

REGIONAL INEQUALITY ACROSS DISTRICTS IN KALIMANTAN, 2000 – 2012: IS KUZNETS HYPOTHESIS PREVAIL IN KALIMANTAN?

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ABSTRACT

The purpose of this study is to investigate the inequality development across the districts in Kalimantan and examine whether Kuznets hypothesis is prevail in Kalimantan. Williamson Index dan Entropy Theil Index are employed in order to analysis the inequality of 55 districts in Kalimantan during 2000-2012. The result of study shows that: (1) Kuznets hypothesis is prevail in Kalimantan; (2) regional inequality in Kalimantan shows an increasing trend for the period of observation. East Kalimantan province gives the largest contribution towards the inequality in Kalimantan.

Keywords: Inequality, Williamson Index, Theil Entropy Index, Kuznets Hypothesis.

JEL Classification: D63, R12

INTRODUCTION

As a matter of development, inequality cannot be completely eliminated. The income inequality will remain. Inequality of inter-regional development is a common aspect of economic activity, whether in the family or community, or between regions within a particular region. The existence of different distribution of income between regions and the distribution of central and local government expenditure is one of the problems in the implementation of development. This difference occurred over the years, causing an imbalance between regions.

According to Sjafrizal (2008 in Sitorus, 2012), inequality between regions is caused by differences in natural resource content and demographic conditions of each region, so that the ability of a region in pushing the development process to be different. The differences in regional wealth lead to the existence of developed regions and underdeveloped regions. The

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phenomenon of inequality in the distribution of income has become a common phenomenon that occurs in both developed and developing countries, one of which is Indonesia.

Regional inequality in Indonesia occurs because the central government controls and controls most of the regional revenues set as state revenue. Development is still concentrated in the West Indonesia Region, especially in Java Island. Table 1 shows that the rate of economic growth in the Western Region of Indonesia (KBI) is higher than that of Eastern Indonesia (KTI). Economic growth of the Western Region of Indonesia from 2006-2012 reached an average of 5.77 percent with the highest economic growth achieved by the island of Java, amounting to 6.20 percent. In terms of the contribution of GRDP to national GDP, the contribution of the West Indonesian Gross Regional Domestic Product (PDRB) is dominant and never decreases from 80 percent (see Table 2).

Table 1. Growth Rate of ADHK 2000 GRDP in Western Region of Indonesia and Eastern Region of Indonesia, 2006-2012 (%)

Province	Year							Average
	2006	2007	2008	2009	2010	2011	2012	
Western Region of Indonesia								5.77
Sumatera	5.26	4.96	4.98	3.50	5.58	6.19	5.82	5.18
Java	5.78	6.17	6.02	4.81	6.33	6.65	6.57	6.20
Bali	5.28	5.92	5.97	5.33	5.83	6.49	6.65	5.92
Eastern Region of Indonesia								5.65
Kalimantan	3.80	3.14	5.35	3.47	5.38	4.97	4.83	4.42
Sulawesi	6.93	6.88	8.43	6.92	8.25	8.10	8.67	7.24
Nusa Tenggara	3.92	5.02	3.83	8.22	5.80	1.24	2.15	4.31
Maluku and Papua	-0.40	5.72	4.17	11.90	9.93	8.56	7.85	6.62
Total 33 Provinces	5.19	5.63	5.74	4.77	6.14	6.35	6.30	5.83
Indonesia	5.51	6.32	6.01	4.63	6.22	6.49	6.23	5.92

Source: BPS, 2006-2012

Interregional inequality is important to investigate because the gravity of Indonesia's economic activity still tends to be geographically concentrated to the Western Region of Indonesia (KBI) for more than five decades. BPS data until the first quarter of 2015 shows that the structure of the Indonesian economy is spatially dominated by provincial groups in Java contributing 58.3% to Gross Domestic Product (GDP), followed by Sumatra (22.56%), Kalimantan (8.26%), Sulawesi (5.72%), Bali and Nusa Tenggara (2.97%) and Maluku and

Papua (2.19%). Indonesia's economic structure is still spatially concentrated KBI about 80-81% (see Table 2). Eastern Region of Indonesia (KTI), as a suburb, only gets the rest, which is about 19-20%. In short, the pattern of unbalanced development in Indonesia is still continuing, which is reflected in the strong "center" (Java-Sumatra) as the development gravity and leaving the "edge" (Eastern Region of Indonesia (KTI) and village).

