

Analysis of Factors Affecting Inter-Provincial Inequality in Java

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ABSTRACT

This study aims to determine the characteristics of all variables during the observation period, and determine the effect of all independent variables on the level of interprovincial inequality in Java through the panel data analysis method. This study uses the Williamson Index as a parameter of interprovincial inequality. The research observed on how per capita income, population, investment, open unemployment rate, and the Human Development Index (HDI) affect the level of interprovincial inequality in Java during 2010 – 2021. The results of the study show that during 2010 – 2021 the level of interprovincial inequality in Java tends to increase significantly. Judging from the level of inequality, sequentially there are 3 provinces in Java that have the highest level of inequality, namely DKI Jakarta, Central Java and West Java. On the other hand, partially the level of per capita income, population, open unemployment rate, and HDI have a significant effect on the level of interprovincial inequality in Java, but the level of investment has no significant effect on interprovincial inequality. It was also found that partially per capita income and HDI were the two variables that most influenced the level of interprovincial inequality in Java.

Keywords: Inequality, Williamson Index, Panel Data.

JEL Classification: D63, J11, O

INTRODUCTION

Ideally, the process of economic development is directed at achieving a higher level of social welfare that contains economic justice for society. Meanwhile, in the reality every process of economic development of a country often faces various problems. Economic disparities or economic inequality have become a common phenomenon that often occurs in every developing country (Rejeb & Guiga, 2012). Economic inequality refers to disparities among individuals' incomes and wealth (Klasen, 2016). Economic disparities occur when there is inequality in the distribution of a country's income and wealth. This disparity is generally related to social and economic injustice between groups in society. Economic disparities can occur between low, middle, and high-income groups. Economic disparities are also related to people's opportunities, access and attitudes towards managing a country's economic resources (Bathelt et al., 2024; Djulius et al., 2019, 2022). Differences in demographic conditions and the content of natural resources in each region have created disparities between regions. This resulted in differences in the ability of regions to promote economic growth and development. Therefore, the existence of developed regions and underdeveloped regions in a region is something that we usually find (Alvaredo & Gasparini, 2015).

Per capita income has become a benchmark for the prosperity of a country/region. The per capita income of a country/ region in a particular year is measured by dividing the GDP of a country/ region by its population at that time (Utama, 2013). Variations in the amount of per capita income in each region cause economic inequality between regions. The Kuznets curve is a hypothetical curve from Simon Kuznet (1901-1985) which describes the relationship between economic inequality and per capita income during economic development. This curve illustrates Simon Kuznets' hypothesis about the behavior and relationship of per capita income and economic inequality (Katamso SA & Amir, 2018). The Kuznets Curve implies that the industrialization process of a region results in a large rural-urban income gap, and the rural population decreases as the urban population increases. According to Kuznets' hypothesis, economic inequality decreases if society's welfare increases. At this point in society's economic development, people experience the benefits of the trickled down effect and an increase in per capita income which effectively reduces economic inequality (Harry et al., 2020).

Population is a demographic variable and is a production factor that has high mobility. They can move or migrate to other areas if there are push factors and pull factors. The migration model from Harris - Todaro explains that: high wage levels and a more modern lifestyle in urban areas can be a pull factor for migration, while the push factor is low wage levels in the area of origin (Kataoka, 2010). The Harris-Todaro model, named after John R Harris and Michael Todaro, is an economic model developed in 1970 and used in development economics and welfare economics to explain some of the issues concerning rural-urban migration. The model states that the increasing

population in urban areas causes changes in employment conditions in the region. Changes in the number of labor forces as a production factor in urban areas can change the amount of output produced. The model states that the increasing population in urban areas causes changes in employment conditions in the region. Changes in the number of labor forces as a production factor in urban areas can change the amount of output produced. According to the Harris-Todaro model it can be concluded that variations in population between regions have an impact on economic inequality between regions (Hill, 2021; Kurniawan et al., 2023; Nurhayati et al., 2023; Rostiana & Djulius, 2019; Setiawan et al., 2021).

