

Regional inequality in indonesia, 1994-2012

Mudrajad Kuncoro

Gadjah Mada University, Yogyakarta, Indonesia

Nova Murbarani

Islamic State University Raden Fatah, Palembang, Indonesia

Keyword

Kuznets hypothesis, globalization, economic openness, FDI, inverted U-curve, and inequality.

Abstract

The aim of this study is to identify the trend of regional inequality across provinces in Indonesia, to test Kuznets inverted U-curve hypothesis in Indonesia, and to explore the effect of economic openness and human development on regional inequality in Indonesia. Using panel data of 26 provinces in Indonesia during the period 1994-2012, our empirical study found that the trend of inequality tended to decline over the period of 1994-2012 and to form a cubic rather than a quadratic inverted U curve. Although our findings are in line with Kuznets hypothesis, our model suggests that some key factors – economic openness, FDI, and regional dummy – also affected regional inequality significantly in Indonesia during the period.

1. Introduction

The relationship between inequality and the process of economic development is far from being understood. The debate has focused only on one channel that examines the impacts of economic growth on income inequality. The first argument is that inadequate redistributive policies and the increase in inequality that accompany economic growth lessen the potential benefit of economic growth to the poor (Ravallion, 2001). The conventional textbook approach is that inequality is good for incentives and therefore good for growth considerations might be traded-off against equity goal. On the other hand, another side argues that the negative effect on growth is because its can reduce investment opportunities, worsens borrowers' incentives, and generate macro-economic volatility (Aghion *et al.* 1999). Todaro (1997) argues that greater equality in developing countries may in fact be a condition for self-sustaining economic growth.

The linkage between inequality and growth were largely influenced by the Kuznets hypothesis. Kuznets (1995) conjectured based on limited empirical observation, that there was an inverted U-shape relationship between income inequality and GNP per capita. Kuznets postulated that income inequality increases at the early stage of development and decreases later as industries extract a larger fraction of the rural labor force. The Kuznets hypothesis explained the downward trend in inequality among Organisation for Economic Co-operation and Development (OECD) countries, but was later discarded as it failed to explain growing wage inequality in those countries during 1980s (Aghion *et al.* 1999: 1616). Many empirical studies on the validity of Kuznets hypothesis was performed by many authors during last 30 years, but obtained results are controversial and not conclusive. Ahluwalia (1976) in his early work found support for the Kuznets hypothesis. However, Anand & Kanbur (1993a) re-analyzed later the same data as Ahluwalia (1976) and did not find any evidence supporting the Kuznets hypothesis. Using historical data on the average income and the income inequality for the period 1979-2009 collected for 145 countries, Melikhova & Čížek (2014) found that the inverted U-curve was found in countries with low amount of social contribution but increasing amount of social contributions makes the U-curve flat and shifts its maximum to higher values of the average income.

Other line of studies is to explore to what extent globalisation has coincided with widening income inequality, or has it contributed to the phenomena? Increased trade and capital movements have led to greater specialisation in production and the dispersion of specialised production processes to geographically distant locations. Theoretically globalisation would make a developing country more egalitarian through raising wages of its abundant low-income unskilled workers because the country has comparative advantage in producing unskilled labour-intensive goods and services (Deardorff & Stern, 1994). However, evidence tells us an opposite story. The average Gini coefficients in the transitional and developing countries rose from about 0.25 to 0.30 in the period from the late 1980s to the mid-1990s, an era of rapid globalisation (IMF, 1998). Using a provincial level data set for the period of 1986–1998, a model that quantitatively decomposes the effects of foreign trade and inward FDI on Chinese regional inequality found that globalisation through foreign trade and FDI indeed played an important role in worsening Chinese regional inequality (Zhang & Zhang, 2012).

Yet there have been few studies investigating the effect of globalisation on regional inequality and testing Kuznets hypothesis at provincial level rather than cross countries. This study aims to close the gap by assessing to what extent Kuznets hypothesis is relevant and to extent globalisation may affect regional inequality in Indonesia. Our analysis can suggest appropriate policies to help the backward provinces in the Eastern Indonesia catching up with more prosperous provinces in Jawa and Sumatra islands. In particular, special attention will be paid to the role of foreign trade and FDI in Indonesia's widening regional inequality. By extending Shorrocks' decomposition method (Shorrocks, 1982) and Zhang & Zhang (2012) model, we evaluate the effects of globalisation and other factors on the rising regional inequality. We also attempt to tackle this issue by providing evidence from Indonesia.

