational data across sectors (cross-section) and time series data (time series). The data cross section includes 21 selected lower middle-income countries (see Appendix 1). While the data time series used in the timeframe from 1989 to 2017. The data obtained from two sources, namely: (i) world development indicators published by the World Bank (2019); and (ii) standardize world income inequality database published by Solt (2019). The Standardized World Income Inequality Database (SWIID) takes a Bayesian approach to standardizing observations collected from the OECD Income Distribution Database, the Socio-Economic Database for Latin America and the Caribbean generated by CEDLAS and the World Bank, Eurostat, theWorld Bank's PovcalNet, the UN Economic Commission for Latin America and the Caribbean, national statistical offices around the world, and many other sources (Solt, 2019).

The variables used in this study are income inequality, economic growth, government debt, primary school enrollment, life expectancy, gross fixed capital formation, industrial growth, inflation, and exchange rate index. Income inequality is an estimate of the Gini index measured by a value between 0 and 1. Economic growth, expressed as a percentage, is an increase in the real output of an economy as measured by changes in the real GDP of the base in 2010. Government debt is foreign financing conducted by the government and measured in the ratio of debt to GDP in percent.

The level of primary school participation, expressed as a percentage, is interpreted as a proxy for educational inequality in low middle-income countries. Life expectancy measured in years is a proxy for health. The higher life expectancy indicates that the disease prevalence rate in low middle-income countries is quite high. Gross fixed capital formation is a measure of the level of investment expressed in a ratio to GDP (%). Industrial growth, expressed as a percentage, is defined as the growth of the manufacturing sector on a 2010 basis. In addition, industrial growth is a reflection of sectoral transformation. The higher industrial growth implies a structural change from the traditional economy to the modern economy.

Urban population growth, expressed as a percentage, reflects the rate of urbanization and expressed as a percentage. It is assumed that migration has a greater role than the natural growth rate. Inflation, measured in percent, is interpreted as a burden of growth. The exchange rate is the value of the local currency against the US dollar. This study uses an exchange rate index based on the 2010 basis (2010 = 100). The greater index value indicates that there was a weakening in the value of the domestic currency relative to 2010.

In this study, the simultaneous equation model is used because it can explain complex economic problems (Ekananda, 2016), which is able to describe the phenomenon of debt to economic growth and income inequality. The equation model in this study is divided into three interrelated equations, namely (i) income inequality equation; (ii) economic growth equation; and (iii) government debt equation. Furthermore, the model used can be written as follows:

$$Inq_{it} = \beta_0 + \beta_1 Growth_{it} + \beta_2 Debt_{it} + \beta_3 Educ_{it} + \beta_4 Health_{it} + \beta_5 Ind_{it} + \beta_6 Urban_{it} + \epsilon_1 \quad (7)$$

$$Growth_{it} = \alpha_0 + \alpha_1 Inq_{it} + \alpha_2 Debt_{it} + \alpha_3 Inv_{it} + \alpha_4 Edu_{it} + \alpha_5 Health_{it} + \varepsilon_2 \quad (8)$$

$$Debt_{it} = \gamma_0 + \gamma_1 Exc_{it} + \gamma_2 Inf_{it} + \varepsilon_3 \quad (9)$$

Where, Inq is the level of income inequality (between 0 and 1), Growth is economic growth (%), Debt is the ratio of government debt to GDP (%), Educ is the level of primary school participation (%), Health is life expectancy (years), Inv represents gross fixed capital formation (%), Inf represents inflation rate (%), Ind represents growth in the manufacturing sector (%), Exc is the exchange rate (2010 = 100), Urban indicates the rate of urbanization as measured by urban population growth (%), $\beta_0, \alpha_0, \gamma_0$ are intercepts, $\epsilon_1, \epsilon_2, \epsilon_3$ are error terms, sedangkan it indicates the time and unit of analysis. According to Greene in Ekananda (2016) there are several methods used in estimating the simultaneous equation model. The indirect least square / ILS method is used in exactly identified equations, while the 2SLS and 3SLS methods are used in overidentified equations. Based on the identification of order conditions (see Appendix 2), each proposed equation has a value (K-k) greater

than (d-1). This shows that each equation is overidentified. Therefore, 3SLS can be adopted to estimate the equations (1), (2), and (3). The application of the 3SLS method, as a development of the 2SLS method, produces a more efficient estimation because the standard error of the 3SLS is smaller than that of the 2SLS.