Table 2. Role of Territory/ Island in the Establishment of National GDP, 2011-2015 (%)

Island	2011	2012	2013	2014 (III)	2015 (I)
Sumatera	23.56	23.74	23.81	23.63	22.56
Java	57.59	57.65	57.99	58.51	58.3
Kalimantan	9.55	9.30	8.67	8.21	8.26
Sulawesi	4.61	4.74	4.82	4.97	5.72
Bali and Nusa Tenggara	2.56	2.51	2.53	2.50	2.97
Maluku and Papua	2.13	2.06	2.18	2.18	2.19

Source: BPS, 2011-2015

The success of a region in carrying out development can be seen from the achievement of high economic growth and low income gap. The magnitude of regional disparities is reflected in differences in economic growth and the contribution of GRDP to national GDP. The island of Borneo has a large natural resource potential and is one of the country's foreign exchange earners, but the rate of economic growth and the contribution of GDP to national GDP tends to decline.

Table 3 shows the slightly difference between provinces seen from PDRB per capita values. In Kalimantan, only East Kalimantan and North Kalimantan have GRDP per capita exceeds the average per capita GRDP of Indonesia. Provinces with GRDP per capita above Indonesia are generally resource-based in abundance or have a large population.

Table 3. Gross Regional Domestic Product Per Capita (PDRB) 2010-2014 at Constant 2010 Price (in Thousand Rupiah)

Province	PDRB Per Capita				
	2010	2011	2012	2013	2014
Aceh	22,450.4	22,704.80	23,099.13	23,277.74	23,199.49
Sumatra Utara	25,412.07	26,711.24	28,036.88	29,343.04	30,482.59
Sumatra Barat	21,584.91	22,638.75	23,744.01	24,844.62	25,963.24
Riau	69,701.03	71,637.89	72,396.34	72,300.12	72,331.01
Jambi	29,160.16	30,856.66	32,417.72	34,085.91	36,088.83
Sumatra Selatan	25,932	27,157.98	28,577.89	29,679.57	30,627.55
Bengkulu	16,463.68	17,282.27	18,143.51	18,921.19	19,631.40
Lampung	19,722.39	20,739.31	21,794.83	22,772.78	23,648.76
Kep. Bangka Belitung	28,906.78	30,212.18	31,172.42	32,086.91	32,868.70
Kep. Riau	65,703.34	68,024.21	70,930	73,674.03	76,753.11
DKI Jakarta	111,528.86	117,672.92	123,962.38	130,110.55	136,407.58
Jawa Barat	20,974.94	21,976.53	23,036	24,119.24	24,961.05
Jawa Tengah	19,209.31	20,053.80	20,950.62	21,852.22	22,858.32
DI Yogyakarta	18,652.97	19,387.45	20,183.88	21,040.36	21,873.72
Jawa Timur	26,371.10	27,864.26	29,508.40	31,093.39	32,703.80
Banten	25,397.65	26,548.94	27,716.47	29,034.51	29,961.85
Bali	23,992.63	25,265.96	26,689.58	28,131.09	29,666.48
Nusa Tenggara Barat	15,527.41	14,705.77	14,276.69	14,807.47	15,351.54
Nusa Tenggara Timur	9,316.79	9,675.89	10,030.98	10,398.18	10,742.42
Kalimantan Barat	19,510.07	20,227.16	21,062.22	21,969.80	22,707.79
Kalimantan Tengah	25,455.05	26,588.90	27,749.01	29,110.59	30,220.97
Kalimantan Selatan	23,418.47	24,567.52	25,547.77	26,431.39	27,230.80
Kalimantan Timur	116,946.31	121,196.23	124,50.88	132,813.96	132,628.18
Kalimantan Utara	-	-	-	77,305.40	77,131.48
Sulawesi Utara	22,707.79	23,812.97	25,145.96	26,445.92	27,804.68
Sulawesi Tengah	19,558.53	21,105.70	22,724.47	24,481.12	25,316.32
Sulawesi Selatan	21,306.72	22,769.19	24,507.17	26,086.94	27,760.85
Sulawesi Tenggara	21,573.11	23,338.07	25,489.79	26,817.47	27,898.88
Gorontalo	14,811.95	15,687.65	16,650.27	17,640.56	18,627.37
Sulawesi Barat	14,755.47	16,023.44	17,169.06	18,010.31	19,211.14
Maluku	11,951.84	12,477.19	13,129.11	13,574.04	14,230.08
Maluku Utara	14,361.54	14,994.63	15,691.01	16,334.50	16,872.31
Papua Barat	54,049.32	54,539.86	55,047.84	57,595.40	59,156.84
Papua	38,785.11	36,383.24	36,280.03	38,393.76	38,891.99
Indonesia	28,778.17	30,112.37	31,519.93	32,874.76	34,127.7

