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# Simultaneous Relationship between Financial Inclusion, Economic Growth, and Income Inequality in Sulawesi Island, 2011–2019

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## Abstract

Sulawesi Island has fairly high economic growth but is not followed by a significant decrease in income inequality. Therefore, a new strategy is needed to overcome these problems, one of them by increasing the role of the financial sector through financial inclusion. This study aims to analyze the relationship between financial inclusion, economic growth, and income inequality, as well as the factors influencing them in Sulawesi Island from 2011 to 2019. The analytical method used is the simultaneous equation model with panel data using the EC2SLS model. The results show that there is a simultaneous relationship between financial inclusion and economic growth and also between economic growth and income inequality. Economic growth has a positive and significant effect on financial inclusion. Financial inclusion, foreign direct investment, and government spending have a positive and significant effect, while income inequality has a negative and significant effect on economic growth. Financial inclusion and inflation have a positive and significant effect, while economic growth has a negative and significant effect on income inequality. Thus, this study can show that financial inclusion can reduce income inequality by promoting economic growth.

**Keywords:** financial inclusion, economic growth, income inequality, simultaneous equation, EC2SLS

**JEL classifications:** C33; G21; O11; R11

## 1. Introduction

Each country strives to promote inclusive and sustainable economic growth following Sustainable Development Goal 8. One of the measures to support the achievement of inclusive economic growth is income inequality reduction (Hapsari, Hutagaol & Asmara 2013). As a developing country, Indonesia achieved quite a favorable economic performance in 2011, with its economic growth rate reaching 6.17 percent. However, in the subsequent years, the economic growth tends to stabilize at 5 percent. World Bank (2018) deems that the economic growth of Indonesia is not inclusive. One of the reasons is that the benefits of economic growth have not been evenly distributed. It means that the economic

growth of Indonesia has not been able to significantly reduce inequality.

Inequality between regions remains a classic problem in Indonesia. Based on Presidential Decree No. 13 of 2000 and Presidential Regulation No. 2 of 2015, the territory of Indonesia is divided into Western Indonesia (WI) and Eastern Indonesia (EI). The WI region covers the islands of Sumatra, Java, and Bali, while the EI region includes the islands of Kalimantan, Sulawesi, Nusa Tenggara, Maluku, and Papua. There remain a considerable gap between the two regions, particularly in the contribution of each region to the national economy as measured by the contribution of Gross Regional Domestic Product (GRDP) to Gross Domestic Product (GDP). In 2019, the economic activities of Indonesia remained concentrated in the WI region, which contributed 81.56 percent. Meanwhile, the EI region only contributed 18.44 percent (BPS 2021). The

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high difference has prompted the government to focus on the development in Eastern Indonesia, one of which is stated in Nawacita point 3 of the 2015–2019 National Medium-Term Development Plan (RPJMN).

As part of EI, Sulawesi Island has a higher growth opportunity than other EI regions. In 2019, the provincial economic growth of Sulawesi Island reaches 5 to 8 percent, while that of other EI regions ranges from merely -15 to 6 percent (BPS 2021). However, income inequality in Sulawesi Island is fairly high. Three provinces suffer from income inequality that exceeds the national average in Sulawesi Island, namely Gorontalo, Southeast Sulawesi, and South Sulawesi (BPS 2020). Todaro & Smith (2015) clarify that extreme inequality will lead to economic inefficiency, disruption to social stability and solidarity, and societal injustice. Therefore, efforts to reduce income inequality have been included in Sustainable Development Goal 10. One of these efforts is to improve the financial sector as a core development agenda by expanding access to financial services through financial inclusion (BI 2014).

Financial inclusion is a process that ensures easy access, availability, and benefits of the formal financial system for all economic actors (Sarma 2012). Financial inclusion is an essential agenda in various international forums such as G20, APEC, OECD, AFI, and ASEAN. Inclusive finance signifies wider access to financial services for every population, particularly for the poor and marginal groups who have limited access to financial services (Ummah, Nuryartono & Anggraeni 2015). It will positively impact economic growth and reduce income inequality (Kemenkeu 2017).

The financial inclusion of a region can be measured by the Financial Inclusion Index (FII). The results of the National Financial Literacy and Inclusion Survey conducted by the Financial Services Authority (OJK) reveal four provinces in Sulawesi Island with an FII below the national average in 2016. They are Central Sulawesi, Southeast Sulawesi, Gorontalo, and West Sulawesi (OJK 2017). Mean-

while, in 2019, three provinces still retain the same position except Central Sulawesi (OJK 2020b). It shows that financial inclusion in Sulawesi Island remains relatively low compared to other provinces, although FII in Sulawesi Island has increased. The low level of financial inclusion indicates the low level of public access to benefits from banking services, particularly for the poor and marginal groups. As a consequence, the inequality gap will widen and economic growth will be affected. Therefore, it is necessary to analyze the relationship between financial inclusion, economic growth, and income inequality, specifically in Sulawesi Island.

Several previous studies have elucidated the simultaneous relationship between financial inclusion and economic growth (Patrick 1966) and between economic growth and income inequality (Bourguignon 2004). Several studies reveal the effect of financial inclusion on income inequality (Lan & Thuong 2019) and vice versa (Omar & Inaba 2020). Erlando, Riyanto & Masakazu (2020) examine the effect of financial inclusion on economic growth, poverty, unemployment, and income inequality in Eastern Indonesia, using the Panel Vector Autoregression (PVAR) analysis, in which financial inclusion is measured in three dimensions without being formed into a unified value in an index. The results imply that financial inclusion has an effect on economic growth and income inequality. On the other hand, Dhrifi (2015) examines the relationship between those three variables in 89 countries using a simultaneous equation model. However, the financial inclusion variable, which is characterized by the financial sector development variable, is not employed as an endogenous variable. In other words, it can be concluded that the two previous studies have not examined the simultaneity among the three variables, even though several previously described studies suggest that the three variables can influence each other.