3. RESULTS AND DISCUSSION

3.1 RESULT

In testing the validity of endogenous variables, causality tests can be carried out among the main variables in this study, namely: (i) government debt; (ii) income inequality; and (iii) economic growth. The causality test used is the Granger Causality test. Specifically, this test is used to identify whether each variable has a reciprocal relationship or not. The hypothesis in the Granger Causality Test is that if prob> chi2 is significant, then the variable being tested (excluded) influences the intended equation. However, if the test results show that there is no reciprocal relationship, then simultaneous equations can still be carried out as long as there is endogeneity, a condition where errors in one equation can affect other equations.

Based on the granger causality test (see Appendix 3), it can be seen that the value of Prob> chi2 of each variable is not significant (all of them have values greater than 10%). These results imply that the main variables do not have a reciprocal relationship. Thus, endogeneity testing is needed.

Basically, an endogeneity test is performed to find out whether the error in an equation affects the other endogenous variables. If the error has a significant effect, then there are symptoms of endogeneity. Thus, simultaneous equations can be carried out. In this study, there are three equations that make a simultaneous system. Thus, there are four endogeneity tests needed, namely: (i) testing the effect of the income inequality error on economic growth; (ii) testing the effect of the economic growth error on income inequality; (iii) testing the effect of government debt error on income inequality; and (iv) testing the effect of government debt error on economic growth.

Table 1. Endogenity Test

Equation Tested	t	P>|t
Inequality → Growth	-3,98	0,00
Growth → Inequality	-4,22	0,00
Debt → Inequality	5,10	0,00
Debt → Growth	2,35	0,02

Source: Processed in Stata 16 (2020)

Based on endogeneity test, the value of P> | t | each error is significant (all have values less than 10%). These results indicate that there are symptoms of endogeneity. Thus, the use of simultaneous equations in this study can be applied.

Furthermore, the data used in this study is panel data, which is the merging of cross section data and time series data. In the panel data estimation, there are three models used, namely: (i) Common Effect Model; (ii) Fixed Effect Model; (iii) and Random Effect Model. To choose which model is more efficient, it takes the Chow test, Hausman test, and Lagrange Multiplier (LM) test. Those tests are not always carried out together.

Usually, the selection of the Hausman test or the LM test is based on the results of the Chow test. If the Chow test shows a significant Prob> F value, it means that the selection of the Fixed Effect Model (FEM) is more efficient than the Common Effect Model (CEM). Thus, the next test conducted is the Hausman test not the LM test. If the Hausman Test shows a significant Prob> chi2 value, the Fixed Effect Model (FEM) is better than the Random Effect Model (REM). Regarding the use of simultaneous equations, the panel data models identified should be CEM and FEM. If the results of the panel data model selection test show REM, it is necessary to identify the stationarity of the data in the study.

Based on the panel data model selection test, each proposed equation is more efficient using FEM than CEM (the Chow Prob> F test value is significant at the 1% significance level). Furthermore, if

the Hausman test is carried out, income inequality equation and government debt equation is more efficient using REM than FEM (prob value of chi2 are 0.7409 and 0.1346 respectively). On the other hand, the economic growth equation is more efficient using FEM than REM (the value of prob> chi2 is 0.0005). These results indicate that the data leads to time series characters that tend to be unstable. However, in the analysis of simultaneous equations, data that tend to be stable are needed. Thus, stationarity test is conducted for each variable.