Being the largest archipelago and the fourth most populous country in the world, together with the second largest recipient of Foreign Direct Investments (FDI) in ASEAN, Indonesia has obviously been a major participant in the process of globalisation for the past four decades. It is virtually certain for Indonesia to become even more important in the world economy in the future because of its huge size, dynamic economic growth, continuing policy reforms, and in particular member of the Group of Twenty (G20). Together, the G20 commands well over 85 percent of the global economy. Therefore, the success of the forum will have a significant impact on all nations, including those who are not members of the G20. Indonesia was not only honored to be inaugurated as a member of the G20 in 2008 but also it has been the only country in ASEAN to be included.

The purpose of this study: (1) to identify inequality trend that evolved in every province in Indonesia; (2) to test to what extent Kuznets hypothesis is applicable in Indonesia; and (3) to analyse the impact of economic openness, FDI, Human Development Index (HDI), Gross Regional Domestic Product (GRDP) per capita, GRDP per square capita, and the dummy of Java island on inequality between provinces in Indonesia.

The rest of the article is organised as follows. Section 2 describes recent literature and trends of foreign trade, FDI, and regional inequality over the past two decades in Indonesia. A conceptual framework and empirical specifications are developed in section 3. Findings and discussions will be presented in the fourth part, while the fifth part draws major conclusions and implications.

2. Survey of literature

Development within countries is not always equally distributed. Regional disparities are often become a serious problem. Some areas are experiencing rapid growth, while some other areas experiencing slow growth. The local area is not having the same progress due to lack of

sources owned; tendency role of capital/investors (usually choose urban areas or areas that already have comprehensive facilities are also highly skilled workforce); besides that there is an imbalance distribution of income redistribution from central government to local governments (Kuncoro, 2004: 127).

Like other developing countries, Indonesia’s economic integration with the world has been accompanied with growing regional inequality. Academic literature on income distribution in Indonesia often indicated that income inequality has been relatively low as a consequence of the ‘pro-poor’ policies pursued by its government. Yet it has been argued that this may be a misconception, arising from significant difficulties in interpreting the available income and expenditure survey data for Indonesia (Cameron, 2002). Leigh & van der Eng (2009) found that top income shares in Indonesia have been relatively high over the course of the twentieth century while a sharp rise in top income shares during the late-1990s, coinciding with the 1997-1998 economic crisis.

It is reasonable to speculate that regional comparative advantages in the context of the globalisation might be an important factor behind the changes in regional inequality. Figure 1 plots the positive relationship between regional inequality and trade. Economic openness, as reflected by the sum of exports and imports of goods and services measured as a share of gross domestic product, has increased from 52.18% in 1994 to 85.96% in 2012. Table 1 indicates that Gini coefficient increased from 0.34 in 1994 to 0.39 in 2012, an increase about 14.71%. From spatial dimension, Gini coefficient as a measure of income distribution, turned out to be quite varied across provinces (Figure 2). Regional comparative advantage in the context of economic openness may become a major factor to regional inequality.

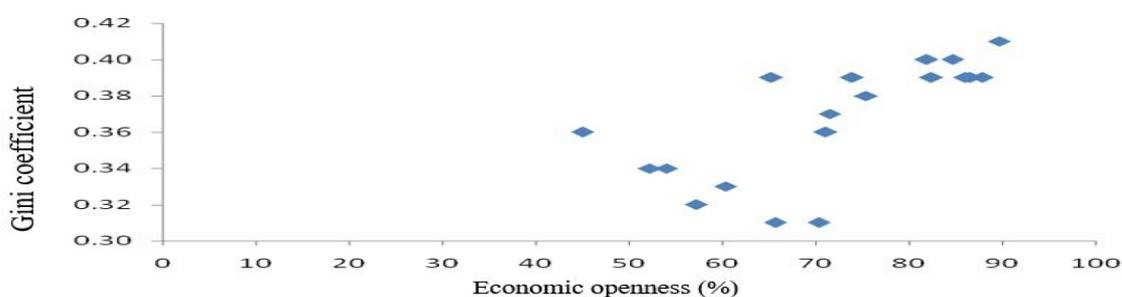


Figure 1 Economic openness and regional inequality: Indonesia, 1994-2012
(Source: BPS; BKPM, various years)