Referring to the aforementioned explanation, this study aims to: (i) describe financial inclusion, economic growth, and income inequality, and (ii) analyze the relationship between financial inclusion,

economic growth, income inequality, and the factors that influence them in Sulawesi Island in 2011–2019 using a simultaneous equation model with panel data. This model is applied to overcome the bias and inconsistent results of the estimation using the Ordinary Least Square (OLS) model due to the simultaneity problem among the variables employed (Baltagi 2005).

## 2. Literature Review

Financial inclusion is an important component of social and economic inclusion that plays a role in improving the welfare of the people. According to Chakravarty & Pal (2013), financial inclusion is a process that removes barriers and overcomes the inability of several individuals to access and utilize financial services. An inclusive financial system can enable wider access to financial services without price and non-price barriers (Demirguc-Kunt & Klapper 2012).

Patrick (1966) explains a relationship between financial inclusion and economic growth in a hypothesis called “Demand-Following and Supply-Leading Phenomena”. The “Demand-Following” phenomenon states that economic growth drives demand for financial services, which will encourage the development of the financial sector. The higher the economic growth, the greater the demand from entrepreneurs for external funds to finance company expansion, which cannot be covered by company profits. On the other hand, the “Supply-Leading” phenomenon illustrates that the development of the financial sector through the establishment of financial institutions and the provision of financial assets, liabilities, and services will increase the supply of financial services. It is mainly the increasing demand for financial services by modern entrepreneurs that will encourage economic growth in the real sector.

Greenwood & Jovanovic (1990) predict an inverted U-shaped non-linear relationship between financial sector development and income inequality. It indi-

cates that credit market imperfections in the early stages of development lead to increased income inequality. Then, over time, the financial system becomes more developed and more mature, thus the transaction costs of using financial services will decrease, which in turn renders financial services more accessible to a wider range of people (Beck, Demirgüç-Kunt & Levine 2007; Jalilian & Kirkpatrick 2005).

An inverted U-shaped relationship is also found between economic growth and income inequality. According to Kuznets, income distribution tends to deteriorate in the early phases of economic growth but improves subsequently as economic development progresses (Todaro & Smith 2015). In addition, Bourguignon (2004) affirms that the relationship between economic growth and income inequality can be simultaneous. This relationship is described in the Poverty-Growth-Inequality Triangle (PGI Triangle) model. In this model, economic growth and income inequality affect each other and can affect the absolute poverty level.

The magnitude of financial inclusion in an area can be determined by the literacy factor of the community as measured by the literacy rate proxy. A good level of literacy certainly renders it easier for the public to receive and comprehend information, including those related to financial services. Over time, financial markets have developed to become more complex, thus an illiterate individual will have difficulty with making the right financial decisions (Evans & Adeoye 2016).

Furthermore, several factors such as investment and government expenditure can influence economic growth. Investment is spending capital goods and means of production to increase the ability of the economy to produce goods and services. Investment is divided into Domestic Direct Investment (DDI) and Foreign Direct Investment (FDI). According to Mankiw (2015), investment is one of the components of GDP from the demand side and has a positive relationship with GDP. The Harrod-Domar theory clarifies that GDP growth (as a proxy for economic growth) is directly proportional to the pro-

portion of GDP saved and invested (Todaro & Smith 2015). In other words, investment is one of the factors driving economic growth. Government expenditure is also one of the components of GDP from the demand side (Mankiw 2015). Government expenditure is part of the fiscal policy instruments issued to support the running of the economy. Through this policy, the government can make a series of expenditures to meet public needs, which directly or indirectly affects the production of goods and services (Azwar 2016).

High or low-income inequality can be caused by inflation. Inflation is when the prices of goods and services increase continuously. Inflation can hamper the real minimum wage through a decrease in purchasing power, particularly for the poor and middle class. Thus, higher inflation will widen inequality (Easterly & Fischer 2001; Kavva & Shijin 2020). In addition to inflation, the unemployment rate is also expected to affect income inequality. Unemployment can limit access to sources of income, specifically for low-income groups (Deyshappriya 2017). This group generally has relatively low skills. Moreover, they are at the bottom of the income distribution, thus the high unemployment rate will further worsen the relative position of this group (Mocan 1999).

Referring to the aforementioned description, the research framework is presented in Figure 1.

### 3. Method

#### 3.1. Research Scope

This study utilized secondary data covering six provinces in Sulawesi Island in 2011–2019, namely North Sulawesi, Central Sulawesi, South Sulawesi, Southeast Sulawesi, Gorontalo, and West Sulawesi. Financial inclusion was first discussed at the G20 Pittsburgh Summit in 2009. Then, in 2010, it was reiterated at the Toronto Summit with the issuance of nine principles for innovative financial inclusion that will guide the development of financial inclusion. Since 2010, financial inclusion has received great

attention from international forums such as CGAP, APEC, World Bank, and ADB, including developing countries such as Indonesia (BI 2020a). It certainly takes time to issue several regulations or policies that encourage financial inclusion in Indonesia, thus the impact was less visible in 2010. Therefore, 2011 is considered as the initial period in this study, and 2019 is the final period. This study aims to analyze the impact of financial inclusion on economic growth and income inequality, and vice versa, under normal conditions (prior to the Covid-19 pandemic). The variables used in this study consist of three endogenous variables and six predetermined variables. The details of the variables, units, and data sources used in this study are presented in Table 1.

