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THE STRENGTH OF THE SEEMINGLY UNRELATED REGRESSION MODEL IN DETECTING ECONOMIC GROWTH AND POVERTY RATE BASED ON FINANCIAL INCLUSION IN INDONESIA

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ABSTRACT

Financial inclusion has become an essential topic in recent years. Its impact on economic growth, poverty alleviation, and reducing income inequality is evident in several countries. Indonesia as a developing country, where economic growth has slowed in recent years, the level of use of formal financial services still needs to be increased, and the decline in the poverty rate, which is not followed by a low Gini ratio, is necessary to study further how financial inclusion affects economic growth and poverty rate in Indonesia. Using the Seemingly Unrelated Regression (SUR) model, we wanted to investigate the model's strength to achieve the objectives of this study. The results of the SUR model show that financial inclusion does not positively impact economic growth. However, we find the dimensions of availability of financial inclusion optimal for poverty alleviation and reducing income inequality well with significant adverse results. Meanwhile, the dimensions of accessibility and usability have no significant effect.

1. INTRODUCTION

Various literature has discussed the relationship of financial development in increasing growth, reducing inequality, and affecting the poor. (Greenwood & Jovanovic, 1990) explain that financial development increases capital allocation, aggregate growth and helps the poor in economic development. (Ang, 2010) reports that in India, financial development helps reduce income inequality. (Beck, Demirgüç-Kunt , & Levine, 2007) stated that financial development can affect the poor through two channels, namely aggregate growth and changes in income distribution. (Levine, 1997) reveals that financial development increases the average growth faster.

The concept of development in the financial sector will lead to conditions of financial inclusion (Erlando, Riyanto, & Masakazu, 2020) as (Kim, Yu, & Hassan, 2018) considered that financial inclusion is the ease of accessibility and availability of formal financial services for all participants in an economy. Financial inclusion is a viable tool to reduce poverty and income inequality; as (Fadun, 2014) and (Park & Mercado, Jr., 2015), improved access to financial services for those on low incomes and could reduce the number of working poverty (Coulibaly & Yogo, 2016). Likewise, (Burgess & Pande, 2005) said that expanding access to finance can reduce poverty in India. Furthermore, (Mwaitete & George, 2018) explained that an increase in financial inclusion and an increasing number of people having access to formal financial services would reflect economic growth.

Financial inclusion has become an important topic since the millennium development goals (MDG's) and then continues to the sustainable development goals (SDGs), which are global agreements for joint development for poverty alleviation. From this development goal, it is said that financial services can alleviate, improve people's living standards, improve people's welfare, which ultimately increases economic growth. Financial inclusion is identified as encouraging seven of the seventeen SDGs, including reducing inequality, and poverty alleviation (Bank T. W., 2018).

Globally, financial inclusion has increased due to mobile phones and the internet but has not been evenly distributed across countries. The World Bank said that in 2017, as many as 3.8 billion adults (69 percent) now have a bank account, and 1.7 billion adults still do not have a bank account. During this period, account holdings more than doubled in lower-middle-income countries and increased from 13 percent to 35 percent in low-income countries. East Asia and Pacific Region (71 percent) and South Asia (70 percent) had the highest account ownership rates. In comparison, the Middle East and North Africa region had the

lowest account ownership rates (43 percent) in 2017 (Group, 2021) (Figure 1).

