The Causality Relationship Between Growth and Inequality: Java and Sumatera Studies

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Article Information	Abstract
	This research article has the theme of the causal relationship between growth and inequality with the object of research being the provinces on the island of Java and Sumatra island. The purpose of this study is to identify and analyze conditions of inequality in income distribution and economic growth and to analyze whether there is a causal relationship between inequality income with economic growth in provinces on the island of Java and provinces on the island of Sumatra during the 2015-2020 period. The research method used is quantitative descriptive using the Granger causality test analysis tool. Based on the research results, the condition of economic growth in each province on Sumatra Island fluctuated, with the highest average economic growth in South Sumatra Province and the lowest in Riau Province. Inequality in the distribution of provincial income on the island of Sumatra fluctuates, the highest average income distribution inequality is in the provinces of South Sumatra and Bengkulu, and the lowest is in the province of the Bangka Belitung Islands. Meanwhile in Java, economic growth also fluctuated. The highest average economic growth was in DI Yogyakarta Province, and the lowest was in Central Java Province. Inequality in the distribution of provincial income in Java Island fluctuates, with the highest inequality in Yogyakarta province and the lowest in Central Java province. In addition, the results of the Granger causality test show that there is no one-way or two-way causality relationship between economic growth and income inequality on the islands of Sumatra and Java.

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INTRODUCTION

Economic growth ideally has a positive impact on people's welfare. However, what often happens is that economic development progress sometimes causes differences in the welfare level through unequal income distribution. Several studies show similarities between the Kuznets curve and the relationship between economic growth and inequality in income distribution. This phenomenon is interesting to study because there are differences between the provinces on the island of Sumatra and the island of Java regarding inequality.

However, in terms of growth, there are similarities. Nugroho (2014) found that the influence of economic growth and inequality between sub-districts in Brebes rejected the hypothesis. The same thing was also found by Parkising, Nasir, and Nujum (2020), who did not find proof of the Kuznet curve in the province of South Sulawesi. Suryantini and ., (2022) also found the same thing in the case of the province of Bali, showing no relationship between growth and inequality in Bali. While there are differences with other studies, Guiga and Rejeb (2012) also found that the relationship between growth and inequality can be described from an inverted U-curve according to Kuznet's hypothesis— Ananda and Pulungan (2019) who found a significant effect of economic growth on inequality. Sirtama (2021) found the same thing in West Nusa Tenggara, which stated that the relationship between growth and inequality is similar to the Kuznet curve.

Based on this phenomenon, there are differences and similarities between Kuznet's theory and facts in several areas. In Indonesia, the island of Java is an area that has many big cities and is an industrial center. Increased development on the island of Java does not necessarily lead to equity. Compared to the island of Java and one of the other big islands, namely the island of Sumatra, the province on the island of Sumatra turns out to have lower inequality when compared to the island of Java.

Hariani (2019) in his research found that only the HDI variable had a significant effect on income inequality. Meanwhile, the variables of open unemployment rate (TPT) and district/city minimum wage (UMK) have no significant effect on income inequality. The advantage of this research lies in the use of a panel data model with provinces that have a dense population. While the weaknesses of this study include, the independent variables used are only three variables and only one is significant, and the object only focuses on inequality and does not link it to poverty and focuses on one province only and does not link it to poverty. Olofin et al., (2015) in their research, found that political terror reduced poverty significantly at the level when real/capita income was used for poverty. Then, democracy is recorded as reducing poverty with statistically significant results, while increasing population and poverty are positively related to statistically significant results.

Sumner (2014), in his research on how poverty and inequality will be in Indonesia in the future by analyzing descriptive and trend statistics, shows that Indonesia has the potential to earn income higher than the international poverty line assuming an even distribution of income when using the international poverty line. international poverty, the number of poor people in urban areas is higher than rural residents Guiga & Rejeb (2012), examines the relationship between poverty, inequality, and growth by using a panel data simultaneous equation model. The research results show that state investment in social sectors such as education and health and improving the living conditions of the rural population can promote growth and reduce economic inequality. Therefore, the Kuznets hypothesis based on the relationship between economic growth and income inequality is the most appropriate.