The distribution of investment in a region is a factor causing economic inequality between regions. Investment coming to a region tends to increase the total output of that region, because basically investment activities are aimed at increasing the capacity to produce an output (Hidayat et al., 2018). The process of accelerating economic development in a region is usually caused by the high absorption capacity of a region for new investment arrivals. The economic development of a region will attract many investors to invest in the region, so that investment will have a positive influence on the output produced by that region. Therefore, the difference in the amount of investment that comes to a region is a determining factor in the occurrence of economic inequality between regions. The existence of open unemployment in an area indicates that there are production activities that do not work holistically to support the development process. Open unemployment is caused by an excess supply of labor in the labor market. The emergence of unemployment in an area indicates that the economy is running inefficiently due to low labor force participation in the economy. Low labor force participation in a region reduces the level of social welfare, hampers the development process, and increases income inequality. If left unchecked, open unemployment will worsen inequality between regions in a country.

The existence of open unemployment in an area indicates that there are production activities that do not work holistically to support the development process. Open unemployment is caused by an excess supply of labor in the labor market (Nasiruddin & Arif, 2023). The emergence of unemployment in an area indicates that the economy is running inefficiently due to low labor force participation in the economy. Low labor force participation in a region reduces the level of social welfare, hampers the development process, and increases income inequality. If left unchecked, open unemployment will worsen inequality between regions in a country.

Human resources are the most important economic resource among other economic resources, because they are in charge of managing or allocating other resources, including managing human resources. Good output is produced by good quality human resources (Ramadhan et al., 2024). Differences in the quality of human resources in each region are very likely to be the cause of economic disparities between regions. The quality of human resources is reflected by the size of the HDI (Human Development Index). Since 1990 the UNDP (United Nations Development

Program) agency has determined HDI as a measure of the quality of human resources in economic development activities. Basically, HDI is a composite indicator to measure development achievements in the quality of human life. Good development quality will be created by the work of human resources who have a good HDI as well. The difference in the HDI of each region causes differences in labor productivity in creating output. HDI consists of three fundamental components: life expectancy in the health sector, average and estimated years of schooling in the education sector, and a decent standard of living. Therefore, it is very possible that the difference in HDI is a determining factor in the occurrence of economic disparities between regions (Panzera & Postiglione, 2022).

Java is a special island for Indonesia. Java has become a destination for people to work and live, so that by 2022 the total population of Indonesia will live in Java as much as 64.26%. Java has become a concentrated area of economic activity in Indonesia and a destination for investment activities. BPS (Central Statistics Agency) reports that in 2022 the spatial structure of the Indonesian economy will be dominated by Java, which contributes 56.48 percent to Gross Domestic Product (GDP). Meanwhile, based on the amount of capital invested, according to the Investment Coordinating Board (BKPM) report, the realization of Domestic Investment (PMDN) and Foreign Investment (PMA) in Java in 2022 is 47.34% compared to the realization of total investment in Indonesia.

There are 6 provinces on Java, namely: DKI Jakarta, West Java, Central Java, Yogyakarta, East Java and Banten. Each province on the island of Java has different economic conditions and demographic conditions, so there is the possibility of differences in economic inequality between regions in Java. The researchers aim to explain both in demography side and economic side of interprovincial inequality.

METHOD

This research uses secondary data obtained from BPS, BKPM, and other trusted institutions. The data is GDP per capita, population, investment, open unemployment, and human development index (HDI).

The interregional economic inequality variable is in the form of the Williamson Index, with the following formula:

$$IW = \frac{\sqrt{\sum(Y_i - Y)^2 F_i / n}}{Y} \dots \dots \dots (1)$$

Where:

IW = Williamson Index

Y_i = GRDP per capita provence

Y = GDP per capita of Java

F_i = Population of province

n = Total population of Java

The research method used is a quantitative research method using the panel data regression method, namely a regression method that combines time series and cross section data.

