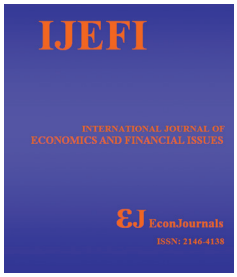

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Income Inequality in Indonesia: Before and during the Covid-19 Pandemic

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ABSTRACT

Growth and inequality are economic indicators that are strongly linked to the development process. Regional inequality has long been an issue in Indonesia. This study aims to analyze inequality and economic growth at the city/district level throughout Indonesia before and during the COVID-19 pandemic. It uses secondary data sourced from the Central Statistics Agency from 2017 to 2020. The analyzed Gross Regional Domestic Product (GRDP) and GRDP per capita data consist of 514 cities/districts and 34 provinces. The analytical method used is the Theil Index and Williamson Index (IW). The results revealed that the level of income inequality, calculated based on Theil's Index, was 0.258 in 2019. That value increased to 0.516 in 2020. From 2017 to 2020, the level of inequality in Indonesia increased, followed by inequality within the province itself (within-group), while inequality between provinces (between-group) tended to decrease. The contribution of inequality within the province (within-group) is 53–63% to the national Theil Index, the rest comes from inequality between groups (between provinces).

Keywords: Inequality, Economic growth, Williamson index, Theil index
JEL Classifications: O40, O11

1. INTRODUCTION

Growth and inequality are economic indicators that are strongly connected to the development process as they are used to assess the economic performance of a country or region. These indicators have long been debated in Indonesia. Economic growth is generally expressed by the national income or regional income referred to as Gross Domestic Product (GDP) and Gross Regional Domestic Product (GRDP). The higher the income level of the people in a country or region, the better their welfare. National income and per capita income are generally used indicators of community welfare (Arsyad, 2017).

Inequality between regions is one of the problems that often arise in economic development. Inequality is a consequence of changes in economic structure and the industrialization process, where investment by the private sector and the government, in terms of both infrastructure and institutions, tend to be concentrated in developed regions.

The Gini index is a commonly used measure of inequality (Bandyopadhyay, 2017 and Banerjee, 2010, Checchi, 2000). Its values range between 0 (perfect equality) to 1 (perfect inequality). Inequality in Indonesia has not changed much in the last 15 years, still in the range of 0.3–0.4 (moderate). Also, inequality in cities is higher than that in rural areas. Inequality between regions occurs due to differences in regional development (developing and lagging) such as in South Kalimantan and Central Kalimantan (Harris and Yunani, 2019). High inequality is in line with the severity of the poverty level as it tends to reduce people's welfare (Sodik et al., 2021, Yang and Qiu, 2016). Therefore, one of the solutions is education to get out of poverty (Todaro, 2003). Andiny & Mandasari (2017) stated that the poverty variable did not affect the inequality, especially in Aceh. Many factors influence the

inequality of income distribution in Indonesia, including economic growth, investment, and human development index (Febriyani and Anis, 2021), financial technology (Adiputra and Satria, 2021), decentralization policies (Santi and Iskandar, 2021; Pose and Tselios, 2009), and the level of open unemployment (Nabila and Laut, 2021) Figure 1.

According to Kuznets, income distribution will increase in line with economic growth. In the early stages of economic growth, income distribution tends to deteriorate or inequality is high. However, in later stages, things will improve. This hypothesis is known as Kuznets's "Inverted-U" hypothesis, according to a series of changes in the trend of income distribution with the size of the Gini coefficient and per capita GDP growth which will look like an inverted U-shaped curve (Todaro and Michael 2000).