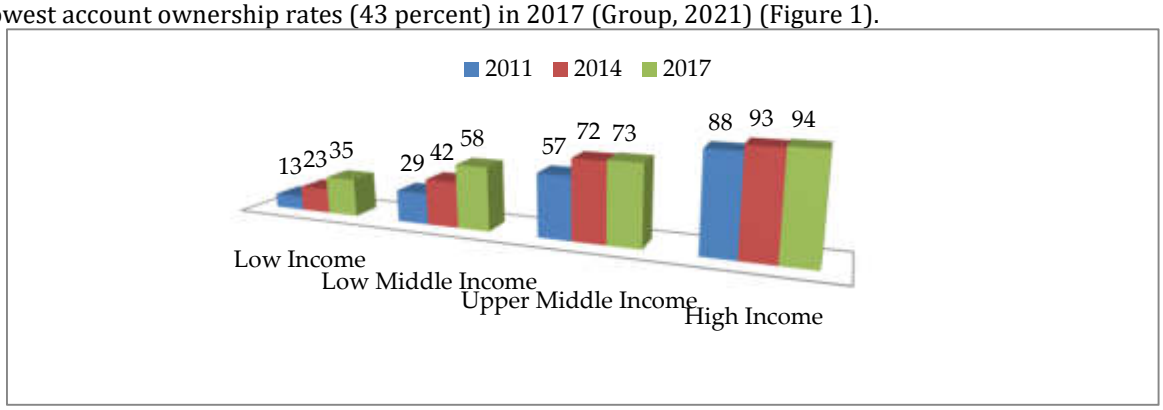

Figure 1. Account Ownership by Classification of State Income (%)
Source: (Demirgüç-Kunt, Klapper, Singer, Ansar, & Hess, 2018)

While there has been a spike in account ownership in some countries, progress has been slower in others, indicating that it is still essential for increasing financial inclusion. Indonesia, as a developing country with a lower middle income, based on the results of a survey by Otoritas Jasa Keuangan (OJK) in 2019, the financial inclusion index was 76.19 percent. Of course, this number increased compared to 2016, 67.8% (Keuangan, 2020). The following figure shows the trend of developing savings rates and credit levels representing the dimensions of Indonesia's financial inclusion use, followed by GDP growth data. Figure 2 shows that the savings and credit rates tend to increase despite a decline in the savings rate in 2019. Meanwhile, GDP growth tends to slow down. Between the savings rate and the credit, the rate has the opposite pattern. In 2010 the credit rate decreased from 2009, but the savings rate increased in the same year compared to the previous year. Likewise, in 2019 when the credit has risen from 2018, the savings pattern decreased. Of course, this needs verification of empirical evidence.

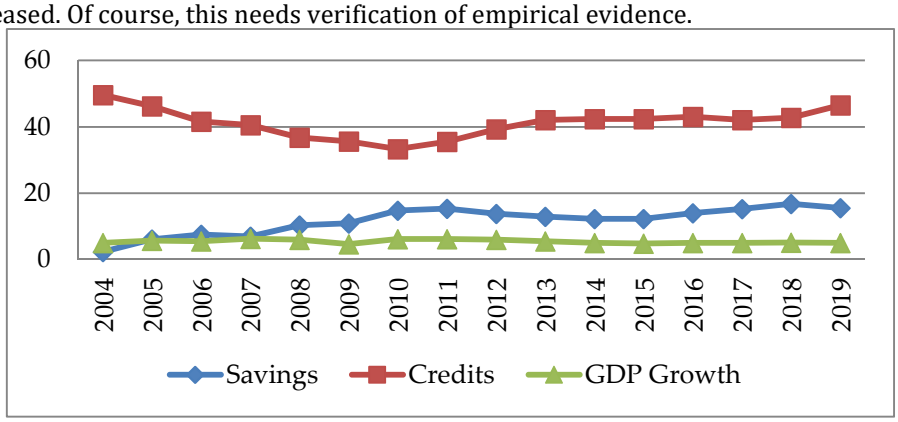

Figure 2. Comparison of Indonesia's Savings, Credit, and GDP Growth, 2004 – 2019 (%)
Source: World Bank Data

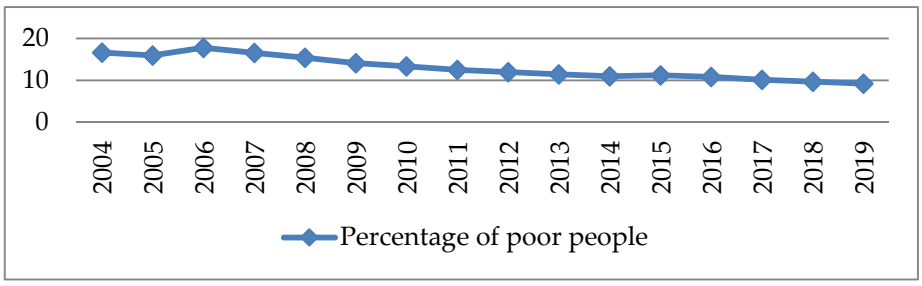

Figure 3. Percentage of Indonesia's Poor People, 2004 – 2019 (%)
Source: Central Bureau of Statistics