The regression model estimation process uses pooling least squares (Common Effect), a fixed effects approach (Fixed Effect Model) and a random effects approach (Random Effect Model). The selection of the regression model uses: The Chow Test, Hausman Test, and Lagrange Multiplier Test. The Chow test is carried out to determine between the Common Effect or Fixed Effect model. The Hausman test is used to select Common Effect or Fixed Effect model. Meanwhile, the Lagrange Multiplier Test is carried out to determine the Common Effect or Random Effect model (Gujarati, 2021; Manik et al., 2023; Wooldridge, 2002). The regression model used is as follows:

$$INQ_{it} = \beta_0 + \beta_1 GDPC_{it} + \beta_2 POP_{it} + \beta_3 INV_{it} + \beta_4 UNEMP_{it} + \beta_5 HDI_{it} + \varepsilon_{it} \dots \dots (2)$$

Where:

Y = Inequality between regions

X1 = Gross Regional Domestic Product per capita

X2 = Population

X3 = Investment

X4 = Open Unemployment Rate

X5 = Human Development Index

β_0 = Constant

ε = Error

i = Provinces in Java

t = Time period (2010-2021)

Based on the independent and dependent variables that have been formulated, here is the operational definition of the variable:

Table 1. Operational Variable

Variable Code	Variable Name	Opreational Variable Definition	Unit
INQ	Inequality between regions	Inequality between regions is a difference in the standards of living and opportunities for work between regions. the Williamson Index is used in economics to assess differences in the level of income per capita of each region.	Williamson index
GDPC	GRDP per capita	the amount of added value produced by all business units in an area or the total value of final goods and services produced by all economic units.	Million Rp.

Variable Code	Variable Name	Opreational Variable Definition	Unit
POP	Population	the number of individuals present in a subjectively designated geographic range.	People
INV	Investment	<i>the amount spent by a business on capital assets</i>	Billion Rp.
UNEMP	Open Unemployment Rate	An indicator used to measure the workforce that is not absorbed by the labor market and depicts the underutilization of the labor supply.	Percentage (%)
HDI	Human Development Index	<i>a statistical composite index of life expectancy, education and per capita income indicators</i>	Index

RESULT

Before discussing the research results, first discuss the characteristics of each variable used in this research, namely economic inequality, Gross Domestic Regional Product per capita, population, investment, Open Unemployment Rate, and Human Development Index.

This research uses the Williamson index as a parameter of economic inequality. Observation results show that economic inequality in Java tends to increase from 2010 to 2021. As can be seen in Figure 1 below, the Williamson index in Java tends to increase from 0.60 in 2010 to 0.67 in 2021. This illustrates that economic inequality in Java tends to increase from 2010 – 2021.

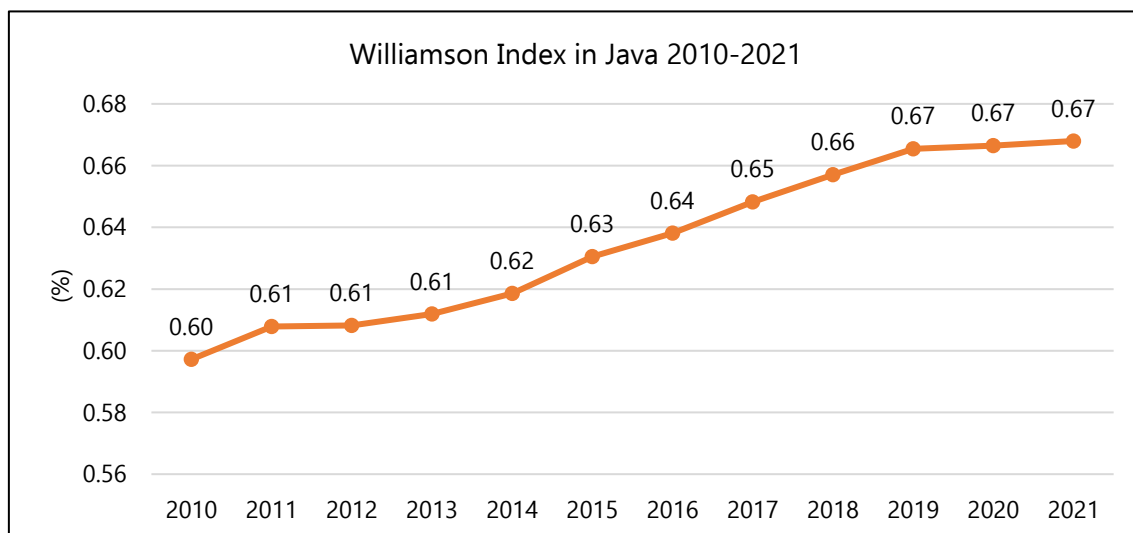


Figure 1. Williamson Index in Java

Regional per capita income or GRDP per capita of all provinces in Java from 2010 to 2021 can be seen in figure 2. From this figure, it can be seen that the GRDP per capita of all provinces in Java tends to increase. It can also be seen that from 2010 to 2021

DKI Jakarta Province is the province with the highest GRDP per capita among other provinces in Java. The GRDP per capita of provinces outside DKI Jakarta appears to have an increasing trend even though there are differences in the size of GRDP per capita.