#### 3.2. Analysis Method

In this study, the descriptive analysis applied line and bar charts. The inferential analysis employed a simultaneous equation model with panel data. This study utilized financial inclusion variables measured by the Financial Inclusion Index (FII), using an approach by Sarma (2012). This index consists of three dimensions: banking penetration, availability of banking services, and usage. The banking penetration dimension represents the number of third-party fund accounts per 1,000 adult population. The dimension of the availability of banking services uses the indicator of the number of commercial bank branch offices per 100,000 adult population. Finally, the usage dimension applies the indicator of the proportion of deposit and credit to GRDP.

According to Sarma (2012), the stages of FII formation begin with setting an upper limit ( $M_i$ ) and a lower limit ( $m_i$ ) for each dimension. The lower limit set in this study is 0 (zero). Meanwhile, the upper limit is determined by the maximum value that depends on the distribution of each dimension, and this value is not an outlier value. Then, weight is needed to calculate the index of each dimension. In favor of simplicity, the three dimensions in this study are assumed to have the same weight, equal

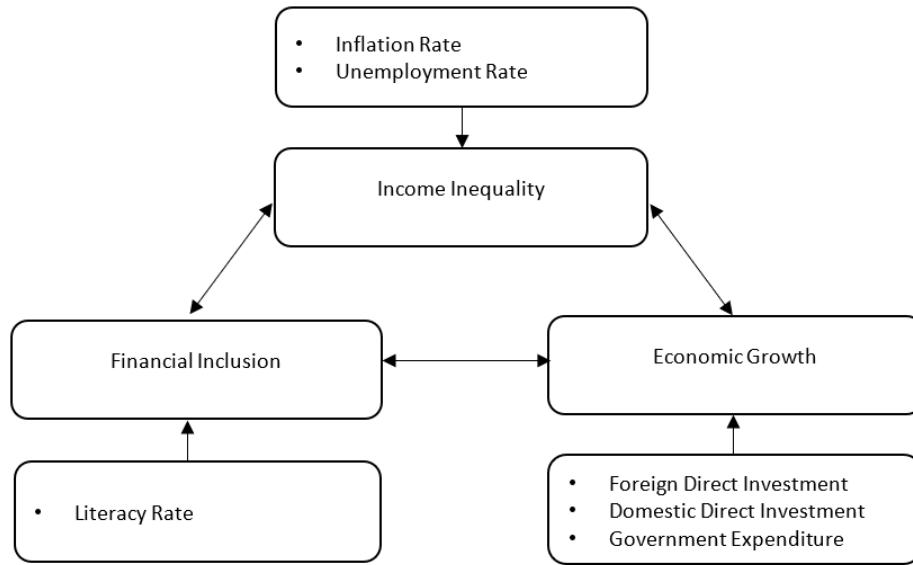


Figure 1. Research Framework

to 1 (one). This equal weighting explains that each dimension is equally important in measuring the level of financial inclusion in a region. The next step is to calculate the index value of each dimension by using the following formula:

$$d_i = w_i \frac{A_i - m_i}{M_i - m_i} \quad (1)$$

where:

- $d_i$  : the  $i$ -th dimension index;
- $w_i$  : the amount of weight for the  $i$ -th dimension ( $0 \leq w_i \leq 1$ );
- $A_i$  : the actual value for the  $i$ -th dimension;
- $m_i$  : the lower limit for the  $i$ -th dimension;
- $M_i$  : the upper limit for the  $i$ -th dimension.

Equation (1) will produce a dimension index value in the range  $0 \leq d_i \leq w_i$ . In three-dimensional space, point  $X = (d_1, d_2, d_3)$  represents the achievement of financial inclusion in a region, point  $O = (0, 0, 0)$  denotes the point in a non-ideal situation (the lowest achievement of financial inclusion), and point  $W = (w_1, w_2, w_3)$  symbolizes the point in an ideal situation (the highest achievement of financial inclusion) or  $W = (1, 1, 1)$ . The next step is to calculate  $X_1$  (Euclidean distance between  $X$  and  $O$ ) and  $X_2$

(inverse Euclidean distance between  $X$  and  $W$ ). Then, the two distances are normalized by the distance between  $O$  and  $W$  with the following formula:

$$X_1 = \frac{\sqrt{d_1^2 + d_2^2 + d_3^2}}{\sqrt{w_1^2 + w_2^2 + w_3^2}} \quad (2)$$

$$X_2 = 1 - \frac{\sqrt{(w_1 - d_1)^2 + (w_2 - d_2)^2 + (w_3 - d_3)^2}}{\sqrt{w_1^2 + w_2^2 + w_3^2}} \quad (3)$$

The FII developed by Sarma (2012) uses the simple average of  $X_1$  and  $X_2$ . Therefore, FII can be calculated using the following formula:

$$FII = \frac{1}{2}(X_1 + X_2) \quad (4)$$

Equation (4) produces FII values from 0 to 1 that increase monotonically, meaning that a higher index value will indicate a higher level of financial inclusion. Three categories are referred to in classifying FII scores: (1) high FII has a value in the range of 0.6 and 1; (2) medium FII has a value in the range of 0.3 and 0.6; and (3) low FII has a value of less than 0.3 (Sarma 2012). A value of 0 (zero) represents complete financial exclusion, while 1 (one)

**Table 1. Details of Variables, Units, and Data Sources**

Type of variables	Variable	Unit	Source
(1)	(2)	(3)	(4)
Endogenous Variables	Financial Inclusion Index:	Point	Financial Services Authority and Statistics Indonesia
	1) The number of third-party fund account	Point	
	2) The number of commercial bank branches	Point	
	3) Total deposit	Billion Rupiahs	
	4) Total credit	Billion Rupiahs	
	5) The number of adult population	Thousand people	
	6) Gross Domestic Regional Product (GRDP)	Billion Rupiahs	
	GRDP per capita	Million Rupiahs	
	Gini coefficient	Point	
Predetermined Variables	Literacy rate	Percent	Statistics Indonesia
	Inflation	Percent	
	Unemployment rate	Percent	
	Government expenditure	Million Rupiahs	Investment Coordinating Board
	Domestic direct investment	Million Rupiahs	
Foreign direct investment	Million US\$		

represents full financial inclusion.