Furthermore, Figure 3 shows the percentage of poor people in Indonesia with a declining trend of development. From 2004 to 2019, the rate was below 20 percent. This development is undoubtedly good

and can be correlated with the movement of increasing financial inclusion. However, even though the percentage of poor people is decreasing, the Gini ratio is still relatively high. As a ratio that can be used to determine the condition of poverty, Indonesia's Gini ratio is in the range of 0.3 to 0.5 for the period 2004 – 2019, meaning that the level of inequality is relatively high in Indonesia, but from 2014 to 2019, the trend has decreased (Figure 4).

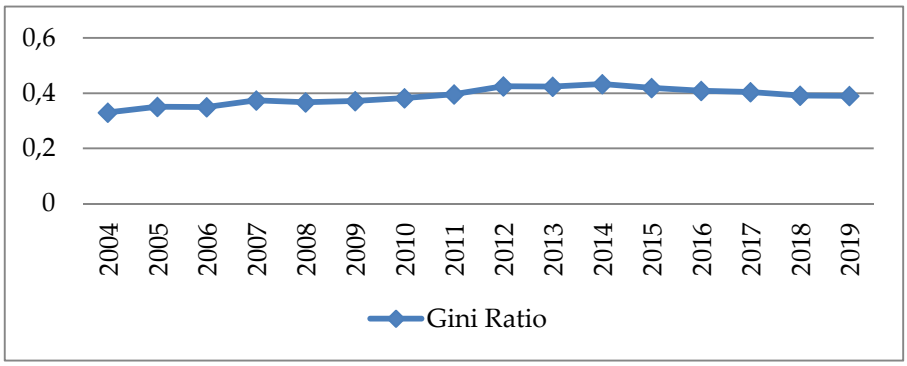

Figure 4. Indonesia's Gini Ratio, 2004 – 2019
Source: Central Bureau of Statistics

Apart from the positive impact of financial inclusion on growth, poverty, and inequality, it is also necessary to discuss its negative effect on the economy. For example, the subprime mortgage case that hit the United States in 2008 explained that mortgages could be high risk. The existence of easy access to credit can also cause financial institutions that lend money. Several previous studies also found this negative impact. (Ayensu, 2017) for example, it finds that financial inclusion does not substantially impact poverty reduction in Sub-Saharan Africa. (Ductor, 2015) reveals that financial developments hurt economic growth when not accompanied by growth in the real sector.

Based on the phenomenon of the problem and the data that has been presented, as well as the gap from previous studies, this paper aims to examine further how the impact of financial inclusion on economic growth and poverty rates in Indonesia using the SUR model. Growth and poverty rates do not depend solely on financial inclusion. We use the control variables of economic growth, namely real interest rate and unemployment. At the same time, the Gini ratio is used for determining the condition of the poverty level.

2. LITERATURE REVIEW

Financial Inclusion

Financial inclusion programs have become a global priority. Various international forums such as the Group of Twenty (G-20), the Alliance for Financial Inclusion (AFI), and even the World Bank develop programs and policies to increase financial inclusion, such as establishing financial inclusion units in various countries through central banks. Financial inclusion is a condition where individuals and businesses have access to adequate, efficient, and affordable financial products and services that meet their needs, such as financial transactions, payment systems, savings, loans, and insurance from formal financial providers (Luna-Martinez, 2016) (CGAP-GPFI, 2011) (Demirguc-Kunt, Klapper, & Singer, 2017) (Babajide, Adegboye, & Omankhanlen, 2015).