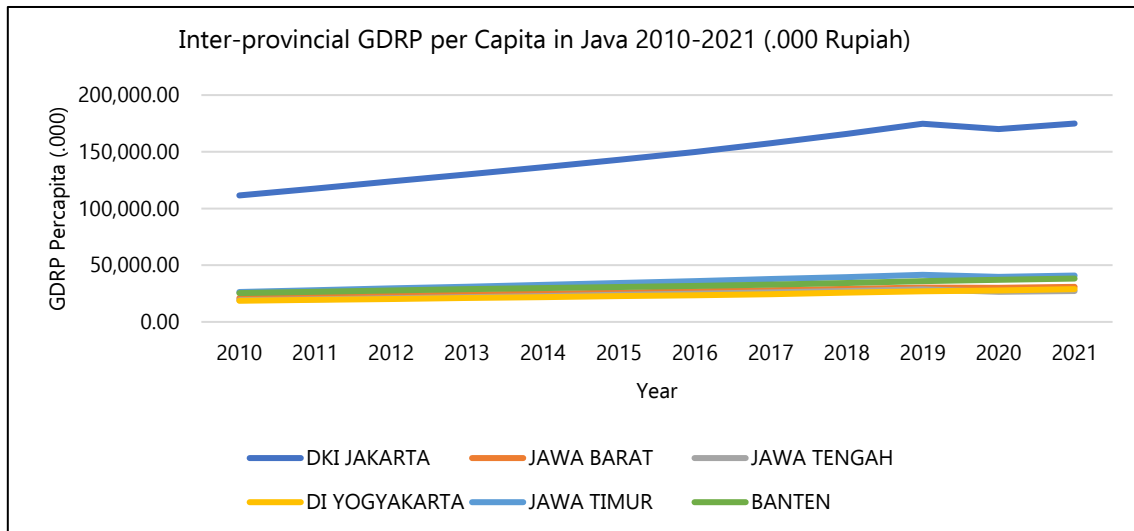


Figure 2. GDRP Per Capita in Java

From figure 3 during 2010 – 2021 the population of each province in Java varies and tends to increase. The largest population in Java is West Java Province, next is DKI Jakarta Province. The smallest population in Java is Yogyakarta Province.