Furthermore, the stages of the simultaneous equation model with panel data analysis are as follows (Baltagi 2005; Gujarati & Porter 2009; Greene 2012).

1. Building model specifications based on information from several related theories and studies. The model specifications used in this study are as follows:

The structural equation of financial inclusion

$$\ln FII_{it} = \beta_{10} + \beta_{11} \ln GRDP_{it} + \beta_{12} \ln Gini_{it} + \gamma_{11} LR_{it} + u_{1it} \quad (5)$$

The structural equation of economic growth

$$\ln GRDP_{it} = \beta_{20} + \beta_{21} \ln FII_{it} + \beta_{22} \ln Gini_{it} + \gamma_{21} \ln DDI_{it} + \gamma_{22} \ln FDI_{it} + \gamma_{23} \ln G_{it} + u_{2it} \quad (6)$$

The structural equation of income inequality

$$\ln Gini_{it} = \beta_{30} + \beta_{31} \ln FII_{it} + \beta_{32} \ln GRDP_{it} + \gamma_{31} \ln Inf_{it} + \gamma_{32} U_{it} + u_{3it} \quad (7)$$

where,  $\beta_{10}, \beta_{20}, \beta_{30}$  are intercepts, while  $\beta, \gamma$  are the coefficients of the endogenous and predetermined variables.  $\ln FII$  = a natural logarithm of the financial inclusion index (a proxy for finan-

cial inclusion);  $\ln GRDP$  = a natural logarithm of GRDP per capita (a proxy for economic growth);  $\ln Gini$  = a natural logarithm of the Gini coefficient (a proxy for income inequality);  $\ln DDI$  = a natural logarithm of the realization of domestic direct investment;  $\ln FDI$  = a natural logarithm of the realization of foreign direct investment;  $\ln G$  = a natural logarithm of government expenditure;  $LR$  = literacy rate;  $Inf$  = inflation; and  $U$  = unemployment rate.  $i = 1, 2, \dots, N$  is the number of observation units (province);  $t = 1, 2, \dots, T$  is the number of time periods; and  $u_{1it}, u_{2it}, u_{3it}$  are the error terms of the  $m$ -th structural equation ( $m = 1, 2, 3$ ) for the  $i$ -th province of year  $t$ .

- Identifying the model with order and rank conditions to determine whether the coefficients of the reduced form equation can be used to estimate the coefficients of the structural equation.
- Forming a reduced form equation.
- Conducting simultaneity and exogeneity tests using the Hausman Specification test. The simultaneity test is carried out to test the existence of simultaneity, or whether the endogenous variables that are regressors are correlated with errors. Meanwhile, the exogeneity test is carried out to test whether a variable is an endogenous or a pure exogenous variable.
- Selecting the best model by using the Chow test and Hausman test. The Chow test is conducted

to select a model between Pooled Two-Stage Least Square (Pooled 2SLS) and Fixed Effect Two-Stage Least Square (FE2SLS). Meanwhile, the Hausman test is conducted to select a model between FE2SLS and Error Component Two-Stage Least Square (EC2SLS).

6. Performing the classical assumption test with a normality test and non-multicollinearity detection.
7. Performing a model significance test which includes a simultaneous test (F-test), a partial test (t-test), and the coefficient of determination.
8. Performing model interpretation.

The hypotheses used in this study are:

1. There is a simultaneous relationship between financial inclusion and economic growth.
2. There is a simultaneous relationship between financial inclusion and income inequality.
3. There is a simultaneous relationship between economic growth and income inequality.
4. Literacy rate has a significant effect on financial inclusion.
5. Domestic direct investment has a significant effect on economic growth.
6. Foreign direct investment has a significant effect on economic growth.
7. Government expenditure has a significant effect on economic growth.
8. Inflation rate has a significant effect on income inequality.
9. Unemployment rate has a significant effect on income inequality.

## 4. Results and Analysis

### 4.1. Result

The first stage of the simultaneous equation model analysis is identifying the model with order and rank conditions. The results in Table 2 show that the three structural equations are overidentified, thus the appropriate estimation method is the Two-Stage Least Square (2SLS) method (Gujarati & Porter 2009).

The next step is to test simultaneity and exogeneity using the Hausman Specification Test, the results of which are presented in Table 3.

The results in Table 3 reveal a simultaneity problem for the three structural equations. Then, the results of the exogenous test show that the variables of financial inclusion, economic growth, and income inequality are proven to be endogenous. Therefore, estimation using the 2SLS method is needed to render the estimators consistent and efficient (Gujarati & Porter 2009). Following these two tests, the next step is to select the best model using the Chow and the Hausman test. The results are presented in Table 4.

The Chow and the Hausman test conclude that EC2SLS is the best model to estimate the three structural equations. The EC2SLS model employs Generalized Least Square (GLS) estimation, which accommodates the violation of homoscedasticity and non-autocorrelation assumptions (Greene 2012). The results in Table 5 reveal that the three structural equations fulfill the two classical assumptions at the 5 percent significance level.

Applying the EC2SLS model, the Table 6 displays the results of parameter estimation in the three structural equations.

## 4.2. Discussion

### 4.2.1. Overview of Financial Inclusion, Economic Growth, and Income Inequality in Sulawesi Island in 2011–2019

#### Financial Inclusion

The financial inclusion of a region can be measured through an index called the Financial Inclusion Index (FII). The development of FII in Sulawesi Island in 2011–2019 is presented in Figure 2.