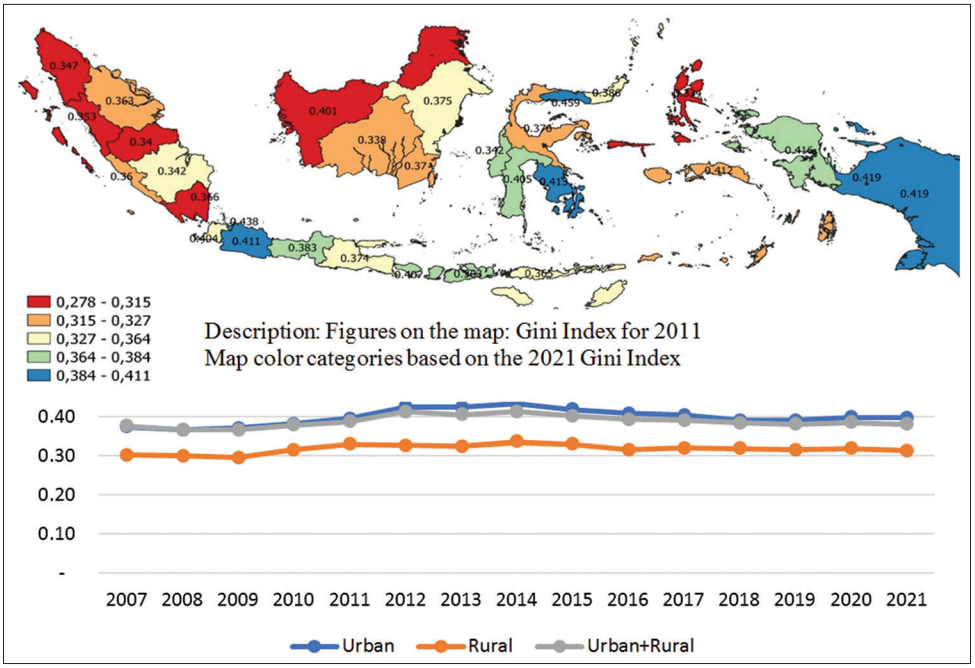
Figure 2 shows the rate of economic growth between provinces and GRDP per capita of each province in Indonesia. During the 2014–2020 period, there was an income inequality between provinces in Indonesia. The GRDP per capita value of around 70% of the provinces was still below the national GRDP per capita. Likewise, the pace of economic growth in 2020 showed a contraction due to the global Covid-19 pandemic.

The Covid-19 pandemic that began at the end of 2019 in Wuhan, China, then spread widely, began to be felt in Indonesia in 2020, affecting the economy as seen in the low growth rate and GRDP per capita at the City/District level in Indonesia. The majority of Cities/Districts in Indonesia have a low growth rate and average GRDP per capita, only a few areas have a high economic growth rate or a high GRDP per capita (Figure 3). This result shows that the economic growth of cities/districts in Indonesia has not been evenly distributed, indicating that inequality is still happening.

Investment, government spending, economic growth, and unemployment are factors affecting income inequality (Salim et al., 2020; Yang and Qiu, 2016). Apergis et al. (2011) stated that, in the short term, unemployment had a positive and significant impact on income inequality, while poverty had a positive and significant impact on income inequality, both in the short and long term. Likewise, globalization had a positive impact on income inequality and wage disparities (Heimberger, 2020; Petcu, 2014. Cysne and Turchick (2012); Lin, 2007) found that education, unemployment, and poverty are crucial in reducing income inequality. The minimum wage plays a significant role in increasing prices and the number of un- employed (Biçerli and Kocaman, 2019). According to Abdelbaki (2021), inequality in the income distribution causes education inequality between the income-classes which in turn increases income gap for the future generations.