Source: BPS (2016)

The economic activity on Kalimantan is increasing. The GRDP value of oil and gas non-oil and gas ADHK of all provinces in Kalimantan has increased every year and its growth is

positive, but the development result in Kalimantan still has not been able to improve the prosperity of its people. Inequality is high in some districts. The significant difference in economic growth and per capita income between districts shows that the development and distribution of income in Kalimantan has not been implemented equally.

Table 4. The overview of Socio-Economic Indicators of Regency/Municipality, 2012

Socio-Economic Indicator	Minimum	Maximum	Mean	National
Economic Indicator				
GDP per capita non-oil and gas (million)	3,342,206.49	75,660,458.64	11,690.738.58	10,671,024.82
Economic growth (%)	0.79	18.25	6.60	6.20
Purchase Power Parity (thousand rupiah)	609.85	661.33	638.39	633.269
Poverty (%)	2.60	26.90	7.90	11.66
Employment Indicator				
Primary Sector Employment (%)	1.38	88.65	52.58	34.36
Secondary Sector Employment (%)	1.77	54.58	11.26	19.10
Tertiary Sector Employment (%)	3.90	88.54	36.16	46.54
Unemployment Rate (%)	0.32	14.32	5.19	6.14
Education Indicator				
Average School Duration (years)	5.73	10.80	7.96	7.92
Literacy Rate (%)	88.34	99.95	95.68	93.10
Population indicator				
Life Expectancy (years)	61.69	73.79	68.39	70.10
Dependency Ratio	36.91	62.42	51.89	50.50
Population Density (population/ km2)	1.57	8,917.42	385.83	128.09

Source: BPS, 2012.

Based on these circumstances, several questions will be answered in this study: (1) how is the trend of regional inequality among districts/cities in Kalimantan Island? (2) Does the GRDP per capita can affect inequality among districts/cities? (3) Does the Kuznets Hypothesis apply on Kalimantan?

STUDY OF LITERATURE

According to Neo Classical theory, at the beginning of a country's development process, the disparity of inter-regional development tends to increase. The process will occur until inequality reaches the peak point. As the development process continues, the inequality of regional development will gradually decline. Kuznets (1971 in Todaro, 2006) states that in the early stages of economic growth, the linkage between growth and inequality such as U-upside which in the early stages of economic development, income distribution tends to be bad and will not increase until the country reaches middle-income status -income. But after that phase, the distribution of income will continue to improve or inequality will continue to decline. The study on inequality has been widely practiced. As a comparison, outlined some research relevant to this research.