Ananda & Pulungan (2019) in their research, found that by using panel data regression, economic growth, inflation, and the unemployment rate had a positive and significant effect on inequality while the share of the credit sector had a significant negative effect, only total spending was not significant. In Shamsuddin's research (2018), regarding the relationship of growth, poverty, and inequality using Linear

programming and Panel random effects, found that the impact of per capita survey income and some inequalities on poverty measures is 'linear' when controlling for non-linear growth components. However, if these assumptions are relaxed, the study does not establish either a 'U'-shape 'relationship' and/or an 'asymptotic' relationship between the variables. Nugroho (2014) found that the influence of economic growth and inequality between sub-districts in Brebes rejected the hypothesis. The same thing was also found by Parkising et al., (2020), who did not find proof of the Kuznet curve in the province of South Sulawesi. Suryantini et al., (2022) also found the same thing in the case of the province of Bali, showing no relationship between growth and inequality in Bali. While there are differences with other studies.

Based on the main theory of growth and inequality put forward by Kuznets and several previous empirical studies, this study aims to examine the Kuznets theory and some differences in previous studies regarding the results of Kuznets theory in several regions.

According to BPS data in 2017, it turns out that three provinces on the island of Java have a Gini index number which is a measure of inequality that is above 0.4, namely DKI Jakarta 0.409, Yogyakarta Province which is 0.44 and East Java Province 0.415 while on the island of Sumatra the average In the province, the Gini index is below 0.4. However, compared to the economic growth of the province on the island of Java with the province on the island of Sumatra, based on BPS data, the data shows that the data is not so different, namely the highest average range is below 7%. Based on this, it is interesting to test or prove the Kuznet theory in the provinces on the island of Java and the island of Sumatra.

Previous studies show similarities and differences between the theory and the facts. Kuznet's theory of growth and inequality needs to be further tested. Several previous studies only focused on researching one province or one island. The advantages of this research are conducting studies on the two largest islands in

Indonesia which have one of the largest areas and the largest population.

The condition of the provinces on the islands of Sumatra and Java is fascinating. On the island of Sumatra, the population is less than on the island of Java. However, they have a wide area and diverse natural resources, but compared to the island of Sumatra, the average economic growth is lower than that of Java. However, Java has a high average inequality of the island of Sumatra. This is the main attraction of this research.

This research gap arises when the phenomenon of data in the provinces on the island of Sumatra and Java Island shows differences between growth and inequality, while theoretically Kuznet says there is an inverted U-curve relationship between growth and inequality. However, several empirical studies that were stated at the beginning showed that there was a phenomenon of different findings in several regions, some showed the same results as Kuznets' theory, but some showed differences. This is the main attraction for testing the Kuznets theory on the islands of Sumatra and Java.

RESEARCH METHODS

To address the first issue, namely narrating the state of income inequality and economic growth in Indonesia, descriptive analysis is utilized, specifically data tabulation, computing the average, and narrating based on the available figures. To answer the second problem, to determine the reciprocal relationship between economic growth and inequality, the Granger causality test analysis tool Granger (1969) is used as follows:

$Yt = ai\ Yt\text{-}i + bj\ Xt\ \text{-}j + t$ .... (1)

$Xt = ci\ Xt\text{-}i + dj\ Yt\text{-}j + t$ .... (2)

Where Y is economic growth, and X is income inequality. The use of the Granger causality test in this study aligns with the research objective of identifying and analyzing the causal relationship between economic growth and inequality. The Granger causality test is an analytical tool that identifies whether there is a

unidirectional or bidirectional relationship between variables and the possibility of no relationship.

In this study, the variables tested were growth and inequality, with the object of research being all provinces on the islands of Sumatra and Java. The steps in testing causality are first to find the smallest AIC value using one to three lag regression trials. Do the causality test after getting the lag with the smallest AIC value. The

causality test results are from the significance probability value with the lowest degree below 10% alpha.