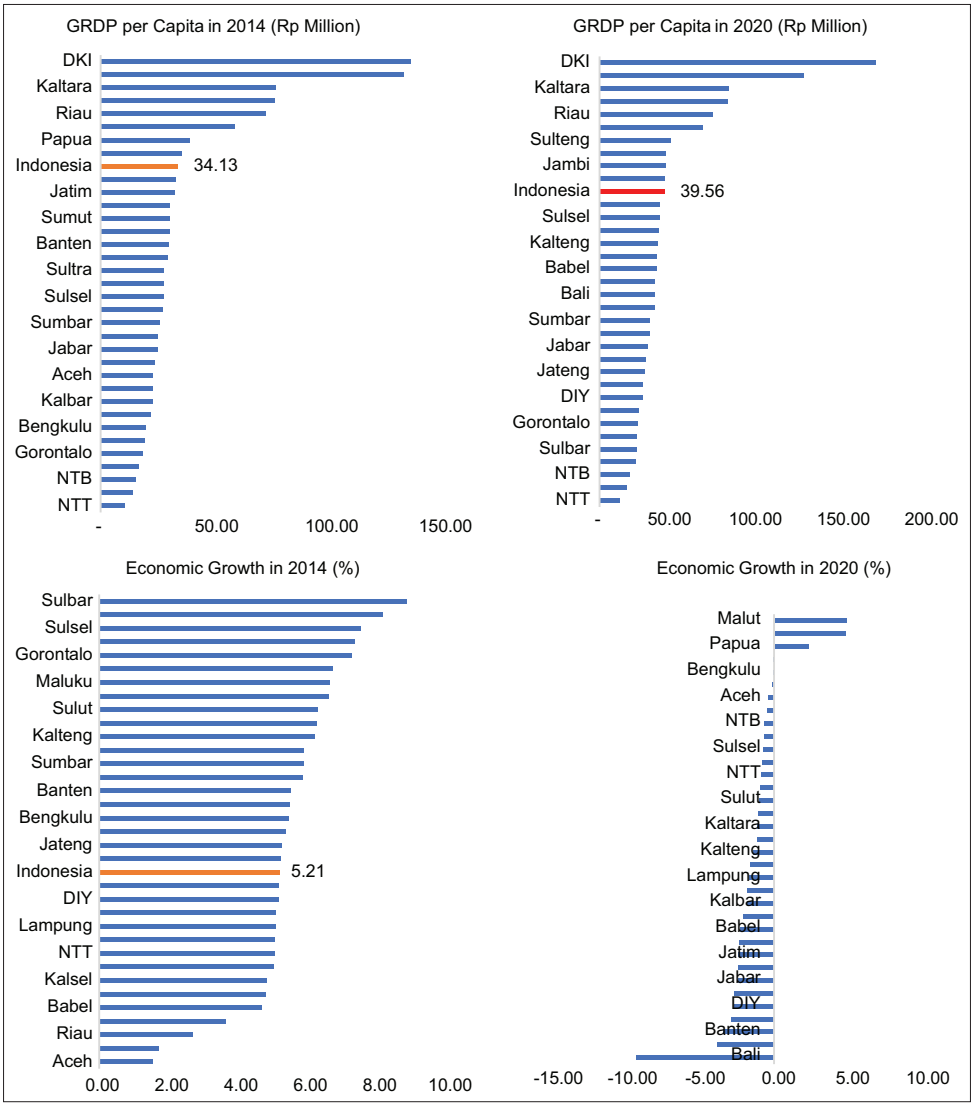
Another affecting the level of income inequality is education (Mincer, 1958; Becker, 1962; Tinbergen, 1972; Dabla-Norris et al, 2015). Shahpari and Davoudi (2013) mentioned that the addition of human capital (the average level of school labor) can make income distribution even in the long term. Meisami (2010) stated that educational status would reduce income inequality. The existence of limited education will hinder the opportunity to earn a higher income (Sanz et al., 2017). Therefore, the government always tries to invest in education. Government spending on education is at least 20% of the national budget. According to Becker and Chiswick (1966); Mincer, 1970, investment in education is effective in balancing income distribution. Education provides increased social and personal income by increasing skill levels, and thereby reducing income inequality. Danim (2004) stated that there are three reasons for investment in education and the relationship between education and income inequality. First, investment in education can increase income productivity in agriculture and help absorb labor into a modern industry.

Figure 1: Gini Index of Indonesian Provinces in Indonesia



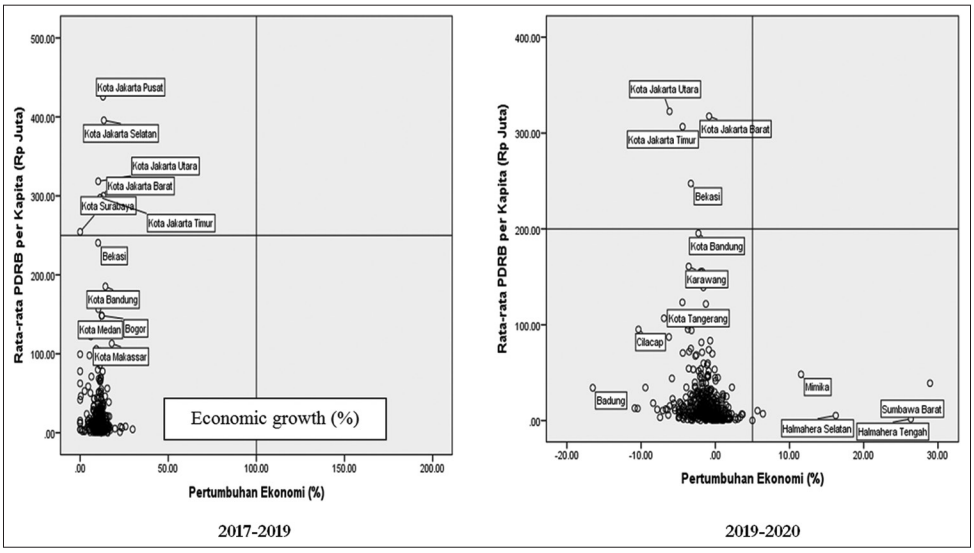
Source: BPS (2021)

Figure 2: GRDP of Provinces in Indonesia Based on 2010 Constant Prices



Source: BPS (2021)

Figure 3: Economic Growth Rate and GRDP per Capita City/District in Indonesia



Source: BPS (2021)