Table 5. Summary of Result from Previous Researches

No.	Author	Method	Analysis result
Study Outside Indonesia			
1	Easterly (2001)	Regression and Gini Index	Poverty in Pakistan has risen from 22 percent to 32 percent due to political and economic instability, high inflation pressures and low savings rates.
2	Bonet, et al., (2006)	Econometric Method	Fiscal decentralization in Colombia during the 1990s led to increasing inequality. The fiscal decentralization policy has an impact on income inequality. Control variables such as agglomeration and openness levels have a negative impact on inequality.
3	Yang, et.al., (2008)	Cluster Analysis	The imbalance of development in China is caused by regional economic imbalances.
4	Ayelazuno (2013)	Analysis of PDB, PDB per capita, and HDI	Ghana failed to diversify the economy into industrialization, especially manufacturing. Inequality in Ghana is getting worse, rising unemployment, high debt, bigger social gaps, and underdeveloped infrastructure.
Study in Indonesia			
5	Chrisyanto (2006)	Multiple Linear Regression Analysis	The economic disparity between regions in Indonesia is caused by the high per capita income of DKI Jakarta Province.
6	Soetopo (2009)	Williamson (CVw) Index	The inequality of inter-island income in Indonesia is categorized as low inequality with an index of imbalance between 0.210 and 0.261.
7	Rochana (2012)	Williamson Index	Economic disparity between regions in Indonesia is getting bigger in the era of regional autonomy.
8	Kuncoro (2013)	Theil Entropy Index	Intra-regional disparity in Indonesia tends to increase during the period of 2001-2010 both between islands and within the island.

METHODOLOGY

Location, Variable, and Research Data

This research was conducted in Kalimantan covering 4 provinces, 9 cities and 46 regencies with observation period of 2000-2012. The variables of this study include 3 socio-economic indicators of districts/municipalities, consisting of GRDP, population, and GRDP per capita. In this study, secondary data obtained from the Central Bureau of Statistics with the time span of 2000-2012.

Data Analysis Method

The data analysis technique used in this research is descriptive quantitative analysis with analysis tool of Williamson index and Theil Entropy Index. The Williamson Index and Theil Entropy Index are among the methods for measuring regional inequality. The Williamson Index (1965) suggests the Vw model (weighted index) and Vuw (unweighted or un-weighted index) to measure the level of per capita income inequality of a country at a given time (Dhyatmika, 2013). The formulations of the Williamson Index (Williamson, 1965) are as follows:

$$IW = \frac{\sqrt{\sum_{i=1}^n (y_i - \bar{y})^2 \cdot f_i / n}}{\bar{y}} \dots\dots\dots(1)$$

Where:

IW = Williamson Index;

y_i = GRDP per capita district / city i ;

\bar{y} = GRDP per capita of Kalimantan Island;

f_i = population of district / municipality i ;

n = population of Kalimantan.

Williamson index ranges from $0 < IW < 1$, if the coefficient value near zero means that the area is more unbalanced. When approaching one then the area is more unbalanced (Sjafrizal, 2008 in Sitorus, 2012).

Theil Entropy Index was introduced by Henri Theil (1967). This index has an advantage over other spatial concentration index that is at a point in time, this index provides

a measure of the degree of concentration of spatial distribution in a number of regions and sub-regions within a State. The formula of Theil Entropy index is as follows (Akita, 2003).

$$IC = \sum_{i=1}^N \frac{GDP_i}{GDP_u} \log \frac{y_i}{\bar{y}} = IC_{BR} + IC_{WR} \dots \dots \dots (2)$$

Where:

IC = Theil Entropy Index;

GDP_i = Regency / Municipal PDRB i;

GDP_u = GRDP of Kalimantan Island;

y_i = GRDP per capita regency / city i;

\bar{y} = GRDP per capita Kalimantan Island;

IC_{BR} = Entropy Index Theil Between Group;

IC_{WR} = Entropy Index Theil Within Group.

FINDINGS AND DISCUSSIONS

1) Analysis of Regional Inequality

Based on the results of inequality analysis using Theil Entropy Index and Williamson Index, it is found that overall condition of inequality among regencies/cities in Kalimantan Island during the period 2000-2012 tends to increase in non-oil and gas sector and decrease in oil and gas sector.