One of the goals of financial inclusion is an effective strategy for economic development, reducing poverty, income distribution, and financial system stability (Zia & Prasetyo, 2018). Financial inclusion has also been included in the six priorities of the In Indonesian government. In June 2012, Bank Indonesia, in collaboration with the Secretariat of the Vice President - TNP2K and the Fiscal Policy Agency - Ministry of Finance, issued a National Strategy for Financial Inclusion. This strategy guides the strategic steps of the ministry or institution in promoting economic growth, accelerating poverty reduction, reducing disparities between regions and individuals to create the welfare of the Indonesian people (Perpres, 2016).

Reffering to (Sarma, 2008), the measure of financial inclusion uses three dimensions, namely accessibility, availability, and use of banking services. SNKI also compiles financial inclusion dimensions based on these three dimensions. Accessibility means the reach of financial services, availability means the availability of financial products to meet people's needs, and use means the use of financial products.

Several literature studies describe indicators of financial inclusion through the number of bank branches per 100,000 adults dewasa (Joseph & Varghese, 2014) (Siddik, Ahsan, & Kabiraj, 2019) (Wang'oo, 2013) (Mwaitete & George, 2018) (Iqbal & Sami, 2017) (Park & Mercado, Jr., 2015) (Zia & Prasetyo, 2018) (Nasution, Sari, & Dwilita, 2013) (Nasution, et al., 2019), number of offices commercial bank branches per 1,000 km2 (Siddik, Ahsan, & Kabiraj, 2019), debit and credit card usage (Joseph & Varghese, 2014), number of ATMs (Joseph & Varghese, 2014) (Julie, 2013) (Wang'oo, 2013) (Mwaitete & George, 2018) (Iqbal & Sami, 2017) (Park & Mercado, Jr., 2015) (Bakari, et al., 2019), savings (Ravikumar, 2013) (Siddik, Ahsan, & Kabiraj, 2019) (Bakari, et al., 2019) (Zia & Prasetyo, 2018) (Wang'oo, 2013) (Nasution, et al., 2019), credit (Ravikumar, 2013) (Siddik, Ahsan, & Kabiraj, 2019) (Iqbal & Sami, 2017) (Park & Mercado, Jr., 2015) (Bakari, et al., 2019) (Zia & Prasetyo, 2018), depositors of commercial banks (Park & Mercado, Jr., 2015), loan accounts at commercial banks per 1000 adults and micro-fund depositing institutions (Mwaitete & George, 2018).

Financial Inclusion and Poverty Alleviation

Poverty is a scarcity or condition of a person who lacks a certain amount of property or money (Bhagwati & Panagariya, 2013). World Bank describes poverty as hunger, lack of shelter, sickness, inability to see a doctor, lack of access to school, high maternal and infant mortality, lack of work, and fear of the future (Bank W. , 2001). Poverty is one of the core problems of every economy in the world. In 2015, more than 736 million people lived below the international poverty line (Nations, 2021). According to (Kingsley, 2013), financial inclusion promises to overcome income inequality, underdevelopment, poverty, and improve welfare. This opinion is in line with the view of former UN Secretary-General Kofi Annan that financial exclusion is a big challenge before us and must be fought together to build an inclusive financial sector that positively impacts the welfare of life.

Financial Inclusion and Growth

Several empirical reviews on financial inclusion and growth include the finding of (Mwaitete & George, 2018) that financial inclusion significantly affects economic growth in Tanzania. In particular, financial inclusion is strongly correlated and significantly impacts growth through total factor productivity and resource allocation (Hariharan & Marktanner, 2012) (Levine, Loayza, & Beck, 2000). Financial inclusion also contributes to developing a solid financial structure that facilitates economic growth in India (Sharma, 2016). In contrast, (Arcand, Berkes, & Panizza, 2012) findings for high-income countries indicate that financial inclusion is negatively related to growth. Another interesting finding is that finance does not affect growth in countries with double-digit inflation (Rousseau & Wachtel, 2011). also find that financial depth (Demetriades & Law, 2006) does not affect growth in poor institutional countries.

3. METHOD

Data

To obtain results according to the purpose of this study, we used secondary data with a quantitative approach, with a period from 2004 to 2019 (16 years). The small sample size due to our difficulty in finding data under 2004 is the limitation of this study. We obtained data from the Central Bureau of Statistics (BPS) and World Bank Data, processed using the Eviews 10.0 software. The three primary variables of this study are (1) financial inclusion, (2) economic growth, and (3) poverty level (Table 1).