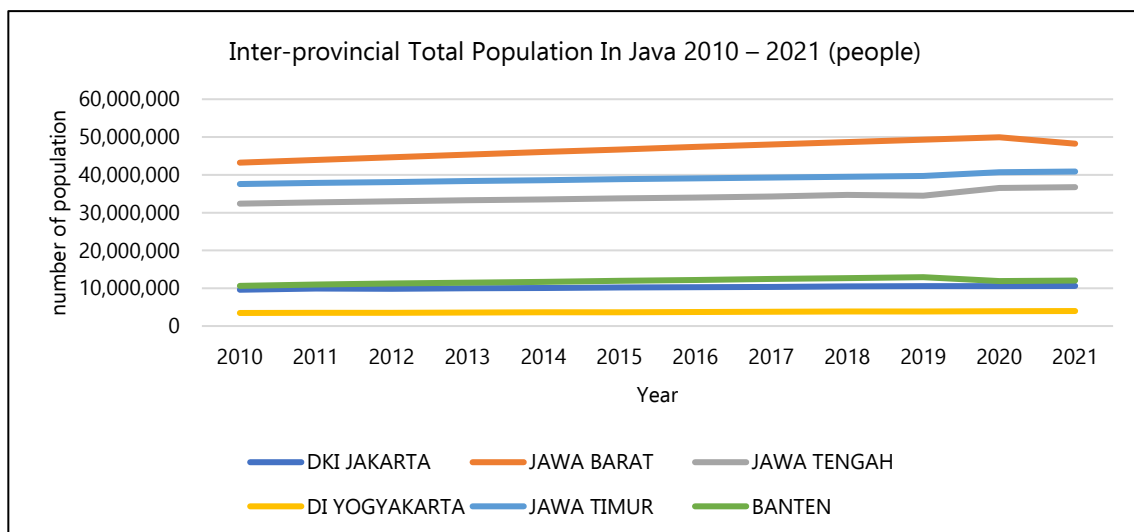


Figure 3. Population in Java

Inter-provincial investment movements in Java in 2010 - 2021 have fluctuated but have shown a positive trend since 2012. In Figure 4, it can be seen that the largest amount of investment in Java is in West Java Province, then East Java Province. The lowest amount of investment in Java during 2010 - 2021 was in the province of Yogyakarta with the amount of investment tending to be constant.

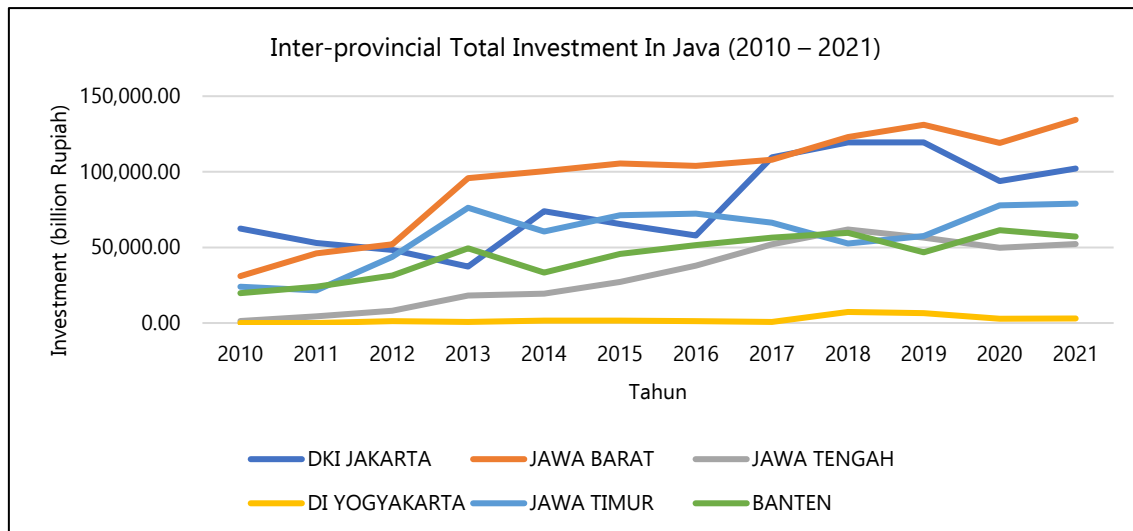


Figure 4. Investment in Java

From figure 5 it can be seen that during the period 2010 – 2021, the rate of open unemployment on Java varied. The highest open unemployment rate in Java is Banten Province, then West Java Province and DKI Jakarta Province. The lowest open unemployment rate in Java during the period 2010 – 2021 was Yogyakarta Province.