Table 6. Value of Williamson Index and Entropy Theil Inter District / City, 2000-2012

No.	Year	Williamson Index	Theil Entropy Index	Williamson Index	Theil Entropy Index
		<i>Migas</i> (Oil and Gas)		<i>Non Migas</i> (Non-Oil and Gas)	
1	2000	1.1833	0.1962	0.6942	0.0864
2	2001	1.1433	0.2056	0.7162	0.0923
3	2002	1.1467	0.1864	0.7583	0.0871
4	2003	1.0816	0.1723	0.7169	0.0815
5	2004	1.1082	0.1786	0.8061	0.0934
6	2005	1.0829	0.1702	0.8516	0.0972
7	2006	1.0926	0.1711	0.9446	0.1107
8	2007	1.0715	0.1629	0.9655	0.1124
9	2008	1.0565	0.1545	0.9070	0.1052
10	2009	1.0463	0.1521	0.9100	0.1061
11	2010	0.9481	0.1334	0.8231	0.0947
12	2011	0.9354	0.1309	0.8384	0.0983
13	2012	0.9373	0.1295	0.8572	0.1016
Average		1.0641	0.1649	0.8299	0.0975

Sources: BPS, 2000-2012

Theil Entropy Index in this study is not only calculated in total only, but it is calculated Theil Entropy between Group Index and Theil Entropy within Group Index. Entropy Theil Between Group Index is used to find out the imbalance that occurs between provinces, whereas Theil within Group Entropy Index is used to know the picture of inequality that occurs within the province. The districts/municipalities in Kalimantan Island are grouped into four groups on the basis of grouping are the positions of each district/city in the four provinces. Table 6 shows that the Theil Entropy Index Between Group and Within Group in the non-oil and gas sector has a tendency to rise and in the oil and gas sector tends to decrease.

Table 7. Theil Entropy Index, Theil Entropy between group, Theil Entropy within Group Kalimantan (Non-oil and gas), 2000-2012

Year	Theil Entropy Index	Theil Entropy Index Between Group	Theil Entropy Index Within Group				
			Total Within Group	West Kalimantan Province	South Kalimantan Province	Central Kalimantan Province	East Kalimantan Province
2000	0.0864	0.0441	0.0424	0.0097	0.0099	0.0054	0.0173
2001	0.0923	0.0522	0.0401	0.0077	0.0102	0.0014	0.0208
2002	0.0871	0.0463	0.0408	0.0070	0.0095	0.0019	0.0224
2003	0.0815	0.0435	0.0308	0.0067	0.0096	0.0016	0.0202
2004	0.0934	0.0516	0.0418	0.0066	0.0077	0.0014	0.0262
2005	0.0972	0.0492	0.0480	0.0059	0.0088	0.0016	0.0316
2006	0.1107	0.0549	0.0558	0.0055	0.0088	0.0016	0.0399
2007	0.1124	0.0566	0.0558	0.0051	0.0086	0.0011	0.0409
2008	0.1052	0.0545	0.0508	0.0052	0.0085	0.0011	0.0359
2009	0.1061	0.0546	0.0516	0.0054	0.0085	0.0009	0.0368
2010	0.0947	0.0499	0.0447	0.0052	0.0076	0.0010	0.0310
2011	0.0983	0.0535	0.0448	0.0051	0.0074	0.0010	0.0313
2012	0.1016	0.0549	0.0467	0.0051	0.0073	0.0009	0.0334
Averages	0.0975	0.0512	0.0462	0.0062	0.0086	0.0016	0.0298

Sources: BPS, 2000-2012

Overall, the inequality of development on the Borneo is more due to the inequality between provinces than inequality within the province, where provincial inequality gap contributes an average of 53.94 per cent to total inequality and the oil and gas sector contributes 54.45 per cent to inequality between provinces. In provincial inequality contributes 46.06 percent of total inequality and the non-oil and gas sector contributed

47.45 percent (see Table 7). Areas that contribute substantially to inequality between and within the province are East Kalimantan Province.

Table 8. Average of Theil Entropy Index Inter District/ City, 2000-2012

Information	Non-Oil and Gas	Oil and Gas
T-Between Prov	0.0512	0.1451
T-Within Prov	0.0462	0.1214
Total	0.0975	0.2666
T-Between Prov (%)	52.55	54.45
T-Within Prov (%)	47.45	45.55

Sources: BPS, 2000-2012

2) The Relationship Between GRDP per capita and Regional Inequality

In this study, we will examine the relationship between GRDP per capita with Williamson Index and Theil Entropy Index. To test the relationship between the two indices, the Pearson correlation test was used. The correlation test results showed the coefficients of 0.706 and 0.628 respectively. Both coefficient values are close to 1 and are marked positive with significance at $\alpha = 5$ percent. That is, there is a strong relationship between GRDP per capita with Williamson Index and Theil Entropy Index. The level of inequality is in line with the per capita GRDP that is if the per capita GRDP increases then the level of inequality also increases, and vice versa.