Table 1. Research Variables

Main Part	Dimension	Variable Indicator
Financial Inclusion	Accessibility	Number of commercial bank branches (per 100,000 adults)
		Number of ATM (per 100,000 adults)
	Availability	Net national savings (% of GNI)
		Domestic credit provided by the financial sector (% of GDP)
	Usability	Borrowers from commercial banks (per 1,000 adults)
Macroeconomy		Real interest rate (percent)
		Unemployment (% of total labor force)
		GDP growth (percent)
		Percentage of poor people (percent)

Poverty and Inequality	Gini ratio (index)

Estimation Technique

This study uses the Feasible Generalized Least Square (FGLS) estimation technique with the Seemingly Unrelated Regression (SUR) model with data analysis procedures consisting of: (1) SUR modeling, (2) Measuring the goodness of the model, (3) Testing SUR assumptions (normality and heteroscedasticity), and (4) Interpretation of the model.

Seemingly Unrelated Regression

The SUR model was first proposed in 1962 by Arnold Zellner (Santosa, 2018). This model is a multivariate regression generalization using a vector parameter model. The SUR model consists of several systems of unrelated equations but can be solved into a set of equations. The relationship between these equations can be related to each other through the correlation between errors. This model produces a more precise estimator than obtained from the least-squares method (Conniffe, 1982). Furthermore, the SUR modeling in this study is as follows:

$$EG_t = \alpha_0 + \alpha_1 BBR_t + \alpha_2 logATM_t + \alpha_3 SV_t + \alpha_4 logCR_t + \alpha_5 logBRW_t + \alpha_6 IR_t + e_1 \quad (1)$$
$$PVR_t = \beta_0 + \beta_1 BBR_t + \beta_2 logATM_t + \beta_3 SV_t + \beta_4 logCR_t + \beta_5 logBRW_t + \beta_6 IR_t + \beta_7 EG_t + e_2 \quad (2)$$
$$GR_t = \gamma_0 + \gamma_1 BBR_t + \gamma_2 logATM_t + \gamma_3 SV_t + \gamma_4 logCR_t + \gamma_5 logBRW_t + \gamma_6 IR_t + \gamma_7 EG_t + e_3 \quad (3)$$
$$UNM_t = \delta_0 + \delta_1 BBR_t + \delta_2 logATM_t + \delta_3 SV_t + \delta_4 logCR_t + \delta_5 logBRW_t + \delta_6 IR_t + e_4 \quad (4)$$

Where BBR: commercial bank branches (per 100,000 adults), log atm: ATM logarithm (per 100,000 adults), SV: net national savings (% of GNI), logCR: domestic credit provided by financial sector logarithm (% of GDP), logBRW: borrowers from commercial banks logarithm (per 1,000 adults), IR: real interest rate (percent), UNM: unemployment (% of the total labor force), EG: GDP growth (percent), PVR: percentage of poor people (percent), GR: Gini ratio, α, β, γ, and δ are coefficients, t is the period of observation (2004 – 2019), and e is error terms

4. RESULT AND DISCUSSION

Table 2 shows the estimation results of the SUR model FGLS with system procedures. In the first equation, bank branch offices as an access dimension have a significant positive impact on economic growth. Meanwhile, ATM has a significant negative impact, followed by interest rates as a macroeconomic variable which also has a significant negative impact. The goodness of the first equation model is 0.7539, meaning that the model can explain variations in the economic growth of 75.39 percent. The results of the second equation, the dimensions of the availability of financial inclusion, both have a significant adverse effect on poverty. Meanwhile, economic growth has a significant positive effect on poverty. The size of the goodness of the second equation model is 0.9887, meaning that the model can explain the variation in the poverty rate of 98.87 percent.