RESULTS AND DISCUSSION

To find out the condition of provincial economic growth on the island of Sumatra can be seen in Table 1 below:

Table 1. The province's economic growth on the island of Sumatra for the 2015-2020 period

Province	2015	2016	2017	2018	2019	2020	Average
Aceh	-2.61	1.38	2.31	2.79	3.45	0.71	1.33
North Sumatra	3.81	3.94	3.95	4.06	3.61	-1.84	2.92
West Sumatra	4.23	4	4.07	3.95	3.14	-2.33	2.84
Riau	-2.24	-0.28	0.24	-0.01	2.51	6.03	1.04
Jambi	2.44	2.65	2.93	3.07	4.46	0.34	2.64
South Sumatra	2.98	3.65	4.16	4.7	4.11	0.53	3.35
Bengkulu	3.44	3.63	3.38	3.42	4.49	-1.7	2.77
Lampung	3.95	4.01	4.09	4.21	4.18	-7.44	2.16
Kep. Bangka Belitung	1.89	1.95	2.35	2.37	3.95	-2.34	1.69
Kep. Riau	3.03	2.12	-0.69	1.83	-0.08	4.77	1.83
Average	**2.09**	**2.70**	**2.67**	**3.03**	**3.38**	**-0.32**	

Source: Source: Central Bureau of Statistics, 2021

Based on the data in Table 1. it can be seen that, in general, during the period 2015 to 2020, the economic growth of the province on the island of Sumatra fluctuated. The highest average economic growth occurred in 2019 at 3.38%, and the lowest occurred in 2020 at -0.32%.

In particular, the economic growth conditions of each province on the island of Sumatra during the period 2015 to 2020 also fluctuated, on average the economic growth in the province of South Sumatra was the highest at

3.35%, and the lowest was the province of Riau, namely 1.04%. However, what is interesting is that Riau province in 2020 had a high economic growth of 6.03% compared to other provinces on the island of Sumatra, even though at that time, the Covid-19 disaster was hitting and had an impact on the economy.

Meanwhile, to find out the condition of income distribution inequality can be seen in Table 2. the following:

Table 2. Income inequality in the provinces on the island of Sumatra in 2015-2020

Province	2015	2016	2017	2018	2019	2020	Average
Aceh	0.339	0.341	0.329	0.318	0.321	0.319	0.327
North Sumatra	0.326	0.312	0.335	0.311	0.315	0.314	0.318
West Sumatra	0.319	0.312	0.312	0.305	0.307	0.301	0.309
Province	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**Average**
Riau	0.366	0.347	0.325	0.347	0.331	0.321	0.339
Jambi	0.344	0.346	0.334	0.335	0.324	0.316	0.333
South Sumatra	0.334	0.362	0.365	0.341	0.339	0.338	0.346
Bengkulu	0.371	0.354	0.349	0.355	0.329	0.323	0.346

Province	2015	2016	2017	2018	2019	2020	Average
Lampung	0.352	0.358	0.333	0.326	0.331	0.32	0.336
Kep. Bangka Belitung	0.275	0.288	0.276	0.272	0.262	0.257	0.271
Kep. Riau	0.339	0.352	0.359	0.339	0.337	0.334	0.343
Average	**0.336**	**0.337**	**0.331**	**0.324**	**0.319**	**0.314**	

Source: Central Bureau of Statistics, 2021

Based on the data in Table 2. it can be seen that, generally, during the period 2015 to 2020, the inequality of income distribution through the local Gini index on the island of Sumatra experienced fluctuations. The highest average Gini index number occurred in 2016, 0.337, and the lowest occurred in 2020, at 0.314.

In particular, the condition of income distribution inequality in each province on the island of Sumatra during the period 2015 to 2020 also varied and fluctuated, on average the inequality of income distribution through the Gini index was highest in the provinces of South Sumatra and Bengkulu, namely 0.346 and the lowest. It is the province of the Bangka Belitung Islands, which is 0.271.