Stationarity test is usually used in time series data for testing data stability. In panel data, stationarity test is better used when the panel data model selection results are REM. In principle, if each variable is stationary, the FEM model can be applied. Thus, simultaneous equations can be applied. Therefore, panel data stationarity test is a key element in simultaneous equations. In this study, Augmented Dickey Fuller (ADF) for panel data used as the stationarity test method. Therefore, the stationarity test for panel data is a key element in simultaneous equations. In this study, Augmented Dickey Fuller (ADF) for panel data is used as the stationarity test. The hypothesis in the panel ADF test is that if the p-value is not significant, then all panels contain unit roots. Meanwhile, if the p-value is significant, then there is at least one stationary panel.

Table 2. Unit Root Test for Panel Data

Variables	t	Conclusion
Inq	0,0000	Stationary
Growth	0,0000	Stationary
Debt	0,0000	Stationary
Educ	0,0000	Stationary
Health	0,0000	Stationary
Ind	0,0000	Stationary
Urban	0,0000	Stationary
Inv	0,0000	Stationary
Exc	0,0000	Stationary
Inf	0,0000	Stationary

Source: Processed in Stata 16 (2020)

Based on the stationarity test, it can be seen that the p-values of all variables are significant. It can be concluded that each variable in the simultaneous equation system is stationary. Thus, the use of FEM in the equation of income inequality and government debt can be applied. In the end, the simultaneous equation in this study can be estimated.

Based on statistical results, it can be seen that there are three variables that become endogenous variables, namely: (i) government debt; (ii) income inequality; and (iii) economic growth. Thus, the discussion of statistics in this study will be divided into three parts.

First, in the government debt equation, both the exchange rate and inflation have a significance level of less than 1%. This indicates that both of these variables significantly affect government debt. The coefficient of the exchange rate is -0,8407 which means that the weakening of the domestic exchange rate index compared to 2010 by one unit, the ratio of government debt to GDP will decrease by 0,84%, assuming that inflation does not change. Meanwhile, the inflation coefficient value of 0,034 implies that when inflation increases by 1%, there will be an increase in the ratio of government debt to GDP of 0,034%, assuming that the exchange rate is fixed. The constant value is 135,82 which means that if the exchange rate and inflation are zero, then the ratio of government debt to GDP is 135,82%.

Second, in the income inequality equation, only economic growth does not significantly affect income inequality because it has a significance level of more than 10%. Meanwhile, other variables significantly influence income inequality with varying degrees of significance. Economic growth has an error rate of 21% and has a coefficient of -0,0002. That is, 21% of the coefficient value is zero and the remaining 79% believe that the coefficient is -0,0002. In this case, due to an error rate of more than 10%, it can be concluded that the economic growth variable does not significantly affect income inequality.

Government debt has an error rate of less than 1% with a coefficient of -0,0002 indicating that when there is an increase in the ratio of government debt to GDP by one percent, then income inequality drops to 0,0002 points, assuming cateris paribus. The primary school participation variable has an error level of less than 1% with a coefficient of 0,0007 indicating that when there is an increase in primary school participation of one percent, income inequality increases by 0,0007 points, assuming the other variables do not change. Life expectancy has an error rate of less than 1% with a coefficient of 0,002 indicating that when an increase in life expectancy of one year causes income inequality to increase by 0.002 points.

Table 3. Statistic Result

Variables	Coef.	Std. Error	P>|z|
Debt			
Exc	-0,8407	0,1082	0,000
Inf	0,0340	0,0044	0,000
Constant	135,8202	9,5529	0,000
Inq			
Debt	-0,0002	0,0001	0,007
Growth	-0,0017	0,0013	0,215
Educ	0,0008	0,0003	0,008
Health	0,0020	0,0008	0,008
Ind	0,0012	0,0007	0,074
Urban	0,0105	0,0021	0,000
Constant	0,1660	0,0424	0,000
Growth			
Debt	-0,0352	0,0063	0,000
Inq	23,2453	14,3369	0,105
Invest	0,3101	0,0412	0,000
Educ	-0,0534	0,0299	0,075
Health	-0,0296	0,0592	0,616
Constant	-3,2445	5,5747	0,561