Table 9. Pearson Correlation Value between GDP Per Capita, Williamson Index, and Theil Entropy Index

		Williamson Index	PDRB Per Capita
Williamson Index	Pearson Correlation	1	0,706(*)
	Sig. (2-tailed)		0,007
	N	13	13
PDRB Per Capita	Pearson Correlation	0,706(*)	1
	Sig. (2-tailed)	0,007	
	N	13	13

* Correlation is significant at the 0.05 level (2-tailed).

		Theil Entropy Index	PDRB Per Capita
Theil Entropy Index	Pearson Correlation	1	0,628(*)
	Sig. (2-tailed)		0,022
	N	13	13
PDRB Per Capita	Pearson Correlation	0,628(*)	1
	Sig. (2-tailed)	0,022	
	N	13	13

* Correlation is significant at the 0.05 level (2-tailed).

KUZNETS HYPOTHESIS TESTING

How Far The Relevance of Kuznets Hypothesis

The Kuznets hypothesis states that in the initial growth of a region, the inequality worsens and in later stages the inequality decreases, but at one time there will be an increase in inequality again and eventually decline again (Kuncoro, 2002). Testing of Kuznets Theory (1955) was done using two methods. The first method is to use graph estimation. Graphical estimates are used to see trends in the shape of the quadratic curve which is a relation of the Gini Index and per capita income. In addition, curve estimation methods are also used to compare quadratic types with linear and cubic types.

The second method is to use regression estimation. This regression estimation uses Gini Index variable as the dependent variable, while the independent variable is non-oil per capita income and non-quadratic per capita non-quadratic income. Several studies have treated the extent to which Kuznets hypothesis is validated by making estimates of the relationship between the imbalance index and the per capita GDP logarithm. The study uses quadratic equations by following the approach of Ahluwalia (1976) and Melikhova and Cizek (2012). Based on research conducted by Melikhova and Cizek (2012), compiled a comparison of Kuznets hypothesis research from various countries. Most contemporary research refers to the method used by Ahluwalia (1976) by using linear regression with the Gini Index as the dependent variable to measure inequality, whereas the GDP per capita of the state in the form of logarithm and quadratic logarithm becomes its independent variable.

Test of Kuznets Hypothesis in Indonesia

The validity of the Kuznets hypothesis in Indonesia during the period 1994-2012 is evidenced by estimating the relationship between the Gini Index and the PDRB per capita logarithm in the form of linear, quadratic and cubic equations. Estimates of the relationship between the Gini Index and the PDRB per capita logarithm in the form of linear, quadratic and cubic equations are as follows:

Table 10. Estimation of Relationship between Gini Index and GDP per capita logarithm in Indonesia, 1994-2012

Explanatory Variable	Linear	Quadratic	Cubic
C	-0.842 (-7.413)*	-5.849 (-3.097)*	133.614 (3.618)*
Lnpdrbpk	0.068 (9.399)*	0.699 (2.943)*	-25.760 (-3.680)*
Lnpdrbpk2	-	-0.020 (-2.656)*	1.650 (3.736)*
Lnpdrbpk3	-	-	-0.035 (-3.782)*
Adjusted R-squared	0.150	0.161	0.183
F-Statistic	88.337	48.239	37.797

Source: The results of calculation with SPSS

Notes: * $\alpha = 1\%$; ** $\alpha = 5\%$; *** $\alpha = 10\%$

Based on the estimation result, the relationship between Gini Index and Gross Regional Domestic Product (PDRB) per capita with linear equation model shows $R^2 = 0.478$, quadratic equation $R^2 = 0.653$, and cubic equation $R^2 = 0.656$. Thus, the cubic equation is the best model for explaining the relationship between the Gini Index and the PDRB per capita logarithm.