To find out the condition of the province's economic growth on the island of Sumatra, it can be seen in Table 3 below:

Table 3. Regional economic growth on the island of Java for the 2015-2020 period

Province	2015	2016	2017	2018	2019	2020	Average
DKI Jakarta	4.84	4.84	5.21	5.16	5.46	-2.7	3.80
West Java	3.52	4.17	3.89	4.25	4.3	-0.77	3.22
Central Java	4.68	4.49	4.52	4.59	5.17	-7.71	2.62
DIY Yogyakarta	3.75	3.87	4.11	5.06	4.78	2.75	4.05
East Java	4.8	4.96	4.87	4.92	4.88	-4.39	3.34
Banten	3.24	3.14	3.67	3.75	5.06	3.48	3.72
Average	4.13	4.24	4.37	4.62	4.94	-1.55	

Source: Central Bureau of Statistics, 2021

Based on the data in Table 3. it can be seen that, generally, during the period 2015 to 2020, the province's economic growth in Java experienced fluctuations. The highest average economic growth occurred in 2019 at 4.94%, and the lowest occurred in 2020 at -1.55%.

In particular, the economic growth conditions of each province on the island of Java during the period 2015 to 2020 also fluctuated, on average the economic growth in the province of Yogyakarta was the highest at 4.05%, and the lowest was in the province of Central Java, namely 2.62%.

Meanwhile, to find out the condition of income distribution inequality can be seen in Table 5. the following:

Table 4. Income inequality in the provinces on the island of Java in 2015-2020

Province	2015	2016	2017	2018	2019	2020	Average
DKI Jakarta	0.421	0.397	0.409	0.39	0.391	0.4	0.401
West Java	0.426	0.402	0.393	0.405	0.398	0.398	0.403
Central Java	0.382	0.357	0.365	0.357	0.358	0.359	0.363
DIY Yogyakarta	0.42	0.425	0.44	0.422	0.428	0.437	0.428
Province	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**Average**
East Java	0.403	0.402	0.415	0.371	0.364	0.364	0.386
Banten	0.386	0.392	0.379	0.367	0.361	0.365	0.375
Average	**0.406**	**0.395**	**0.400**	**0.385**	**0.383**	**0.387**	

Source: Central Bureau of Statistics, 2021

Based on the data in Table 4. it can be seen that, generally, during the period 2015 to 2020, the inequality of income distribution through the local Gini index in Java experienced fluctuations. The highest average Gini index number occurred in 2015, 0.406, and the lowest occurred in 2019, 0.383.

In particular, the condition of income distribution inequality in each province on the island of Java during the period 2015 to 2020 also varied and fluctuated, on average the inequality of income distribution through the Gini index was the highest in the province of Yogyakarta, namely 0.428 and the lowest was the province of Java. The Middle is 0.363.

Before carrying out a causality test to get the optimum lag with the smallest Akaike Info Criterion (AIC), a regression is carried out first with three-time lags. First lag, the results of the regression output are obtained as follows:

Table 5. The results of the regression of inequality and growth on the Sumatra with the first lag

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.334908	0.043234	7.746467	0.0000
KT(-1)	-0.034756	0.132168	-0.262966	0.7935
PE(-1)	0.001638	0.001354	1.210110	0.2313
R-squared	0.025938	Mean dependent var		0.327169
Adjusted R-squared	-0.008850	SD dependent var		0.025074
SE of regression	0.025185	Akaike info criterion		-4.475667
Sum squared resid	0.035519	Schwarz criterion		-4.370029
Likelihood logs	135.0322	Hannan Quinn Criter.		-4.434430
F-statistics	0.745592	Durbin-Watson stat		2.024831
Prob(F-statistic)	0.479104			

Source: Data Processed, 2022

Based on the results of the regression output in Table 4.5. The result is that the AIC value is -4.47, then a regression between inequality and growth is carried out on the island of Sumatra using the second lag. The results of the regression output can be seen in the following table:

Table 6. The results of the regression of inequality and growth on the Sumatra with a second lag