Referring to Figure 2a, the finance of Sulawesi Island is shifting to more inclusive, as specified by the average FII value which continues to increase yearly. In 2011, the average FII reaches



**Table 2. The Results of the Identification of Simultaneous Equation Model with Order and Rank Conditions**

Equation	Order Condition ( $K - k$ ) ... ( $m - 1$ ) (2)	Rank Condition Rank (A) ... ( $M - 1$ ) (3)	Decision (4)
Financial Inclusion	$(6 - 1) > (3 - 1)$	Rank (A) = 3 - 1	Overidentified
Economic Growth	$(6 - 3) > (3 - 1)$	Rank (A) = 3 - 1	Overidentified
Income Inequality	$(6 - 2) > (3 - 1)$	Rank (A) = 3 - 1	Overidentified

**Table 3. The Results of the Simultaneity Test and the Exogeneity Test Using the Hausman Specification Test**

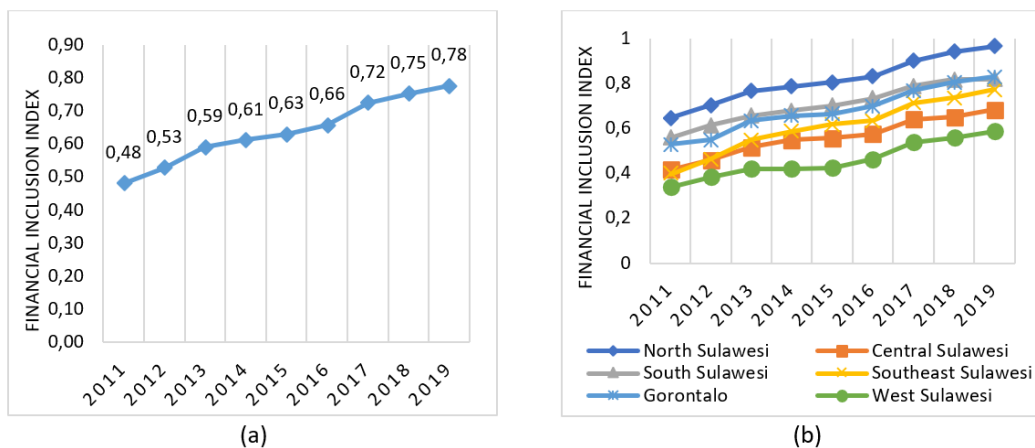
Equation	F-table (2)	Simultaneity Test		Exogeneity Test	
		F-statistic (3)	Decision (4)	F-statistic (5)	Decision (6)
Financial Inclusion	$F_{0,05(2,48)} = 3.1907$	5.4764	Reject $H_0$	5.5543	Reject $H_0$
Economic Growth	$F_{0,05(2,46)} = 3.1996$	5.6190	Reject $H_0$	3.9342	Reject $H_0$
Income Inequality	$F_{0,05(2,47)} = 3.1951$	14.4221	Reject $H_0$	5.0177	Reject $H_0$

Source: The processing result of Stata 13 software

**Table 4. The Results of the Best Selection Model**

Equation	Chow Test			Hausman Test		
	F-statistic (2)	p-value (3)	Decision (4)	$\chi^2_{hit}$ (5)	p-value (6)	Decision (7)
Financial Inclusion	26.06	0.0000*	Reject $H_0$	4.53	0.2100	Do Not Reject $H_0$
Economic Growth	5.87	0.0003*	Reject $H_0$	8.79	0.1178	Do Not Reject $H_0$
Income Inequality	14.08	0.0000*	Reject $H_0$	4.09	0.3933	Do Not Reject $H_0$

Note: \*) significant at  $\alpha = 0.05$

**Figure 2. The Development of the Financial Inclusion Index in Sulawesi Island in 2011–2019**

Source: Statistics Indonesia and Financial Services Authority (processed)

0.48, then increases to 0.78 in 2019. According to Sarma (2012), the FII in Sulawesi Island reaches the medium inclusiveness category in 2011–2013. It increases and changes into the high inclusiveness category from 2014 until 2019. This increase is inseparable from the commitment of the government to achieving financial inclusion, one of which is contained in the 2015–2019 RPJMN and strengthened

by the issuance of Presidential Regulation No. 82 of 2016 concerning the National Strategy for Financial Inclusion (SNKI).

An increase in FII also occurs in six provinces in Sulawesi Island, as shown in Figure 2b, where North Sulawesi is the province with the highest level of financial inclusion with an average of 0.82.

**Table 5. The Results of the Classical Assumption Test**

Equation	Normality			Non-multicollinearity
	Skewness/Kurtosis tests for Normality			
	Pr ( <i>Skewness</i> )	Pr ( <i>Kurtosis</i> )	p-value	VIF > 10
(1)	(2)	(3)	(4)	(5)
Financial Inclusion	0.0512	0.901	0.0695	None
Economic Growth	0.1586	0.4955	0.2754	None
Income Inequality	0.2168	0.3688	0.2934	None

Source: The processing result of Stata 13 software

**Table 6. The Results of Parameter Estimation by Applying the EC2SLS Model**

Variable	Structural Equation		
	Financial Inclusion	Economic Growth	Income Inequality
(1)	(2)	(3)	(4)
c	-4.3283 (1.0181)*	-0.4202 (0.5300)	-0.2367 (0.3192)
Financial Inclusion		0.2829 (0.0748)*	0.1914 (0.0784)*
Economic Growth	0.9920 (0.1182)*		-0.2123 (0.0851)*
Income Inequality	0.6467 (0.3903)	-0.8769 (0.2131)*	
Literacy Rate	0.0131 (0.0116)		
Domestic Direct Investment		0.0013 (0.0121)	
Foreign Direct Investment		0.0384 (0.0092)*	
Government Expenditure		0.1883 (0.0398)*	
Inflation			0.0081 (0.0030)*
Unemployment Rate			0.0106 (0.0061)
R <sup>2</sup>	0.5808	0.8699	0.3636
Adjusted R <sup>2</sup>	0.5556	0.8563	0.3116
Probability F-Statistics	0.0000	0.0000	0.0009

Source: The processing result of Stata 13 software

Notes: \*) significant at  $\alpha = 0.05$ ; (.) standard error

It is supported by a series of work programs implemented to increase financial inclusion, such as Student Savings (SimPel), Business Matching (BM), and credit lending by financial institutions (OJK 2020a). West Sulawesi is the province with the lowest level of financial inclusion (0.46). It is caused by the relatively low value of each dimension forming the FII compared to other provinces.