Source: Processed in Stata 16 (2020)

Industrial growth has an error rate of less than 10% with a coefficient of 0.0012 indicating that when there is an increase in industrial growth of one percent then income inequality increases by 0,0012 points, assuming the other variables remain. Urbanization has an error rate of less than 1% with a coefficient of 0.01 indicating that when an urban population grows by one percent, inequality will increase by 0,01 points assuming the other variables are constant. Constants have an error level of less than 1% with a value of 0,167 indicating that if the other variable is zero, then the value of inequality is income inequality is 0.167.

Third, in the equation of economic growth, life expectancy and constants are not significant because they have an error rate greater than 10%, namely 62% and 56% respectively. It means that the value of the coefficient of life expectancy and constants is believed to be zero compared to the estimated coefficient. Meanwhile, government debt and investment significantly affect economic growth with an error rate of less than 1%. In addition, income inequality and school participation rates also significantly influence economic growth with an error rate of less than 10%.

Government debt has a coefficient of -0.0359 which means that when the ratio of government debt to GDP increases by one percent, economic growth decreases by 0.036% with the assumption that the other variables are fixed. The level of investment has a coefficient of 0.3101, it can be interpreted that when the ratio of investment to GDP increases by one percent, economic growth also increases by 0.31 percent with the assumption that cateris paribus. Income inequality has a coefficient of 23.24, which means that when the level of inequality rises by 1 point, economic growth rises by 23.24. However, the actual value of inequality is in the range of 0-1, so adjustments are needed in this interpretation. Thus, if the income inequality level rises by 0.1 point then economic growth will increase by 2,324 percent assuming other variables are constant. Meanwhile, elementary school

participation has a coefficient of -0.053, which means that if the primary school participation rate increases by one percent, economic growth will decrease by one -0,053 percent with the assumption that cateris paribus.

3.2 DISCUSSION

Based on statistical results, both the exchange rate and inflation have a significant effect on government debt. The negative exchange rate coefficient indicates that the relationship of the exchange rate with government debt is negative. This indicates that if the value of the domestic currency weakens against the USD, government debt will be smaller. The weakening of the domestic exchange rate against GDP (depreciation) implies the instability of the domestic economy. Furthermore, there is no guarantee that the debt will be paid according to the specified time. Thus, this will have an impact on reduced government debt. In addition, the depreciated exchange rate has an impact on the trade balance surplus (Arize & Igwe, 2017; Wahyuni et al., 2019). In this context, the trade surplus has an impact on decreasing external debt. however, the negative relationship between exchange rates and debt is in line with research conducted by Abdullahi, Bakar and Hassan (2015). In this research, external debt in both the short and long term is influenced by macroeconomic components such as interest rates and exchange rates. Their relationship to government debt is negative.

The positive sign of the inflation rate coefficient indicates that there is a positive relationship between the inflation rate and government debt. Basically, there are two impacts of the inflation rate on the economy, namely: (i) driving economic activity; and (ii) burdens for growth. In this case, inflation is an economic condition that shows an increase in the price level in general. In this study, inflation is a burden on economic growth. Associated with the neoclassical concept, inflation is depreciation or investment costs. Moreover, relationship between investment cost and economic growth is negative. In this study, the positive relationship between inflation and government debt suggests that the impact of inflation as an investment cost for growth is smaller than saving activities. Basically, high inflation tends to reduce the value of government debt. When government spending increases with inflation, there is a possibility that real expenditure does not increase due to inflation. In this case, there are difficulties in paying debts so that the debt value will decrease. The positive relationship between inflation and government debt in this study is in line with research conducted by Aizenman and Marion (2011); End *et al.* (2015); Fukunaga, Komatsuzaki and Matsuoka (2019).