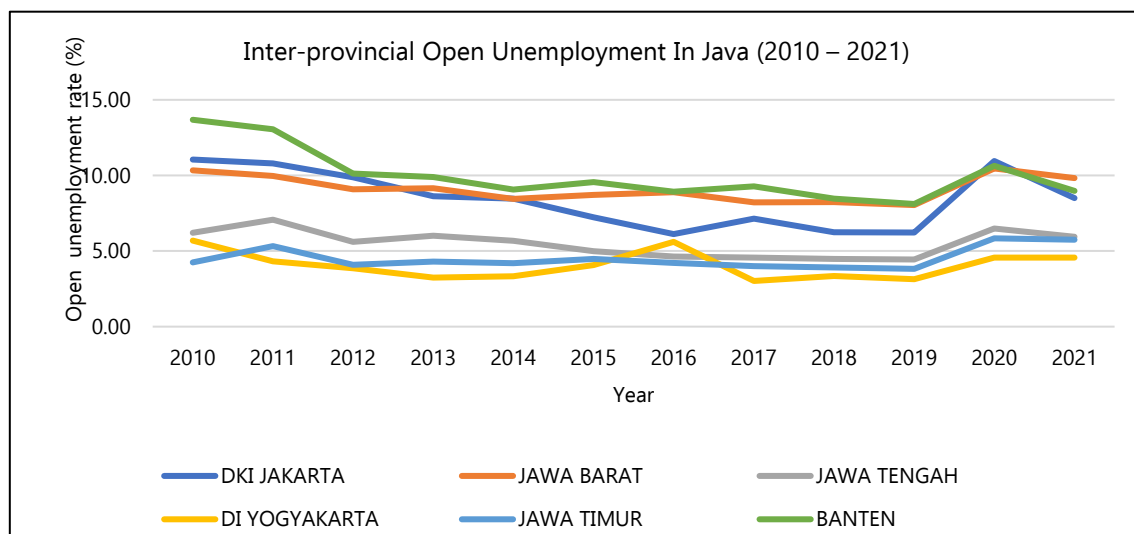


Figure 5. Unemployment Rate in Java

It can be seen in figure 6 that DKI Jakarta Province occupies the highest HDI position in all provinces in Java in 2010 - 2021, second place is West Java Province, and the last HDI ranking in Java in 2010 - 2021 is East Java Province.

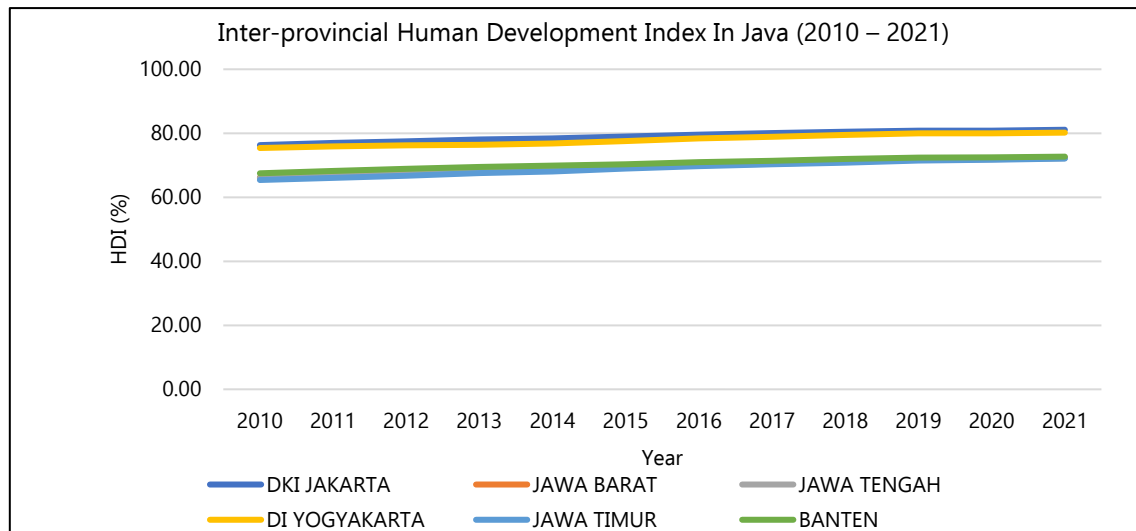


Figure 6. HDI in Java

The results of the Chow test state that the model that suits the panel data used is the Fixed Effect model. Then the Hausman test carried out stated that the suitable model for the panel data used was the Fixed Effect model. This research was not continued with the Lagrange Multiplier test because the results of the Chow test and the Hausman test results stated that the model that suited the panel data used was the Fixed Effect model. Therefore, it can be concluded that: that the appropriate model for the panel data used in this research is the Fixed Effect model.

The model test results state that Fixed Effect model is the most suitable model for the panel data used in this research. The results as shown in table 2 as follows:

Table 2. Data Processed Result by Fixed Effect Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.501774	0.045884	10.93566	0.0000
Percap GDRP (X1)	1.73E-06	1.20E-07	14.36967	0.0000
Pop (X2)	4.23E-09	1.41E-09	3.004722	0.0039
Inv (X3)	-4.63E-08	6.47E-08	-0.715702	0.4769
Open UE (X4)	-0.001629	0.000689	-2.365315	0.0212
HDI (X4)	-0.007169	0.000888	-8.070837	0.0000
R-squared	0.999272	F-statistic		8370.593
Adjusted R-Squared	0.999152	Prob(F-statistic)		0.000000

Source: Processed Data

This statistical test is intended to determine the extent of the influence all independent variables - percapita income (percapita GRDP), population, investment, open unemployment rate, and HDI (human development index) - on economic interprovincial inequality in Java from 2010 - 2021.