### Economic Growth

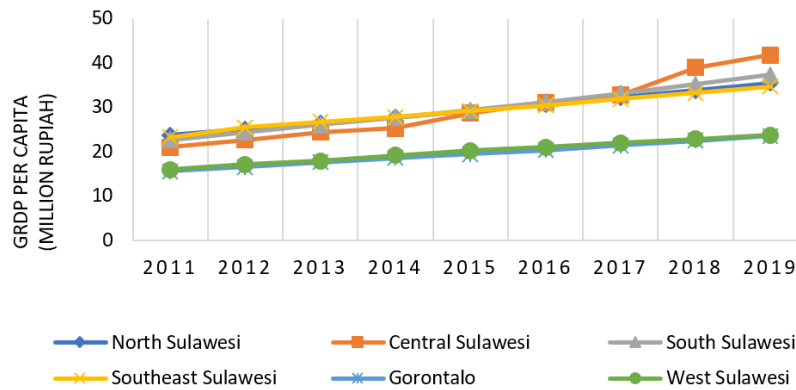
GRDP per capita is an effective measure to determine the real economic growth per capita of the population in an area (BPS 2021). Therefore, this study employed GRDP per capita as a proxy for economic growth. In Figure 3, during 2011–2019, the trend of GRDP per capita in the six provinces in Sulawesi Island tends to increase yearly. On the other hand, the GRDP per capita of Gorontalo and West Sulawesi seems to be far behind that of other provinces. Nevertheless, the economies of the six provinces in Sulawesi Island are dominated by the

same sector, namely Agriculture, Forestry, and Fisheries (Sosilowati et al. 2017). Central Sulawesi has the highest GRDP per capita, particularly in 2018 and 2019, in which the increase in 2019 reaches 3,006 million rupiahs from 2018. This increase can occur due to (1) an acceleration of nickel prices due to the ban on nickel ore exports; (2) encouragement for private construction in Morowali and several other areas; (3) nickel downstream in Morowali; (4) an increase in the price of the plantation sub-sector; and (5) the trade sector reaching post-earthquake normal growth levels (BI, 2020b).

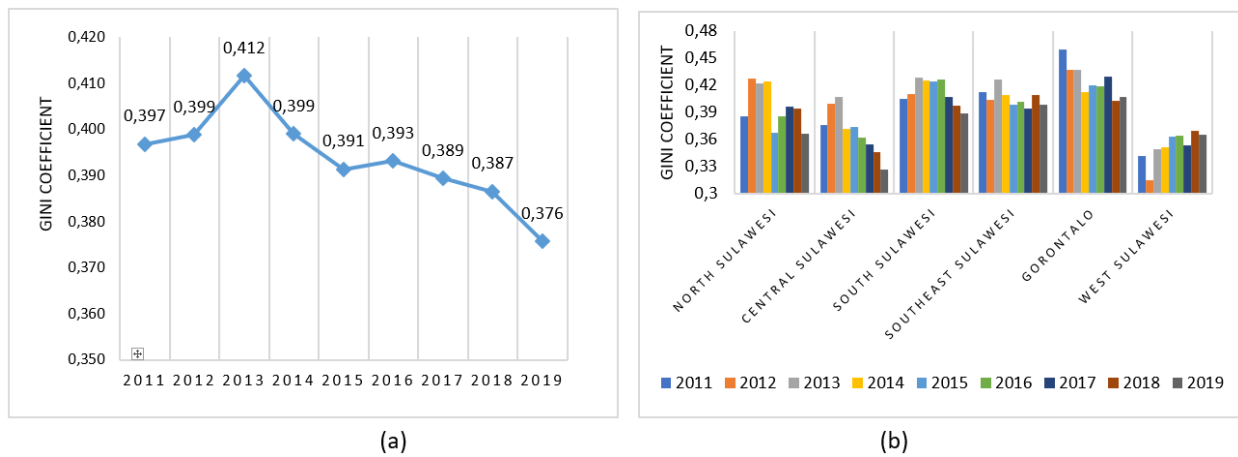
### Income Inequality

The Gini coefficient is used as a proxy for income inequality. The development of the Gini coefficient in Sulawesi Island in 2011–2019 is presented in Figure 4.

Figure 4a presents the average Gini coefficient of the six provinces in Sulawesi Island in 2011–2019.



**Figure 3. The Development of GRDP per Capita (Real) by Province in Sulawesi Island in 2011–2019**  
Source: Statistics Indonesia (processed)



**Figure 4. The Development of the Gini Coefficient on Sulawesi Island in 2011–2019**  
Source: Statistics Indonesia (processed)

The average Gini coefficient for Sulawesi Island has increased from 2011 to its peak in 2013. Furthermore, it experiences a downward trend until it reaches an average of 0.376 in 2019. The decline is supported by targeted social assistance, middle-class economic empowerment, and increased taxes from the upper-class group (Bappenas 2019). The decline is also unable to reach the target stipulated in Presidential Regulation Number 2 of 2015 concerning the RPJMN 2015–2019, i.e. 0.360 at the end of 2019. In addition, the average Gini coefficient of Sulawesi Island in 2019 is 0.376, with three provinces having a Gini coefficient that exceeds the national average: Gorontalo (0.407); Southeast Sulawesi (0.399); and South Sulawesi (0.389) (BPS

2020).