Aizenman and Marion (2011) use United States government debt data to calculate the impact of rising inflation. Based on the model created, an increase in inflation of around 6% could reduce the debt to GDP ratio by 20% in four years. Meanwhile, End *et al.* (2015) used a dynamic fiscal calculation simulation model to calculate the impact of inflation on European countries in 2015-2016. An increase in inflation of 1% can reduce the debt to GDP ratio by 0.15% with an impact that will be felt two years later. Whereas Fukunaga, Komatsuzaki and Matsuoka (2019) calculated the impact of inflation on the ratio of public debt to GDP in 19 countries using a dynamic equation simulation approach and estimation with impulse response. The results show that increasing inflation by 1% will reduce the debt to GDP ratio by 0.5-1%.

Moreover, based on statistical results, the coefficient of government debt has a negative sign. This means that there is a negative relationship between government debt and income inequality. This indicates that the higher the government debt, the less the income inequality. Thus, it seems that government debt in low middle-income countries can increase the accessibility of the poor. Increasing government debt can be used as public spending. Furthermore, the poor receive more benefits from development financed by public spending. As a result, the productivity level of the poor will be even higher. Moreover, the income level of the poor population will grow faster than that of the rich. This causes income inequality to decrease. This research is not in line with the research of Zaghdoudi and Hakimi (2017) which concluded that external debt can increase poverty. Zaghdoudi and Hakimi (2017) claimed that high levels of debt are seen as inhibiting sustainable economic growth and reducing poverty.

In this study, determinants of income inequality such as elementary school participation rates, life expectancy, industrial growth, and urbanization have a positive relationship with income inequality. Only economic growth variables do not have an impact on income inequality. Specifically, it seems that the position of this study does not support Kuznet's findings about the inverse U relationship between economic growth and income inequality. However, it should be noted that in this study income inequality is caused by structural transformation and urbanization rate. Both of these components are actually the factor causing increased income inequality in the initial conditions in the Kuznet hypothesis. Thus, the insignificant effect economic growth seems to be due to the correlation between economic growth and industrial growth (although the pairwise correlation value is relatively small at around -0,1398 with a significance level of 1%). Furthermore, when simulations and re-estimates are carried out by removing economic growth as a determinant of inequality (see Appendix 4), both industrial growth and urbanization still significantly influence income inequality. Meanwhile, the level of income inequality errors on economic growth is getting smaller.

Primary school participation rates are a proxy of education. However, in this study, the level of primary school participation was measured by the ratio of the population who had completed primary school to the total population. Thus, a positive relationship between the level of primary school participation and income inequality can be interpreted that the rich has a greater proportion than the poor. Thus, increasing elementary school participation will increase income inequality. Gregorio and Lee (2002) claimed that the impact of educational inequality and education levels differed on income inequality. Education inequality shows the average distribution of the population going to school, while the average length of schooling indicates an average level of education. The widening income inequality is due to increasing income inequality. However, the effect of increasing school time will correct income inequality. Coady and Dizioli (2017) found a positive relationship between educational inequality and income inequality, especially in developing countries. Meanwhile, there is a negative relationship between increasing school time and income inequality.

Life expectancy reflects health and disease. In this study, there is a positive relationship between life expectancy and income inequality. This suggests that the proportion of the health level of the rich is higher than the poor population. When there is an increase in the level of health, the income inequality is even wider. In addition, it is suspected that there is an imbalance of access to health facilities between the rich and poor in LMIC. Therefore, health improvement is even more obtained by rich people. Furthermore, this increases the productivity level of the rich. In the end, income inequality is even wider due to different levels of productivity.

Industrial growth is interpreted as a change in structural transformation from the traditional sector to the modern sector. The positive relationship between industrial growth and income inequality suggests that the actors of structural transformation are more dominated by wealthy people. In this case, it is assumed that the industry is likely to be the owner of capital. While the poor population is still largely in the agrarian sector. Thus, when there is industrial growth, the results of the development are more obtained by rich people than by poor people. In addition, it can be indicated that in low middle-income countries, the agricultural sector still does not have a strong linkage with the industrial sector. Furthermore, industrial growth cannot encourage the growth of the agricultural sector. Therefore, the results of industrial sector development cannot be obtained directly by the poor population. In general, the results of this study differ from Yasmin and Qamar (2015) which states that the contribution of the industrial sector to GDP is a major factor in overcoming poverty and income inequality. Yasmin and Qamar (2015) used the Vector Autoregressive Model (VAR) and found that an increase in the share of the industrial sector by one percent could reduce inequality and poverty by 0,55% and 0,33%, respectively.