It can be seen from table 3 that all independent variables used in this research show a significant influence on the level of inequality interprovince in Java with an R-squared of 0.999. Simultaneously, all independent variables have a significant effect on the level

of inequality between provinces in Java as seen from the F-prob of 0.00. This means that per capita income (GRDP per capita), population, investment, open unemployment rate, and HDI (human development index) simultaneously have a significant effect on economic inequality between provinces in Java in 2010 - 2021.

From table 3 above, it can be seen from the results of the simultaneous test (F Test) that at a 95% confidence level, all independent variables, namely: per capita income (GRDP per capita), population, investment, open unemployment rate, and HDI (human development index) are simultaneously has a significant effect on economic inequality in Java from 2010 to 2021.

Based on the partial t test from table 3 above, it shows that partially per capita income (GRDP per capita), population, open unemployment rate, and HDI (human development index) - have a significant effect on economic inequality in Java in 2010 - 2021, but partially, the level of investment has no significant effect on economic inequality in Java from 2010 to 2021.

The determination test is intended to determine whether independent variables simultaneously influence the dependent variable. Based on the determination test (R-squared) in table 3, it shows that 99.99% of income per capita (GRDP per capita), population, investment, open unemployment rate, and HDI (human development index) simultaneously have an influence on economic inequality in Java 2010 - 2021, and the remainder (of 0.01%) of economic inequality in Java is influenced by other variables not included in the model used.

The *Autocorrelation Test* results state that the regression model is located in an autocorrelation-free area, likewise the results of the *Heteroscedasticity Test* state that the regression model is free from the problem of heteroscedasticity. This means that the Multiple Linear Functions Equation Model used in this study is fit and does not experience autocorrelation and heteroscedasticity disorders.

The results of this research state that the Williamson Index in Java from 2010 to 2021 shows an increasing trend. As can be seen from table 2.1 above, the Williamson Index for all provinces in Java increased from 0.60 in 2010 to 0.67 in 2021, or an average increase of 0.006364 per year. This increase in the Williamson Index means that during 2010 - 2021 there will be an increase in economic disparities between provinces in Java, in other words, during 2010 – 2021 each province in Java did not enjoy the same development results. A good development process should lead to economic equality in all regions, but this did not happen in all provinces in Java in 2010 – 2021.

DISCUSSION

Economic inequality between regions is a disease that is often encountered in a country's development process. Uncontrolled economic disparities between regions will worsen a nation's economic problems. Economists argue that differences in

demographic conditions and the content of natural resources in each region have created disparities between regions. As happened in Java. All provinces in Java have differences in demographic conditions and natural resource content, causing economic inequality (Yulhendri et al., 2020).

Demographics are the characteristics of a population that have been categorized by distinct criteria such as age, gender and income as a means to study the attributes of a particular group. Differences in demographic conditions cause economic inequality between regions. The different characteristics of population in each region cause economic inequality. Differences in the number of each age group of the population, differences in the number of each gender, and differences in the income of each population can cause economic inequality between regions (S. Siatan et al., 2024). Of all the population characteristics, the one most likely to be controlled is population control, For example in away: empowerment woman and girls, removing barriers to contraception, quality education for all, global justice and sustainable economies, improving child and maternal health.

This research uses the Williamson Index as a parameter for interprovincial inequality. The Williamson Index is an instrument for measuring regional development in a region by comparing it with higher regions. In other words, the Williamson Index generally measures how far there is development inequality in a region (Elpisah et al., 2021). The results of the research state that during the period 2010 - 2021 the Williamson index for all provinces in Java tends to increase from 0.60 to 0.67 or an average increase of 0.006364 per year – meaning that during this period there has been an increase in economic inequality in all provinces in Java.