Testing for The Kuznets Hypothesis in Kalimantan

To prove whether Kuznets's hypothesis applies to the island of Borneo, a quadratic regression is made by plotting graphs between GRDP per capita and the index of inequality (Williamson Index and Theil Entropy Index) in the observation period. The proof is done using goodness of fit test or model accuracy test. By doing a comparison between the value of R^2 and the value of F between the models analyzed to know the graph plot or pattern that best match the data. The criteria used are non-linear or U inverted graphics with R^2 value and the largest F value

being the most suitable model and graph. Here is the value of R^2 and F value between PDRB per capita with Williamson Index and Theil Entropy Index.

Table 11. R^2 and F values between PDRB per capita by Williamson Index and Theil Entropy Index, 2000-2012

Graph	R^2			
	Williamson Index	Significance	Theil Entropy Index	Significance
Linear	0.440	0.013	0.360	0.030
Non-linear	0.751	0.001	0.516	0.027
F				
Linear	8.639	0.013	6.184	0.030
Non-linear	15.073	0.001	5.332	0.027

Sources: BPS, 2000-2012

Table 11 shows that for the graph between GRDP per capita and Williamson Index, R^2 value on nonlinear graph is higher than linear graph, that is $0.751 > 0.440$ and nonlinear F test value is also higher than linear F test value, that is $15,073 > 8,639$. For the graph between GRDP per capita with Theil Entropy Index, R^2 value on nonlinear graph is higher than linear graph that is $0,516 > 0,360$. However, the nonlinear F test value is lower than the linear F test value, that is $5,332 < 6,184$ and the non-linear graphic significance value is smaller than the linear graphs so the data distribution does not follow the linear pattern, but follow the nonlinear pattern. From nonlinear regression result indicated that the relation between PDRB per capita with index of inequality is nonlinear. The Kuznets hypothesis will be more clearly visible if the plot of data is made in the graph with nonlinear spreads of the letter U. The relationship between GRDP per capita and the inequality index is illustrated in Figure 1.

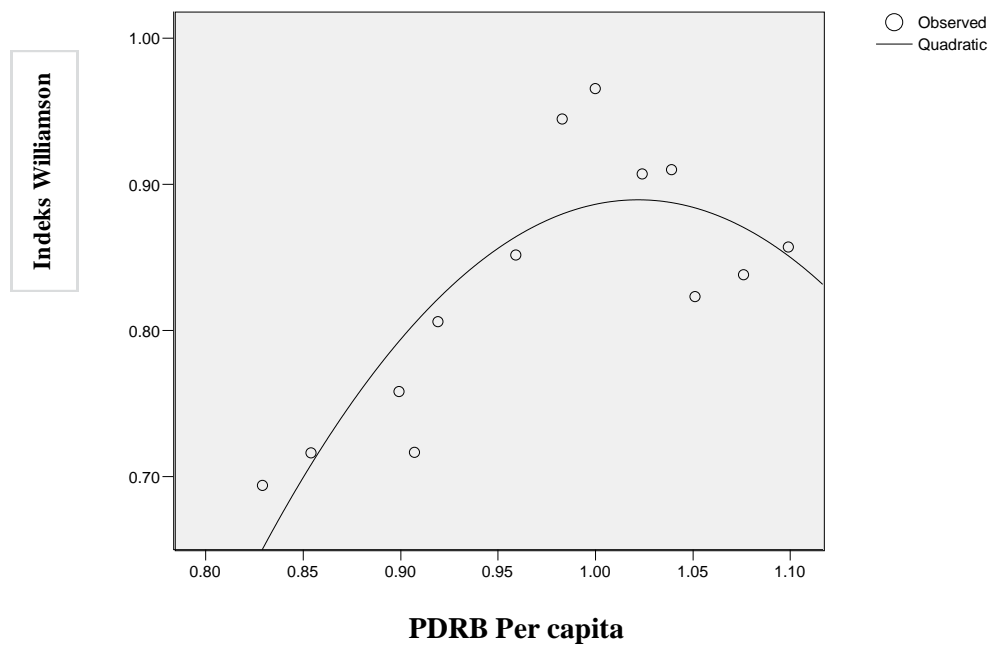


Figure 1. Relationship Curve between Williamson Index with Per Capita Non-Oil and Gas Gross Domestic Product, 2000-2012

Figure 1 shows the relationship between the Williamson Index and non-oil and gas per capita GDP is non-linear or in reverse U-shaped. The inverted U-shaped curve shows that the Kuznets Hypothesis applies on the island of Borneo during the observation period. The highest inequality (IWmax) on the island of Kalimantan of 0.89 was achieved when the GDP per capita value reached Rp. 10,516,332, - or \$ 1,135 (Table 11).