Urban population growth reflects urbanization. In this study, the relationship of urban population growth to income inequality is positive. This indicates that urbanization widens income inequality. In this context, it is assumed that the poor come from rural areas and migrate to cities to get a better life. However, in general, the competencies of the poor do not match the needs of the labor market, so the poor cannot enter the formal labor market. Therefore, the poor choose to work in the urban informal sector. However, the specific difference between formal and informal sector employment income makes income inequality widening. Thus, the level of income inequality is even greater.

This research is in line with Kanbur and Zhuang (2013). According to Kanbur and Zhuang (2013), the impact of urbanization on income inequality depends on the character of urbanization in a country. For example, in the Philippines, urbanization will increase income inequality by 300%. Whereas in Indonesia and India, urbanization will increase income inequality by around 50% and 15%. Meanwhile, different results are shown in China, where urbanization forms an inverse U relationship to income inequality. The same thing was said by Wu and Rao (2017), where there is a strong U-best relationship between income inequality and urbanization. Specifically, Wu and Rao (2017), found that at the urbanization level of 0,53, the higher the urbanization would be able to reduce the level of income inequality.

In addition, based on statistical results, the coefficient of government debt has a negative sign. This indicates that there is a negative relationship between government debt and economic growth. Moreover, the higher the government debt, the economic activity will slow down. In this context, there are three possible reasons for the negative relationship between government debt and economic growth. First, even though government debt can increase fiscal capacity, it is more spent on public spending than on economic stimulus. Second, even though government debt is categorized as investment, it seems that the burden to be paid from government debt is greater than the return on investment. Third, it seems that government debt is used for unproductive activities. Associated with the impact of declining income inequality, economic activity is slower because the government is actively encouraging the accessibility and productivity of the poor. In fact, the main driver of the economy is savings and investment that can be made by more wealthy people. Therefore, economic activity will run more slowly. This is in line with Pattillo, Poirson and Ricci (2011) which states that a large level of debt accumulation causes lower economic growth.

Income inequality shows a positive relationship with economic growth. In this context, this research supports the concept of Kaldor. Inequality of income is indeed needed to increase economic activity. In addition, this study also supports Brueckner and Lederman (2015) who estimate the impact of income inequality on GDP per capita using 104 country panel data over the 1970-2010 period. Brueckner and Lederman (2015) claimed that there is a negative relationship between income inequality and GDP per capita. However, specifically for countries that tend to be poor, income storage actually shows a positive relationship to GDP per capita.

The proportion of gross fixed capital formation to GDP reflects the pace of investment. The investment relationship to economic growth is positive. This indicates that investment is proven to increase economic activity. These results are consistent with the neoclassical view that states economic growth is determined by investment (Olsson, 2013). However, if this investment is associated with government debt. This investment is a compilation of private and government investment. Although government debt that reflects government investment has a negative relationship, the coefficient is still smaller than the coefficient of investment broadly (-0.035 and 0.31 respectively). Thus, investment can still be interpreted as an instrument to encourage economic growth. In low middle income countries, investment for economic growth stimulus is mostly driven from non-government parties.

Primary school participation rates reflect the number of people who have attended primary school. The relationship between elementary school participation rates and economic growth is negative. The higher the ratio of population completing basic education, the lower economic growth. This shows that the quality of formal education especially basic education has no effect in driving economic activity. Thus, it can be said that the quality of formal and informal education does not differ much in low middle income countries. Formal education especially primary education seems to incur greater costs than benefits for the economy. In this context, this research is not in line with previous studies related to the relationship between education and economic growth. In general, higher education will increase the competence and capacity of the population. Moreover, it increases population productivity and increases economic activity. However, in this study, the indicator used was the level of primary school participation, namely the proportion of the population who had attended elementary school. The concept is different from the quality of education.