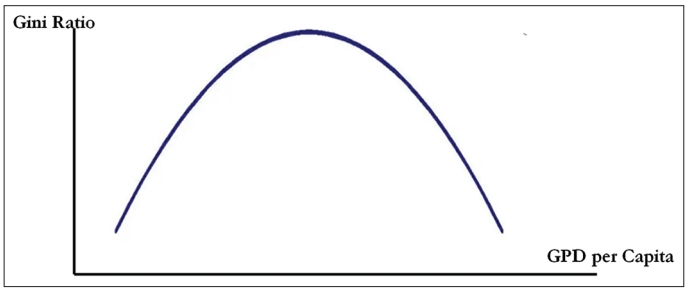
Second, it helps reduce income inequality. Third, the distribution of educational opportunities can be used as a means of income redistribution.

Previous studies discussed inequality, economic growth, technology, and education levels at the city/district level separately. The contribution of this research is to analyze inequality and economic growth at the city/district level throughout Indonesia before and during the COVID-19 pandemic.

2. LITERATURE REVIEW

Income inequality shows that there are differences in income, level of prosperity, and people's living standards so that it can lead to unequal distribution of income between regions, showing the relationship between the inequality index and economic growth (GDP) using the "Inverted U" Kuznets curve (Figure 3). The hypothesis states that in the early stages of growth inequality worsens and in later stages of growth inequality decreases. In the early stages, growth will be centered on the modern sector. At this stage, employment is limited but labor wages and productivity are high.

Figure 4: Kuznets "Inverted U" Hypothesis



Source: Todaro and Stephen (2003)

Some of the indicators used to measure inequality are the Gini Ratio, Williamson's Index (WI), Klassen's Typology, and Theil's Entropy Index. According to Banerjee (2010) and Bandyopadhyay (2017), the Gini index has been widely used as a measure of inequality and inequality trends. Another commonly used index is the Theil's Entropy (Theil's Index). According to Kuncoro (2001), Theil's Entropy concept of distribution is an application of the concept of information theory in measuring economic inequality and industrial concentration. The data needed in the Theil Index analysis is the GRDP per capita and the total population for each region (Figure 4). The advantages of Theil's Index as a tool for measuring inequality are namely: (1) It allows to make comparisons over a certain time to analyze trends in geographic concentration over a certain period; (2) Provides a detailed comparison of smaller geographic sub-units or can calculate inequality within regions and between regions at once, so that the scope of analysis becomes wider, (3) Can calculate the contribution of each region to the overall regional development inequality so that it can provide a fairly important policy, and (4) Allows to analyze changes in the pattern of industrial location and suburbanization (Sjafrizal, 2012). However, this index also has the disadvantage as it cannot evaluate the contribution of other factors such as education, race, and indigenous people to inequality as a whole. Besides, it cannot provide a clear qualification on the causes of the inequality caused by the correlation between the decomposition principles.

The result from some previous research shows that population, economic growth, Labor Force Participation Rate, and Human Development Index are factors that influence inequality (Pamiati and Woyanti (2021); Rahmawati and Yuniarti (2020). Senol and Orhan (2021) analyzed inequality among OECD countries including Indonesia. The results show that an increase in the ratio of government education spending to GDP and health spending