This research assumes that the determining variables for economic inequality between regions are: per capita income (GRDP per capita), population, investment, open unemployment rate, and HDI (human development index). All of these independent variables are thought to be the cause of economic inequality between provinces in Java, where differences in demographic conditions and the content of natural resources in each region have created economic disparities between regions (Apriyani, 2022). This resulted in differences in the ability of regions to promote economic growth and development.

Per capita income is a reflection of the level of economic prosperity that a country/region has achieved. Mathematically, a country's per capita income is national income divided by the population. National income is the value of goods and services that a country is able to produce in one year. A country's national income is positively correlated with the quantity and quality of economic resources a country has. So a country's per capita income is positively correlated with the quantity and quality of the economic resources it has but is inversely related to population. So, controlling population could be the solution chosen by the government in an effort to improve the economic welfare of the community. The results of this research state that partially, per capita income has a positive and significant effect on economic inequality in Java.

Therefore, Java must be able to boost economic growth and control its population to reduce economic inequality.

The population of a region is one of the economic wealth of that region. In economics, population is a production factor that plays a role in creating output. In the production function of a region, population is one of the independent variables of the region's output. Variations in population between regions can cause economic inequality between regions. As found in this research, partially, variations in population between provinces in Java from 2010 to 2021 have a positive and significant effect on economic inequality between provinces.

Differences in resource productivity between regions give rise to differences in the amount of output produced and give rise to differences in the per capita income that a region can achieve. This causes economic inequality between regions. As stated by Simon Kuznets in his hypothesis, in a process of economic development there will be differences in the amount of per capita income for each region (province) which will result in economic inequality between regions. According to Kuznets, the industrialization process in a region will accelerate the increase in the amount of output, as a result of which the region will have a relatively large level of per capita income compared to rural areas which tend to have an agricultural structure. Therefore, according to Keynes, differences in per capita income are the cause of economic inequality between regions. So, it is very important to make efforts to increase economic productivity in rural areas by empowering the economic resources owned by rural areas. This is the benefit of increasing development in underdeveloped areas to catch up with the level of development in more advanced areas in Java.

The investment absorption capacity of a region varies greatly. Investment causes an increase in capital goods so that future output levels become greater. The varying amount of investment between regions usually causes disparities between regions. The results of this research state that, partially, the level of investment between provinces in Java does not have a significant effect on economic inequality between provinces. This is something interesting to research further, why differences in investment levels between provinces in Java do not cause economic disparities.

Open unemployment describes a low level of labor force participation. This happens because the job market is saturated, so that at a certain predetermined wage level, the job market is no longer able to accommodate the available workforce. The ability of the job market in each region will vary in accommodating the workforce. Variations in the number of open unemployed in a region will widen economic disparities between regions. If left unchecked, open unemployment will worsen inequality between regions in a country. This hypothesis is in accordance with the results of this research, which state that partially the level of open unemployment between provinces in Java has a negative and significant effect on the level of inequality in Java.

The human development index (HDI) is an indicator of the quality of human resources. The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and having a decent standard of living. The HDI is the geometric mean of normalized indices for each of the three dimensions. Varying levels of HDI between regions cause uneven development results that have been implemented. The results of this research state that there is a negative relationship and significant effect between variations in HDI and economic inequality between provinces in Java during 2010 - 2021. The results of this research are in line with the research hypothesis.

CONCLUSION

The research results state that the Williamson Index for all provinces in Java has increased from 2010 to 2021, meaning that during this period there has been an increase in economic disparities between provinces in Java.

This research uses the independent variables of economic inequality between regions, namely: income per capita (GRDP per capita), population, investment, open unemployment rate, and HDI (human development index). This research uses panel data in the form of all variables used from 2010 to 2021 in all provinces in Java. The results of data processing state that the appropriate model is the Fixed Effect Model. Then simultaneously all independent variables have a significant effect on the level of inequality between provinces in Java.

The results of this research state that partially: variations in per capita income and population have a positive and significant effect on economic inequality between provinces in Java, but variations in the amount of investment in each province in Java have a negative correlation and do not significantly affect economic inequality between provinces in Java. The results also showed that the open unemployment rate and HDI had a negative and significant effect on the level of inequality between provinces in Java.

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