Figure 4b shows that the Gini coefficient of West Sulawesi tends to increase. It can occur due to increased income inequality in urban areas and increased poverty (Kemenkeu 2018a). Nevertheless, West Sulawesi has the lowest Gini coefficient and it is unable to achieve the target of the West Sulawesi Provincial Government specified in the RPJMD and RKPD, namely 0.330 in 2019 (Kemenkeu 2019). Meanwhile, Gorontalo has a downward trend in income inequality. However, the Gini coefficient of Gorontalo is the highest compared to other provinces. It is because of the uneven distribution of efforts to improve the level of community income by the government, in which the poor with

low incomes remains unable to increase their income (Kemenkeu 2018b).

#### **4.2.2. Relationship between Financial Inclusion, Economic Growth, and Income Inequality**

Based on the estimation results, a simultaneous relationship exists between financial inclusion and economic growth. This result aligns with Sharma (2016) and Sethi & Acharya (2018) who discover a two-way relationship between these two variables. In addition, Chow, Vieito & Wong (2018) also reveals a similar result in which most developing countries follow the “Demand-Following and Supply-Leading Phenomena” hypothesis introduced by Patrick (1966). The relationship between economic growth and income inequality is also proven to be simultaneous. This result aligns with the Poverty-Growth-Inequality Triangle (PGI Triangle) model proposed by Bourguignon (2004), showing a two-way relationship between economic growth and income inequality. Yang & Greaney (2017) categorize this result into the first scenario, the virtuous cycle, which implies that higher economic growth will reduce income inequality and vice versa. Next, the relationship between financial inclusion and income inequality is only one-way, in which financial inclusion has a positive and significant effect on income inequality. In contrast, income inequality does not significantly affect financial inclusion. These results are in agreement with Haloho (2019).

#### **4.2.3. Factors Affecting Financial Inclusion**

Based on Table 6 column (2), a coefficient value of 0.9920 indicates that every 1 percent increase in the GRDP per capita growth will increase the growth of the financial inclusion index by 0.9920 with the assumption of *ceteris paribus*. This result is in line with Omar & Inaba (2020), stating that higher per capita income implies higher financial inclusion that can be achieved. This increase in per capita income will increase the need for financial services through an increase in individual savings as individ-

uals seek to obtain a return for their surplus funds, thus increasing financial inclusion (Rafeeq 2018). Most studies apply per capita income as a proxy for economic growth (Sharma 2016; Yang & Greaney 2017; Kim, Yu & Hassan 2018; Sethi & Acharya 2018; Shen, Hu & Hueng 2021) because this measure can take into account the heterogeneity of different population among research samples (Van et al. 2021).

Income inequality has no significant effect on financial inclusion. This result is contrary to Cahyadin (2020) and Omar & Inaba (2020), in which income inequality significantly affects the low level of financial inclusion. Claessens & Perotti (2007) explain that regions with high inequality might worsen the viability of financial reform in the long term due to unequal political influence on the financial sector. Furthermore, the literacy rate does not significantly affect financial inclusion. This result aligns with Ummah, Nuryartono & Anggraeni (2015) and Park & Mercado Jr (2018). This insignificant relationship can be caused by limited digital access, wherein the current digitalization period, all financial information and services can be obtained digitally (Busainah 2020).

#### **4.2.4. Factors Affecting Economic Growth**

Based on Table 6 column (3), a coefficient value of 0.2829 means that every 1 percent increase in the growth of the financial inclusion index will increase the growth of GRDP per capita by 0.2829 percent with the assumption of *ceteris paribus*. This result is in line with Kim, Yu & Hassan (2018), Van et al. (2021), and Karim et al. (2022) that financial inclusion has a significant positive effect on economic growth. Karim et al. (2022) add that financial inclusion generates a greater increase in economic growth in less developed and developing countries. Therefore, financial inclusion is the suitable strategy to boost economic growth. This positive relationship can also occur since better access to financial services will encourage financially constrained companies to be more profitable (Lan & Thuong 2019). In addition to companies, this access also impacts

community groups, specifically the poor, to invest in education and physical assets (Mehrotra & Yetman 2015). A well-developed financial sector will encourage economic growth because financial services provided can increase the intensity and productivity of economic activities (Nasution 2021).

Furthermore, a coefficient value of -0.8769 suggests that every 1 percent increase in the Gini coefficient growth will decrease the growth of GRDP per capita by 0.8769 percent with the assumption of *ceteris paribus*. The negative relationship between the two variables has been empirically proven by Huang et al. (2009). In the political economy approach, high inequality will reduce economic growth because most poor people choose redistributive policies over policies that will increase economic growth (Yumna et al. 2017). Barro in Yumna et al. (2017) also suggests that this negative effect can be explained by credit market imperfections, where several groups of people, particularly the poor, have limited access to the financial sector, for example, for investment. In the end, this can decelerate economic growth through the decline in productivity.

Table 6 column (3) also shows that DDI has an insignificant effect on economic growth, while FDI has a positive and significant effect. A FDI coefficient value of 0.0384 indicates that every 1 percent increase in the FDI growth will increase GRDP per capita growth by 0.0384 percent with the assumption of *ceteris paribus*. This result is in line with Dinh et al. (2019), where, in the long term, foreign direct investment positively influences economic growth. This positive influence can occur because FDI can create large investments to increase economic activities and facilitate development (Rahman & Alam 2021). Meanwhile, the insignificant effect of DDI on economic growth is in agreement with Astuti (2018). According to Astuti (2018), the utilization of DDI for development is frequently not well-targeted. It indicates that domestic investors still lack enthusiasm to play a role in investment activities. Yanti, Fadliyanti & Manan (2021) suspect that other factors, such as labor and technology, play an essential role in increasing economic growth.