Figure 5: Distribution of GRDP by Island in 2017 and 2020

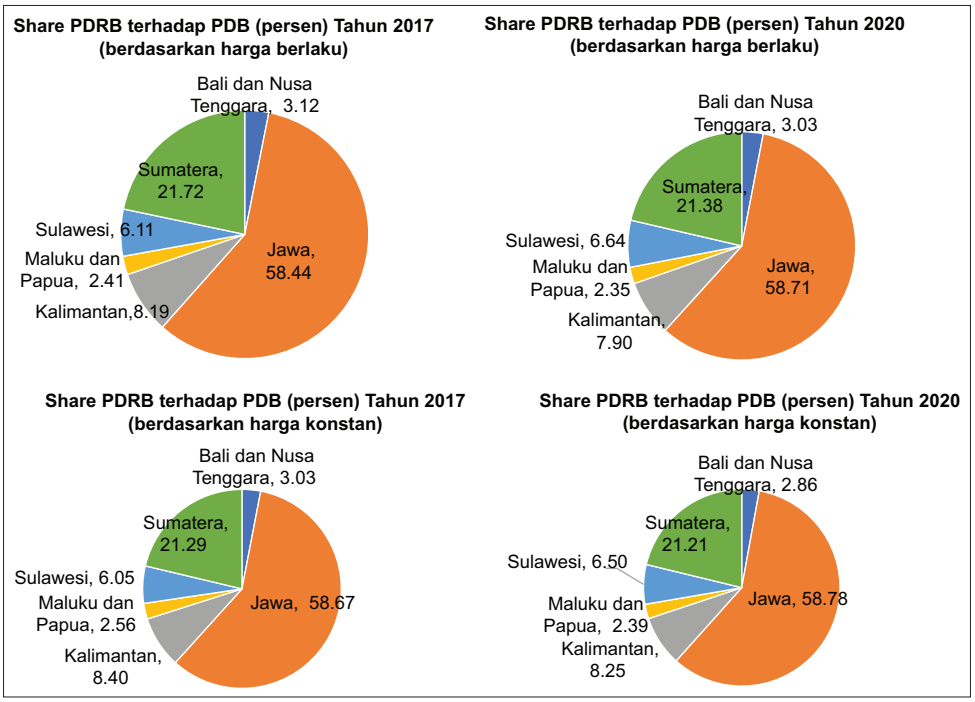


Figure 6: Hierarchical structure: Regional-Province-District

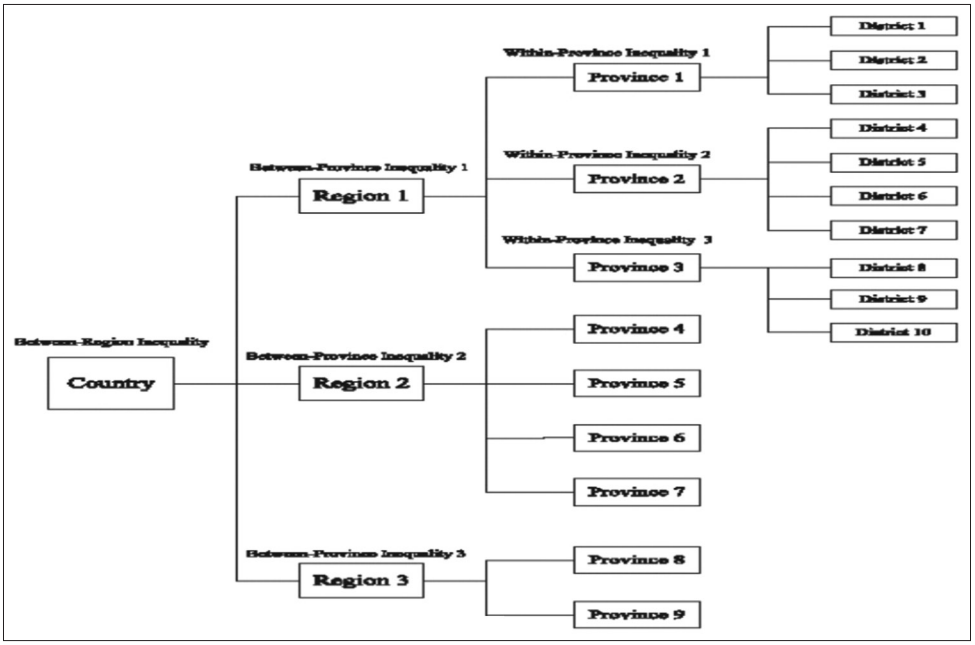
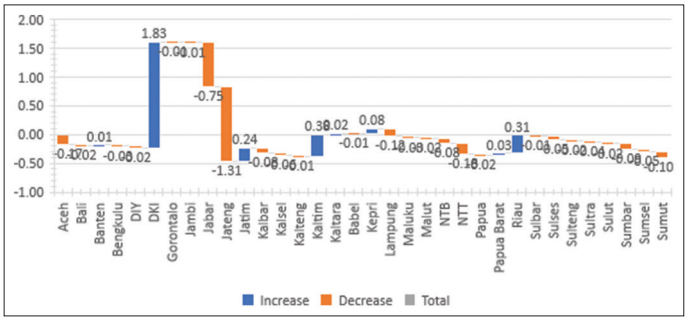


Figure 7: Theil Index at Provincial Level 2020



to GDP contributes to reducing inequality in income distribution, while an increase in the unemployment rate increases income inequality.

Qureshi's research (2021) states that digital technology will increase production and can be used as a stronger and more inclusive growth driver in economic prosperity. Technological advances increase inequality directly through land-biased technological changes and indirectly through increased population growth (Jakob and Strulik, 2020).