Table 2. Estimation Results of FGLS Model SUR

Variables	Equation 1 Coefficient (Prob.)	Equation 2 Coefficient (Prob.)	Equation 3 Coefficient (Prob.)	Equation 4 Coefficient (Prob.)
BBR	0.1921 (0.0070)***	-0.109361 (0.0675)	0.004835 (0.0002)***	-0.084229 (0.0723)
LogATM	-2.155952 (0.0026)***	-0.246865 (0.6719)	0.027104 (0.0202)***	-1.262469 (0.0087)***
SV	0.063905 (0.3956)	-0.469347 (0.0000)***	-0.005338 (0.0003)***	-0.091036 (0.0877)
LogCR	6.078537 (0.0862)	-6.013894 (0.042)***	-0.157838 (0.0111)***	5.528271 (0.0273)***
LogBRW	0.091936 (0.8574)	-0.006066 (0.988)	-0.001345 (0.875)	-0.29 (0.4154)
IR	-0.117604 (0.0066)***	0.020594 (0.5577)	0.000335 (0.6199)	-0.039062 (0.1636)
EG		0.704811 (0.0000)***	0.009484 (0.0000)***	

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Intercept	-13.0304 (0.347)	38.92216 (0.0016)***	00.846793 (0.0012)***	-6.733767 (0.4797)
R^2	0.753905	0.988761	0.948552	0.972933
Determinant Residual Covariance				
1.87E-11				

Note: *** Significance level 5%

In the third equation, financial inclusion in accessibility and availability significantly impacts the Gini ratio, except for the usability dimension, which has an insignificant impact. However, only the availability dimension has a sign following the theory. Likewise, the control variable, namely economic growth, also significantly impacts the Gini ratio. The goodness value of the third equation model is 0.9485, which means that the model can explain the variation of the Gini ratio of 94.85 percent. Furthermore, only the dimensions of access and the availability of financial inclusion significantly affect unemployment in the fourth equation. The value of the goodness of this equation model is 0.9729, which means that the model can explain variations in unemployment by 97.29 percent.

Table 3 shows the results of the Cholesky normality test. The three probability values of chi-square skewness, kurtosis, and jarque-bera are above than 0.05 (0.4302, 0.9591, and 0.8134). This value means that the remainder is normally distributed.

Table 3. Cholesky Normality Test

	Chi-sq	df	Prob.
Skewness	3.825147	4	0.4302
Kurtosis	0.634945	4	0.9591
Jarque-bera	4.460092	8	0.8134

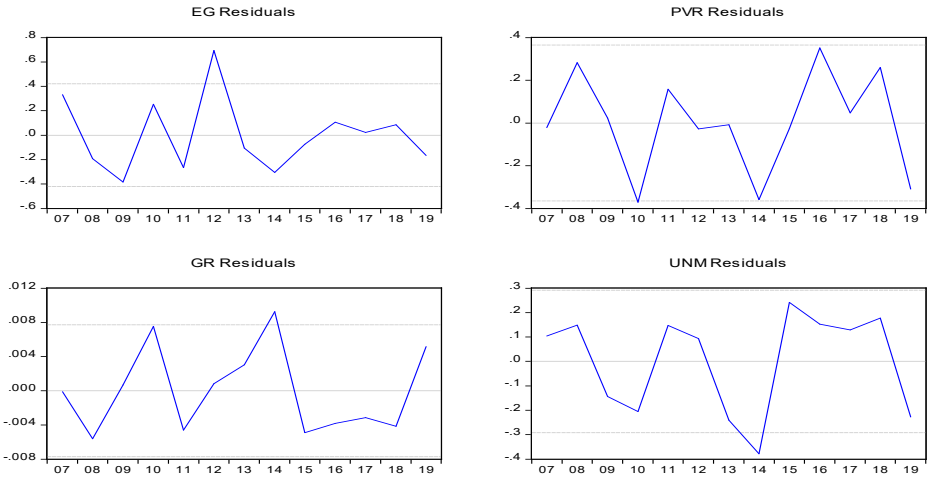

Figure 5. Residual Graph of Each Equation

The residual values of the first to fourth equations tend to fluctuate in positive and negative positions without forming the same pattern. Then the residual variance of each equation is free from the heteroscedasticity problem.