Finally, government expenditure has been proven to significantly and positively affect economic growth. A coefficient value of 0.1883 means that every 1 percent increase in the growth of government expenditure will increase the growth of GRDP per capita by 0.1883 percent with the assumption of *ceteris paribus*. This result is in agreement with Marisa, Majid & Dawood (2019) and Shen, Hu & Hueng (2021), as well as supporting the Keynesian approach and confirming the impact of government expenditure on economic growth by increasing the production of goods and services through fiscal policy instruments (Azwar 2016).

#### 4.2.5. Factors Affecting Income Inequality

Based on Table 6 column (4), a coefficient value of 0.1941 indicates that every 1 percent increase in the growth of the financial inclusion index will increase the Gini coefficient growth by 0.1941 percent with the assumption of *ceteris paribus*. Financial inclusion has a positive and significant effect on income inequality. This result is consistent with Dhrifi (2015), showing that the development of the financial sector has a significant positive effect on low and middle-income countries, including Indonesia. The positive relationship between financial inclusion and income inequality can be triggered by limited access to banking services for the poor (Seven & Coskun 2016). Such limited access may occur because credit market imperfections result in higher transaction costs and imperfect information availability. Therefore, only certain people can access and benefit from financial services, namely the high-income group (Greenwood & Jovanovic 1990; Jalilian & Kirkpatrick 2005).

The low financial literacy of the people of Sulawesi Island can also have a positive effect on financial inclusion in terms of income inequality. According to OECD (2017), financial literacy can be defined as knowledge and understanding of financial concepts and risks, as well as the capability of applying both to make effective decisions in various financial contexts. In 2019, financial literacy in Sulawesi Island was still relatively low, reaching an average of 35.64

percent, suggesting that merely 35–36 people out of 100 residents of Sulawesi Island are included in the well-literate category (OJK 2020). In addition, this number is still below the national average, namely 38.03 percent. Reviewed by province, four provinces have financial literacy below the national average, i.e. South Sulawesi, Southeast Sulawesi, Gorontalo, and West Sulawesi (OJK 2020). This condition implies that the people of Sulawesi Island do not have sufficient knowledge to optimize their money for productive activities. They do not fully understand the various financial products and services offered by formal financial service institutions. Therefore, merely a small portion of the community, namely the well-literate community, can access and use the benefits of formal financial services in Sulawesi Island, which can encourage the income inequality gap.

On the other hand, a more even distribution of income can be achieved by increasing economic growth. A coefficient value of -0.2123 indicates that every 1 percent increase in the GRDP per capita growth will decrease the Gini coefficient growth by 0.2123 percent with the assumption of *ceteris paribus*. Economic growth has a negative and significant effect on income inequality. This result is in line with Lan & Thuong (2019). Kurniasih (2017) argues that this negative relationship is understandable because production capacity will increase along with the increase in economic growth, thus causing the per capita income of the people to increase, which eventually will have an impact on decreasing income inequality.

Furthermore, a coefficient value of 0.0081 indicates that every 1 percent increase in inflation will increase the Gini coefficient growth by 0.0081 percent with the assumption of *ceteris paribus*. This result aligns with Neaime & Gaysset (2018) that higher inflation significantly increases income inequality. Meanwhile, the unemployment rate does not significantly affect income inequality. This result is in agreement with Ulfakhirah (2019). This insignificant influence can be caused by the factors of production (labor) that have not been optimally absorbed.

Most people receive low wages, thus a decrease in unemployment does not necessarily reduce income inequality (Aditiya 2021).

## 5. Conclusion

Financial inclusion policies are beginning to be considered in the financial sector to increase access to financial services. Economic growth and income inequality are both impacted by inclusive finance. Numerous studies have described how financial inclusion affects economic growth and income inequality. However, up to this point, no studies have considered the simultaneity of the three variables. Therefore, this study employed a simultaneous equation model with panel data to explain the relationship between financial inclusion, economic growth, income inequality, and the factors that can affect them in Sulawesi Island. Sulawesi Island was selected as the observation unit because it is the front gate for economic growth in the eastern region of Indonesia.

Observed from the aforementioned results and discussions, the financial inclusion and economic growth of Sulawesi Island increase between 2011 and 2019. Meanwhile, income inequality tends to fluctuate. A simultaneous relationship between financial inclusion and economic growth is found, as well as between income inequality and economic growth. In contrast, there is a one-way relationship between financial inclusion and income inequality. Furthermore, economic growth has a positive and significant effect on financial inclusion. Then, financial inclusion, foreign direct investment, and government expenditure have a positive and significant effect on economic growth, while income inequality has a negative and significant effect. Finally, financial inclusion and inflation have a positive and significant effect on income inequality, while economic growth has a negative and significant effect.

### 5.1. Recommendation

Referring to the aforementioned conclusions, the government and monetary authorities should collab-

orate to increase financial inclusion that is simple to obtain for every level of society. It should encourage residents to engage in productive economic pursuits rather than consumptive ones. Additionally, increasing public education and financial service product literacy are necessary, particularly for those excluded from formal financial services. The government should then improve investment and allocate more funds for government spending to spur economic growth. The government should also be able to control inflation to decrease income inequality, particularly for items that are frequently purchased by the poor and marginal groups.

The availability of data or indicators to build a Financial Inclusion Index remains notably limited to the observation units in this study. Thus, further studies can create a Financial Inclusion Index with more detailed indicators customized to the linked study. For instance, the banking penetration dimension (accessibility) can add the indicators of the number of credit card users, e-money users, and others. Then the dimension of the availability of banking services (availability) can include the indicators of the number of rural banks, sharia commercial banks, and others.

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