Harmadi and Adji (2020) found that after regional autonomy, the disparity of income per capita between provinces in Indonesia became clearer. The disparity of income per capita between districts/cities has increased nationally, while it varied intra-provincially, some have increased, some have decreased, and some have remained constant before and after regional autonomy. Bouincha and Karim (2018) found that growth can reduce inequality if a country has reached an advanced level of development. The unemployment rate, central government debt, rural population, population density, and the ratio of spending on health and education are factors that determine inequality. Meanwhile, Lee et al. (2020) stated that globalization worsens the distribution of income, economic and financial stability can reduce these adverse effects. Besides, low-income countries generally have higher inequality due to globalization.

Liao and Wei (2016) found that regional inequality in China does not show a divergent, convergent, or inverted U pattern. Regional inequality is sensitive to geographic scale. Regional inequalities between provinces are highly volatile. Inequality between East, West, and Central regions continues to increase, but disparities between regions and between provinces have decreased since the 2008 global economic crisis. Another finding is that regional inequality is influenced by decentralization, marketization, and globalization. Meanwhile, the findings in Peru show that with the Gini coefficient, all geographic regions in Peru experienced a decrease in inequality between 2007 and 2017. The results from Theil Index show that aggregate inequality is explained by inequality within regions. Labor income, the number of adults, and monetary policy in the form of public transfers are drivers of inequality reduction (Castillo, 2020). Akita and Kataoka (2003), in their research in Japan after the world war, found that regional inequality peaked in 1958 at 0.58, then decreased and reached its lowest point (0.25) in 1979. After 1979, it increased again and reached its peak in 1979. 1990 was 0.37, and after 1990 it decreased again.

3. METHODS

The data used are secondary data sourced from the Central Statistics Agency (BPS) from 2017 to 2020. The analyzed GRDP and GRDP per capita data consisted of 514 districts/cities and 34 provinces (Figure 5). The analytical methods used are Theil's Index and IW. The Theil index consists of 2 types of Theil indexes, T and L, which measure the income gap per capita in the distribution of households because this index compares the share of income and population for all households. The difference is that Theil T uses the share of

Table 1: The gap in GRDP Per capita from 2017 to 2020

Gap Types	2017	2018	2019	2020
T-within prov	1.201	1.242	1.267	1.180
T-between prov	–1.058	–1.073	–1.009	–0.664
Total	0.143	0.168	0.258	0.516
T-within prov (%)	53.168	53.632	55.673	63.990
T-between prov (%)	46.832	46.368	44.327	36.010

GRDP: Gross Regional Domestic Product

income as a weight, while Theil L uses the share of the population. If the Theil index is close to 1, then the inequality is getting bigger and if the Theil index is close to 0 then the inequality is getting smaller or more even. This study only calculates inequality from the Theil T Index and calculates inequality between groups (Between Group Inequality) and inequality within the region (Within Group Inequality). This method was used by Bappenas (2011) to analyze regional disparities in Indonesia and provide information on the development of regional development outcomes.

$$T = \sum_i \left(\frac{Y_i}{Y}\right) T_i + \sum_i \left(\frac{Y_i}{Y}\right) \ln\left(\frac{\overline{Y}_i}{\overline{Y}}\right) = T_W + T_B \quad (1)$$

$$T_i = \sum_i \left(\frac{Y_{ij}}{Y_i}\right) \ln\left(\frac{\overline{Y}_{ij}}{\overline{Y}_i}\right) \quad (2)$$

Where:
T= Theil Entropy Index (Total Inequality)
T_W= Inequality within groups (within province)
T_B= Inequality between groups (between provinces)
Y_{ij}= City/district GRDP
Y_i= Provincial GDP
Y= Indonesia's GDP
$\overline{Y}_{ij}$= GRDP per capita city/district
$\overline{Y}_i$= Provincial GDP per capita
$\overline{Y}$= Indonesia's GDP per capita
j= city/district
i= province

The IW is used to measure the level of economic disparity between regions. The basis for the calculation is to use the GRDP per capita about the total population per region using the formula.

$$IW = \frac{\sqrt{\sum_i (Y_i - Y)^2 (f_i / n)}}{\overline{Y}}$$

Where:
IW: Williamson Index
$Y_{i:}$ GRDP Per capita per District/City
Y: GRDP Per capita Province
Fi: Total Population of each District/City in the Province
n: Population of City/District in Province

The WI is the coefficient of variation of the average distribution value calculated based on estimates of the GRDP values and the population of areas that are within the scope of the area studied and analyzed,