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.370202	0.067120	5.515511	0.0000
KT(-1)	-0.049728	0.136970	-0.363058	0.7180
PE(-1)	0.001843	0.001591	1.158249	0.2520
KT(-2)	-0.098584	0.152249	-0.647518	0.5201
PE(-2)	0.000605	0.001531	0.395165	0.6943
R-squared	0.039049	Mean dependent var		0.327190
Adjusted R-squared	-0.033476	SD dependent var		0.025292
SE of regression	0.025712	Akaike info criterion		-4.401443
Sum squared resid	0.035039	Schwarz criterion		-4.223819
Likelihood logs	132.6419	Hannan Quinn Criter.		-4.332255
F-statistics	0.538421	Durbin-Watson stat		1.979942
Prob(F-statistic)	0.708118			

Source: Data Processed, 2022

Based on the results of the regression output in Table 4.6. The result is that the AIC value is -4.40, then the regression between inequality and growth is carried out on the island of Sumatra using the third lag.

Third lag. To see the results of the regression using the third lag can be seen in the following table:

Table 7. The results of the regression of inequality and growth on the Sumatra with the third lag

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.398609	0.088571	4.500424	0.0000
KT(-1)	-0.034535	0.139983	-0.246706	0.8061
PE(-1)	0.001953	0.001639	1.191472	0.2391
KT(-2)	-0.109269	0.154219	-0.708529	0.4819
PE(-2)	0.001110	0.001733	0.640753	0.5246
KT(-3)	-0.077663	0.154976	-0.501130	0.6185
PE(-3)	-0.002301	0.001782	-1.291055	0.2026
R-squared	0.072183	Mean dependent var		0.327333
Adjusted R-squared	-0.039155	SD dependent var		0.025493
SE of regression	0.025988	Akaike info criterion		-4.347814
Sum squared resid	0.033768	Schwarz criterion		-4.096913
Likelihood logs	130.9127	Hannan Quinn Criter.		-4.250306
F-statistics	0.648326	Durbin-Watson stat		1.956703
Prob(F-statistic)	0.691148			

Source: Data Processed, 2022

Based on the results of the regression output in Table 4.7. the result of the AIC value is -4.34. Suppose to look at the overall regression results using the first, second, and third lag. In that case, the smallest AIC value is obtained during the first lag so that it is concluded for the Granger causality test using the third lag, and the following results are obtained:

Table 8. The results of the causality test of inequality and growth on the Sumatra

Null Hypothesis:	Obs	F-Statistics	Prob.
KT does not Granger Cause PE	59	2.34737	0.1311
PE does not Granger Cause KT		1.46437	0.2313

Source: Data Processed, 2022

Based on the data in Table 4.8. The relationship between inequality and growth results in no unidirectional or two-way relationship because the probability value is insignificant. In the first row in Table 8, economic growth is insignificant in causing inequality. The statistical F value is 2.34, with a probability level of 0.13. Meanwhile, in the second row, inequality is also insignificant in causing economic growth, with a calculated F value of 1.46 and a probability of 0.23. So it can be concluded that there is no one-way or two-way relationship between economic growth and inequality on the island of Sumatra.

The results of the causality test output between income distribution inequality and regional economic growth on the island of Sumatra show no unidirectional or bidirectional causal relationship. This shows that on the island of Sumatra, between inequality and growth, the factors that cause it are unrelated. An increase or decrease in income distribution inequality did not cause an increase or decrease in economic growth on the island of Sumatra.

The results of this study are similar to the previous study conducted by Nugroho (2014), which found the rejected hypothesis of the effect of economic growth and inequality between subdistricts in Brebes. The same thing was also found by Parkising, Nasir, and Nujum (2020), who did not find proof of the Kuznet curve in the province of South Sulawesi. Suryantini and ., (2022) also found the same thing in the case of the province of Bali, showing no relationship between growth and inequality in the province of Bali. While there are differences with other studies, Guiga and Rejeb (2012) also found that the relationship between growth and inequality can be described from an inverted U-curve according to Kuznet's hypothesis. Ananda and Pulungan (2019) found a significant effect of economic growth on inequality. Sirtama (2021)

found the same thing in West Nusa Tenggara, which stated that the relationship between growth and inequality is similar to the Kuznet curve.