5. CONCLUSION

According to the results of the first equation, financial inclusion does not have a positive impact on economic growth, except for bank branches. The ATM variable has a significant negative impact, and others have an insignificant impact. This result confirms the results of (Migap, Okwanya, & Ojeka, 2015) in Africa and (Ductor, 2015) research on developed and developing countries. Financial inclusion reduces economic growth significantly. If seen from Figure 2, an increase in savings is not always followed by an increase in GDP growth. Indonesia's GDP growth has tended to slow in recent years. In addition, the contributor to Indonesia's GDP is supported by household consumption and quoted from the tempo.co page stated that household consumption expenditures still dominated the Indonesian economy, accounting for more than half of Indonesia's GDP, 55.74 percent (Tempo, 2019).

The significant negative credit variable is not in line with the research of (King & Levine, 1993), (Levine, Financial development and economic growth: Views and agenda, 1997), (Rajan & Zingales, 1998), which state that the positive impact of financial sector credit on per capita income growth in both developed and developing countries. Nevertheless, these results agree with some new research that reveals that financial sector credit can hurt economic growth. To a certain extent, an increase in the financial sector can encourage economic growth, but if the aggregate credit allocation is too large, an increase in credit will reduce economic growth (Arcand, Berkes, & Panizza, 2012) and (Samargandi, Fidrmuc, & Ghosh, 2015).

Based on the facts, the ratio of financial sector credit to GDP in Indonesia was 30 to 50 percent during the year of observation. Of course, this position is still very far compared to Malaysia, Thailand, and Singapore, whose ratio reaches 110 percent (Kontan.co.id, 2020). It means that there is still room for the domestic financial sector to encourage expansion. In the second equation, financial inclusion has not maximally contributed to reducing poverty in Indonesia. The results of this study contradict the results of (Burgess & Pande, 2005), but are in line with (Ayensu, 2017) research. Interestingly, only the optimal availability dimension reduces poverty in Indonesia. These results support research (Coulibaly & Yogo, 2016) (Bakari, et al., 2019) and (Abimbola, Olokoyo, Babalola, & Farouk, 2018). They are in line with the concept of financial inclusion, which states that the more available financial products that meet the community's needs will make the financial system more inclusive, improve welfare and ultimately reduce poverty. Negative signs in all financial inclusion variables have shown a signal that financial inclusion can reduce poverty in Indonesia, but its implementation has not been optimal. Data from the OJK shows that there is still a gap in financial inclusion in urban and rural areas, namely 83 percent and 68 percent (ojk.go.id, 2021). Therefore, it is necessary to increase financial access in rural areas.

Economics growth was found to increase poverty. This result certainly contradicts the theory, but as stated earlier, most of Indonesia's GDP comes from the consumption sector, not the investment or capital formation sector. So that the quality of economic growth is not so good, and its role in reducing poverty is small. Interest rates have no significant impact on poverty. Interest rate policy is one of the monetary policies. It suggests that monetary policy has not been optimal in overcoming the problem of poverty in Indonesia (Prakarsa, 2019). Although financial inclusion is not yet optimal in its impact on poverty, financial inclusion can reduce the economic disparity of the community well through the availability dimension, as shown in the results of the third equation. This result is in line with (Erlando, Riyanto, & Masakazu, 2020). It is proven that financial inclusion in Indonesia can create an even distribution of income and can encourage one of the SDG's programs, according to the World Bank statement. Based on data, Indonesia's Gini ratio is still high ranging from 0.3 to 0.5, but the trend has been decreasing in recent years. Furthermore, according to the fourth equation, financial inclusion does not significantly reduce unemployment. Only the dimension of access through the number of ATMs significantly reduces unemployment. As stated (Economist, 2011), an increase in ATMs will create new jobs such as ATM maintenance officers. In contrast to bank branch offices, it was found to have no significant effect. In recent years, the number of bank branch offices in Indonesia has decreased with digitalization development. People can only transact via ATM or mobile banking without going to a physical office. The credit increases unemployment significantly. One of the reasons is that a more significant portion of the credit disbursed is for consumption credit than for working capital. This result is in line with (Dwiastuti, 2020).

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