Table 2: Theil index of GRDP per capita (ADHB) by Island in 2017-2020

Islands	Indicators	2017	2018	2019	2020
Bali and Nusa Tenggara	T-within prov	–0.008	–0.008	–0.008	–0.007
	T-between island	–0.252	–0.254	–0.248	–0.237
Java	T-within prov	1.204	1.237	1.255	1.165
	T-between island	–1.106	–1.082	–0.890	–0.652
Kalimantan	T-within prov	–0.026	–0.025	–0.023	–0.022
	T-between island	0.437	0.415	0.369	0.310
Maluku and Papua	T-within prov	–0.005	–0.005	–0.005	–0.005
	T-between island	0.032	0.041	–0.035	–0.007
Sulawesi	T-within prov	–0.001	0.000	0.001	0.001
	T-between island	–0.156	–0.124	–0.092	–0.041
Sumatra	T-within prov	0.037	0.042	0.047	0.047
	T-between island	–0.014	–0.069	–0.113	–0.038
National	T-within prov	1.201	1.242	1.267	1.180
	T-between island	–1.058	–1.073	–1.009	–0.664
Total		0.143	0.168	0.258	0.516

GRDP: Gross Regional Domestic Product

the City/District area at the provincial level. This WI formula will produce an index number that is greater than or equal to zero and less than one. The IW assessment criteria are IW=1, meaning regional development is very uneven (perfect gap), IW=0, meaning regional development is well evenly distributed, IW~0, meaning regional development is getting closer to even and IW~1, meaning that regional development of the area is getting increasingly unequal.

4. RESULTS AND DISCUSSION

Until 2020, Indonesia's economy was still dominated by Java (58%), and the rest was spread over Sumatra (21%), Kalimantan (8%), and other regions (Figure 6). Java is central for social and economic activities. The ability of Java Island to dominate the economy is because the majority of the processing industry is still located on the island of Java. Meanwhile, other potentials in Sulawesi, Kalimantan, and Papua are still low. Whereas the availability of abundant raw materials in Sumatra and Kalimantan should encourage the industrial sector to grow and develop in the two islands. The lack of development of the processing industry outside Java is the limited support for existing facilities and infrastructure in the area.

Based on the analysis of the Theil Index, during the 2017-2020 period, the level of inequality in Indonesia has increased, followed by inequality within the province itself (within-group). Meanwhile, the inequality between provinces (between-group) tended to decrease (Table 1). The contribution of inequality within the province (within-group) was 53%-63% to the national Theil Index and the rest was contributed by inequality between groups. The growth of each province was more evenly distributed, both in Java and outside Java. This condition was due to the many programs carried out by the government, especially for areas outside Java, including transportation infrastructures development programs such as toll roads and ports, various areas such as Industrial Estates (IE), and Special Economic Zones (SEZ).

The level of income inequality by island, calculated based on Theil's Index, was 0.258 in 2019 (Table 2). It increased rapidly to

Table 3: Williamson Index (IW) and Theil Index by Province

Provinces	IW intra 2017	IW intra 2020	Tw 2017	Tw 2020	Tb 2017	Tb 2020
Aceh	4.840	4.848	0.000	0.000	–0.160	–0.150
Bali	4.290	3.943	0.000	0.000	–0.010	–0.010
Banten	3.630	3.386	0.070	0.060	–0.050	–0.060
Bengkulu	6.230	6.457	0.000	0.000	–0.020	–0.020
DI Yogyakarta	2.400	2.408	0.000	0.000	–0.020	–0.020
DKI Jakarta	3.700	4.136	0.260	0.260	1.660	1.580
Gorontalo	2.530	2.615	0.000	0.000	–0.010	–0.010
Jambi	3.820	4.011	–0.010	0.000	0.010	0.000
West Java	10.310	10.382	0.520	0.510	–1.270	–1.080
Central Java	9.010	9.117	0.050	0.040	–1.350	–1.140
East Java	25.670	26.156	0.310	0.290	–0.080	0.070
West Kalimantan	4.170	4.115	0.000	0.000	–0.070	–0.060
South Kalimantan	3.400	3.530	0.000	0.000	–0.050	–0.050
Central Kalimantan	4.620	4.759	0.000	0.000	–0.010	0.000
East Kalimantan	11.160	10.921	–0.010	–0.010	0.540	0.390
North Kalimantan	11.710	11.902	0.000	0.000	0.020	0.030
Bangka Belitung Island	1.550	1.602	0.000	0.000	0.000	0.000
Riau Island	22.060	23.208	0.000	0.000	0.090	0.080
Lampung	5.780	5.996	0.000	0.000	–0.120	–0.100
Maluku	6.470	6.618	0.000	0.000	–0.030	–0.030
North Maluku	4.210	4.504	0.000	0.000	–0.020	–0.010
West Nusa Tenggara	2.500	1.939	0.000	0.000	–0.070	–0.070
East Nusa Tenggara	7.010	7.234	0.000	0.000	–0.170	–0.160
Papua	55.900	38.332	0.000	0.000	0.050	0.010
West Papua	22.290	23.150	0.000	0.000	0.030	0.030
Riau	4.610	3.979	–0.010	–0.010	0.480	0.320
West Sulawesi	2.530	2.601	0.000	0.000	–0.010	–0.010
South Sulawesi	26.300	28.775	0.010	0.010	–0.060	–0.010
Central Sulawesi	4.340	12.541	0.000	0.000	–0.020	0.020
Southeast Sulawesi	8.030	7.931	0.000	0.000	–0.030	–0.030
North Sulawesi	10.420	10.526	0.000	0.000	–0.020	–0.010
West Sumatera	10.540	11.041	0.000	0.000	–0.080	–0.070
South Sumatera	15.920	16.699	0.010	0.010	–0.060	–0.030
North Sumatera	27.320	28.090	0.050	0.050	–0.140	–0.050