Referring to several empirical studies and the concept of economic theory, when compared with the results of research on the island of Sumatra, it turns out that the results are similar to some previous studies. This is different from the theory put forward by Kuznet regarding growth and inequality. On the island of Sumatra, which is rich in natural resources, and agricultural and mining products, the output contributing to economic growth comes from these sectors, unrelated to income inequality. So that the source of the causes of growing up and down is not related to the occurrence of inequality in income distribution.

Furthermore, the causal relationship between economic growth and income distribution inequality in Java will be displayed below. Before carrying out a causality test to get the optimum lag with the smallest Akaike Info Criterion (AIC), a regression is carried out first with three-time lags. First lag, the results of the regression output are obtained as follows:

Table 9. The results of the regression of inequality and growth on the Java with the first lag

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.516781	0.066739	7.743318	0.0000
KTJ(-1)	-0.317934	0.171229	-1.856780	0.0726
PEJ(-1)	0.000191	0.001474	0.129273	0.8980
R-squared	0.098768	Mean dependent var		0.392229
Adjusted R-squared	0.042441	SD dependent var		0.024900
SE of regression	0.024366	Akaike info criterion		-4.509457
Sum squared resid	0.018998	Schwarz criterion		-4.376141
Likelihood logs	81.91550	Hannan Quinn Criter.		-4.463437
F-statistics	1.753469	Durbin-Watson stat		2.106891
Prob(F-statistic)	0.189404			

Source: Data Processed, 2022

Based on the results of the regression output in Table 4.9. The result is that the AIC value is -4.50, then the regression between inequality and growth is carried out again on the island of Sumatra using the second lag. Second lag, the results of the regression output can be seen in the following table:

Table 10. The results of the regression of inequality and growth on the Java with Second Lag

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.692885	0.117766	5.883572	0.0000
KTJ(-1)	-0.489250	0.181630	-2.693663	0.0116
PEJ(-1)	0.000225	0.001434	0.156624	0.8766
KTJ(-2)	-0.270048	0.177309	-1.523039	0.1386
PE(-2)	-0.001407	0.002259	-0.622665	0.5384
R-squared	0.210224	Mean dependent var		0.391235
Adjusted R-squared	0.101289	SD dependent var		0.024560
SE of regression	0.023283	Akaike info criterion		-4.547100
Sum squared resid	0.015721	Schwarz criterion		-4.322635
Likelihood logs	82.30070	Hannan Quinn Criter.		-4.470551
F-statistics	1.929817	Durbin-Watson stat		1.785124
Prob(F-statistic)	0.132152			

Source: Data Processed, 2022

Based on the results of the regression output in Table 4.10. The result is that the AIC value is -4.54, then the regression between inequality and growth is carried out again on the island of Sumatra using the third lag, to see the results of the regression using the third lag can be seen in the following table:

Table 11. The results of the regression of inequality and growth on the Java with Third Lag

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.449446	0.166264	2.703205	0.0119
KTJ(-1)	-0.435318	0.181663	-2.396298	0.0240
PEJ(-1)	-0.000289	0.001337	-0.216055	0.8306
KTJ(-2)	-0.142818	0.190766	-0.748658	0.4608
PE(-2)	-0.002840	0.002425	-1.170925	0.2522
KTJ(-3)	0.468181	0.178647	2.620704	0.0145
PE(-3)	-0.002559	0.002168	-1.180348	0.2485
R-squared	0.406958	Mean dependent var		0.391515
Adjusted R-squared	0.270102	SD dependent var		0.024886
SE of regression	0.021261	Akaike info criterion		-4.678031
Sum squared resid	0.011753	Schwarz criterion		-4.360590
Likelihood logs	84.18751	Hannan Quinn Criter.		-4.571222
F-statistics	2.973628	Durbin-Watson stat		2.283407
Prob(F-statistic)	0.023974			