Table 12. Summary the Result of Kuznets Hypothesis Validity Test

Period	Total of Country/ District/City	Data Completeness (%)	GINI/ $IW_{max}(\%)$	GDP _{TP} /PDR B per capita (USD)	Reference
1965-1971	60	0.6	57.6	642	Ahluwalia (1976)
1970-1990	75	0.8	62.7	2,221	Bulir (2001)
1990-2000	44	0.5	45.0	2,575	Hayami (2005)
1965-2003	82	0.8	46.0	2,570	Iradian (2005)
1970-1990	75	0.8	45.9	912	Lin, <i>et.al.</i> , (2006)
1979-2008	145	6.3	43.8	1,528	Melikhova, <i>et.al.</i> , (2010)
2000-2012	55	100	89.0	1m135	Christina (2015)

Source: Christina (2015)

CONCLUSION

The Conclusions that can be drawn based on the results of the analysis in this study as follows.

1. Based on the result of inequality analysis by using Williamson Index and Theil Entropy Index, it is found that the condition of development inequality in Kalimantan Island during the study period showed a tendency to increase. Inequality is more due to provincial inequality between provinces than inequality within provinces (within provinces inequality).
2. Areas that contribute substantially to inequality between and within the province are East Kalimantan Province. Overall, inequality between districts/municipalities in West Kalimantan, South Kalimantan Province and Central Kalimantan Province shows a downward trend, while in East Kalimantan province it tends to widen. The widening inequality is caused by the high disparity of the high gap between the highest and lowest GRDP per capita. The lag is also caused by the limited facilities and infrastructure to support the economic activities of the community and the low accessibility of growth centers in the Kalimantan region, the not optimal use of sea/ river transportation for the accessibility of disadvantaged and inland areas, and the limited ability of human resources in the region in the utilization of potential local flagship resources. In general, the factors that cause the higher condition of inequality of a region is the inability of the region to manage regional autonomy and fiscal decentralization optimally, while the

factors causing the decline of inequality is the more prevalent development activities in all sectors of the field of business.

3. Between per capita GRDP with Williamson Index and Theil Entropy Index there is a strong relationship. The relationship indicates inequality between districts / cities in the same direction with GRDP per capita. If the per capita GRDP value increases then the level of inequality is also increasing, and vice versa. In other words, per capita GRDP affects regional inequality.
4. Goodness of fit test results show that the relationship between GRDP per capita with index of inequality, is non-linear (quadratic). That is, the Kuznets Hypothesis prevails on the Borneo.

Based on the results of the discussion and conclusion, recommendation that can be submitted as follows.

1. Priority development that can be done to reduce inequality is by increasing the accessibility between regions, especially in the western part of Borneo Island, which is relatively behind compared to other regions. One is the increased provision of transport infrastructure, the provision of pioneer transportation modes to areas where public transport cannot be reached, and the development of inter-regional cooperation in transport development. The follow up of these suggestions relates to agencies: Provincial and Regency/Municipal Governments.
2. In the economic field, the policies that can be taken are to strengthen the economic structure in the underdeveloped and border areas by optimizing the development of leading commodities, increasing the processing industry activities, and investment attractiveness through the provision of incentives, the ease of licensing and access to land for investors. In the field of education, local governments in underdeveloped areas should prioritize the development of facilities and infrastructure of primary and secondary education, while improving the quality of education in rich regions can be imposed on local governments and oil and gas, coal and large industries. The follow up of these suggestions relates to agencies: Provincial and Regency/ Municipal Governments.

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