Life expectancy reflects the health quality of the population. In this study, the quality of health has no effect on economic growth. It can be interpreted that both the population with good quality health or not, especially in low middle income countries, will continue their activities. Even if the negative coefficient sign is believed (even with a confidence level of only 37%), it can be interpreted that the level of health quality that is getting worse will increase economic activity. Apparently, these conditions are in accordance with the characteristics of low middle income country residents.

However, the main focus of this study is to prove whether government debt can produce pro equality growth. In this research, the meaning of pro equality growth is the condition of an increase in economic growth accompanied by a decrease in income inequality. Based on statistical results, it can be seen that government debt can narrow income inequality but cannot stimulate economic growth. Thus, empirically, it can be said that government debt in low middle income countries has not been able to create pro equality growth.

There are at least three reasons why government debt is not able to stimulate economic growth. First, government debt does indeed increase fiscal capacity, but it seems that its use is more utilized for public spending than stimulus for economic growth. Furthermore, the increase in public spending seems to be aimed more at increasing the accessibility and productivity of the poor. Thus, income inequality shows a decline. Second, the debt burden is greater than the debt benefits. Although government debt in low middle income countries can be categorized as an investment, the investment costs of having the debt are greater. In the neoclassical view, there are two components that influence economic growth, namely: (i) capital accumulation; and (ii) depreciation. Slowing economic activity implies that debt depreciation is relatively large, thereby reducing the role of debt as an investment. Third, government debt in low middle income countries is used for unproductive activities.

In addition, the results show that this research supports the concept of Kaldor, where income inequality is needed to encourage economic activity. As mentioned earlier, government debt can reduce income inequality. This means that the debt benefits are more obtained by the poor so that the income gap between the rich and the poor gets smaller. However, this fact has an impact on slowing economic activity. Economic growth is actually supported by rich people who are able to do savings and investment activities (due to high MPS values). When the proportion of benefits from government debt is more obtained by the poor, economic growth will be slower.

Based on theese findings, there are three main recommendations submitted. First, increase prudence in government debt management. Although government debt can reduce income inequality, government debt cannot stimulate economic growth. Both income inequality and economic growth are indicators of the success of a country's development.

Second, in order to narrow income inequality, there are three recommendations that can be applied, namely: (i) increasing school participation and disease prevention is more targeted at the poor; (ii) strengthening of the micro industry and linkages between the industrial sector and the agricultural sector; and (iii) controlling the rate of urbanization through high competency requirements to enter urban areas.

Third, in the context of increasing economic growth, there are three recommendations that can be applied, namely: (i) strengthening investment ease policies; (ii) strengthening the role of the private sector in investing in growth stimulus, while government investment is focused on public spending; and (iii) increasing accessibility of higher education and skills for the workforce.

4. CONCLUSION

In this study, the concept of pro-equity growth is to increase economic growth along with reducing inequality in income distribution. Empirically, government debt in low middle income countries has not been able to realize pro equality growth. Although government debt can reduce inequality, government debt is not able to stimulate economic growth.

Nevertheless, this research still has two weaknesses. First, although choosing low-middle-income countries (LMIC) as objects of observation, not all LMIC countries can be used as objects of research. This is due to the limited availability of data on three main variables, namely: (i) government debt;

(ii) income inequality; and (iii) economic growth. Second, there are some data in year t that are empty (not strongly balanced data and the individual series have gaps). Thus, an interpolation technique was used to fill the gaps in the data.

Future study should calculate the index of inclusive growth which considers economic growth, income inequality, poverty, and unemployment as one measure. In addition, it also needs to use dummy regions to examine differences in characteristics between regions. However, other researchers can make this research as a reference to achieve a more comprehensive understanding of the impact of government debt towards economic growth and income inequality.

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