0.516 in 2020. The condition of inequality in Indonesia before the COVID-19 pandemic and during the pandemic was still the same, the contribution of inequality was dominated by Java Island and Sumatra Island (within the province), while inter-island inequality was contributed by Kalimantan Island and Sulawesi Island. This result showed that the source of inequality was between cities/districts within one province (Table 3). Meanwhile, inter-island inequality began to decline during this period.

Based on the analysis of the IW, the nine provinces with the highest inequality were Papua, South Sulawesi, North Sumatra, East Java, Riau Islands, West Papua, South Sumatra, Central Sulawesi, North Kalimantan, and West Sumatra. Meanwhile, according to the Theil Index, provinces that had a major contribution to the occurrence of inequality between provinces were DKI Jakarta, East Kalimantan, and Riau. The biggest contribution that drove inequality within the province was the provinces of DKI Jakarta, West Java, and East Java.

During the pandemic in 2020, there was an increase in inequality in almost all provinces in Indonesia (compared to 2017) except for the provinces of Papua and Banten as seen from the IW and Theil Index (T). In 2020, Theil Index in DKI Jakarta was 1.83, followed by East Kalimantan (0.36), Riau (0.31), and East Java (0.24). The four provinces contributed greatly to Indonesia's inequality in 2020 (Figure 7). Other provinces that also contributed, although relatively small proportion, were Riau island, West Papua, North Kalimantan, Central Sulawesi, Papua, Banten, North Sumatra, South Sulawesi, Central Kalimantan, Bangka Belitung island, and Jambi.

During the pandemic, the government has provided various forms and mechanisms including basic food assistance, cash social assistance, government village fund, electricity subsidies, pre-employment cards, private employee salary subsidies, and micro and small business to reduce the economic impact felt by the community. Social assistance is one of the government's strategies in alleviating poverty and reducing inequality. The results of the research by Firmansyah and Solikin (2019) found that social assistance in Indonesia has a positive impact on poverty alleviation and inequality reduction which is progressive. However, further improvements are needed to address the leakage in the distribution of social assistance. According to Suryahadi et al. (2018), to reduce inequality, the government cannot only rely on social assistance. Another important factor for reducing inequality is increasing resources and encouraging leading sectors in the region to optimize productivity and contribute to GRDP to reduce regional income (Rahmawati and Yuniarti, 2020). According to Jamaludin et al. (2020), the existence of development funds or assistance is needed to reduce income inequality. And then, the increases in the ratio of government education expenditures to GDP and health expenditures to GDP also can reduce inequality in income distribution (Mughal and Diawara, 2011).

5. CONCLUSION

The level of income inequality calculated based on Theil's Index was 0.258 in 2019, which increased to 0.516 in 2020. From 2017 to 2020, the level of inequality in Indonesia increased, followed by inequality within the province itself (within-group). Meanwhile, inequality between provinces (between-group) tended to decrease. The economic equity must start at the sub-district level through an agglomeration system, regional spatial planning so that all regions have their superior sectors, i.e., primary, secondary, and the service sector.

So, our recommendation to reduce inequality is to increase access to education and health so that people can continue their education to a higher level, which will improve the quality of human resources and increase productivity. For further research, they can include the size of the education budget at the city/district level and income inequality calculated at the household level. Furthermore, it is crucial to research the impact of providing social assistance through a government program such as Social Assistance (Bansos), Family Hope Program (PKH), Non-Cash Food Assistance (Sembako Assistance), and Cash Social Assistance to determine its effectiveness.

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