Source: Data Processed, 2022

Based on the results of the regression output in Table 4.11. the result of the AIC value is -4.67, if looking at the overall regression results using the first lag, second lag, and third lag, the smallest AIC value is obtained during the third lag so that it is concluded for the Granger causality test using the third lag. In testing causality, determining the lag is the first thing to do. Of the three regressions performed, it turned out that in the third analysis, the smallest AIC value was found. Lag three shows a reduction in observations from 36 to 33. and the following results are obtained:

Table 12. The results of the causality test of inequality and growth on the island of Java

Null Hypothesis:	Obs	F-Statistics	Prob.
KTJ does not Granger Cause PEJ	33	0.57915	0.6339
PEJ does not Granger Cause KTJ		0.85794	0.4752

Source: Data Processed, 2022

Based on the data in Table 12. The relationship between inequality and growth results in no unidirectional or two-way relationship because the probability value is insignificant.

In the first row in Table 12, economic growth is insignificant in causing inequality. The statistical F value can be 0,57 with a probability level of 0,63. Meanwhile, in the second row, inequality is also insignificant in causing economic growth with a calculated F value of 0,85 and a probability of 0,47. So it can be concluded that there is no one-way or two-way relationship between economic growth and inequality on the island of Java.

Based on the study results showing a causal relationship between economic growth and inequality on the island of Java, the results were not significant, both unidirectional and bidirectional. This has similarities with the results obtained on provincial objects on the island of Sumatra. Several empirical studies have explained the difference in results in discussing growth and inequality. Some of them show that there is a significant effect or relationship between economic growth and income

inequality, while others show that there is no significant relationship.

The results of this study are similar to the previous study conducted by Nugroho (2014), which found the rejected hypothesis of the effect of economic growth and inequality between sub-districts in Brebes. The same thing was also found by Parkising, Nasir, and Nujum (2020), who did not find proof of the Kuznet curve in the province of South Sulawesi. Suryantini and ., (2022) also found the same thing in the case of the province of Bali, showing no relationship between growth and inequality in the province of Bali. While there are differences with other studies, Guiga and Rejeb (2012) also found that the relationship growth and inequality can be described from an inverted U-curve according to Kuznet's hypothesis. Ananda and Pulungan (2019) found a significant effect of economic growth on inequality. Sirtama (2021) found the same thing in West Nusa Tenggara, which stated the relationship growth and inequality has pattern similar to Kuznet curve

This empirical finding shows that the island of Java has similarities with the island of Sumatra, where the sources of economic growth on the island of Java do not show a relationship with income inequality. The island of Java is the center of the development of economic sectors and trade, so the source of growth comes from this sector.

Research by Sayed & Peng (2020) also shows the same thing when the long-term Kuznets curve is in the shape of the letter N. This is the case with Chang et al., (2021), their research did not show strong evidence in favor of the Kuznets inverted U-curve. Meanwhile, Keskin (2017) found a relationship between inequality and growth in developed and developing countries. Moreover, Baiardi et al., (2016) found the Kuznets curve following what was found in several countries.

CONCLUSION

Based on the study's results, the study's conclusions are as follows. First, in particular, the economic growth conditions of each province on the island of Sumatra fluctuate. The highest

average economic growth in South Sumatra is 3.35%, and the lowest is in Riau province, which is 1.04%. Inequality of income distribution through the province's Gini index on the island of Sumatra has fluctuated. The average inequality of income distribution through the Gini index is highest in South Sumatra and Bengkulu provinces, namely 0.346, and the lowest is in the province of Bangka Belitung Islands, which is 0.271.

Meanwhile, in Java, the growth fluctuated. On average, the highest economic growth in the province of Yogyakarta was 4.05%, and the lowest was in Central Java, which was 2.62%. Inequality in income distribution through the province's Gini index on the island of Java has fluctuated, the highest average Gini index number occurred in 2015 at 0.406, and the lowest occurred in 2019 at 0.383. On average, the inequality of income distribution through the Gini index is the highest in the province of Yogyakarta, namely 0.428, and the lowest is in the province of Central Java, which is 0.363. Second, based on the results of the Granger causality test, there is no unidirectional or bidirectional causality relationship between economic growth and income inequality both on the island of Sumatra and the island of Java.

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