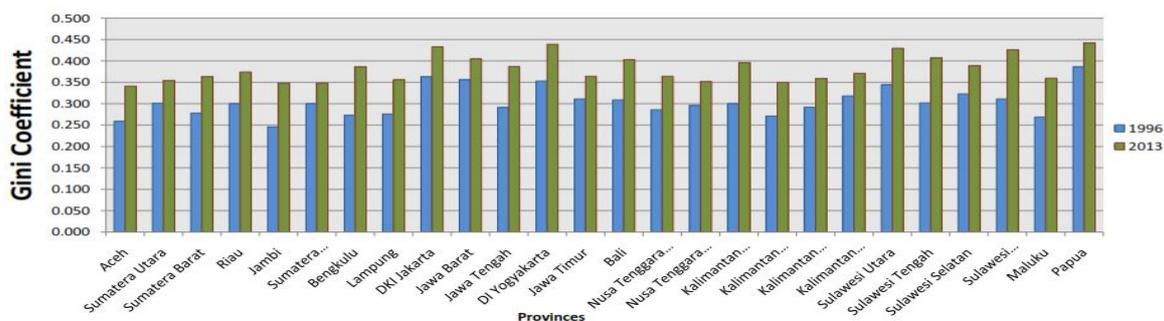


Figure 2: Gini cc Economic openness (%) 5 and 2013
(Source: BPS, various years)

Year	Economic openness (%)	FDI/GDP (%)	Real GDP (2000=100)	HDI (%)	Gini coefficient
1994	52.18	4.08	38.23	62.73	0.34
1995	53.91	8.83	41.71	62.73	0.34
1996	57.08	6.33	44.43	67.70	0.32
1997	60.24	12.92	47.46	67.70	0.33
1998	70.97	9.31	74.90	67.70	0.36
1999	44.96	5.82	74.90	64.30	0.36
2000	71.44	12.37	100.00	64.30	0.37
2001	70.28	12.73	113.32	64.30	0.31
2002	65.63	7.07	124.58	65.80	0.31
2003	65.20	7.80	136.76	65.80	0.39
2004	73.88	6.25	145.85	68.70	0.39
2005	81.87	5.57	171.36	69.57	0.40
2006	84.61	3.13	184.27	70.10	0.40
2007	86.54	5.33	198.11	70.59	0.39
2008	89.59	8.31	223.97	71.17	0.41
2009	75.31	4.84	228.33	71.76	0.38
2010	82.35	6.52	245.48	72.27	0.39
2011	87.78	7.21	255.30	72.77	0.39
2012	85.96	9.04	266.74	73.29	0.39
Annual growth (%)	64.74	121.53	597.72	16.83	14.71

Table 1: Economic openness, foreign direct investment, and regional inequality: Indonesia, 1994- 2012
(Source: BPS and BKPM, various years)

Figure 3 shows the unclear correlation between FDI and regional inequality in Indonesia during 1994-2012 as FDI flows to each province in Indonesia fluctuated from 4,08% (1994) to 9,04% (2012). However, we cannot simply infer causation from these two figures. There are possibly many other factors affecting regional inequality as well during the period. A more systematic framework is needed to quantify the contributions of various components to the overall regional disparity.

The inequality between regions is a serious problem. The empirical studies that have been conducted indicate that there is inequality between regions, either between countries or between regions in a country. The inequality between regions can be smaller, it means that there is convergence or conversely, the inequality is greater, it means that there is divergence. The studies on inequality between areas have been conducted by for examples Lo (1990); Ying (1999); Jones (2002); Kuncoro (2004); Gajwani et al. (2006), Hill (2008), Melikhova & Cizek (2014).

A summary on the description of previous studies is presented in Table 2. Based on the table, it can be found the similarity and differences between this study and previous studies that have been conducted. The similarity of this study with previous studies lies on several analysis method used. The differences of this study with other studies which has been conducted before is that this study will not only test Kuznets hypothesis on the regional inequality in Indonesia but also examine the role of FDI and economic openness on regional inequality.

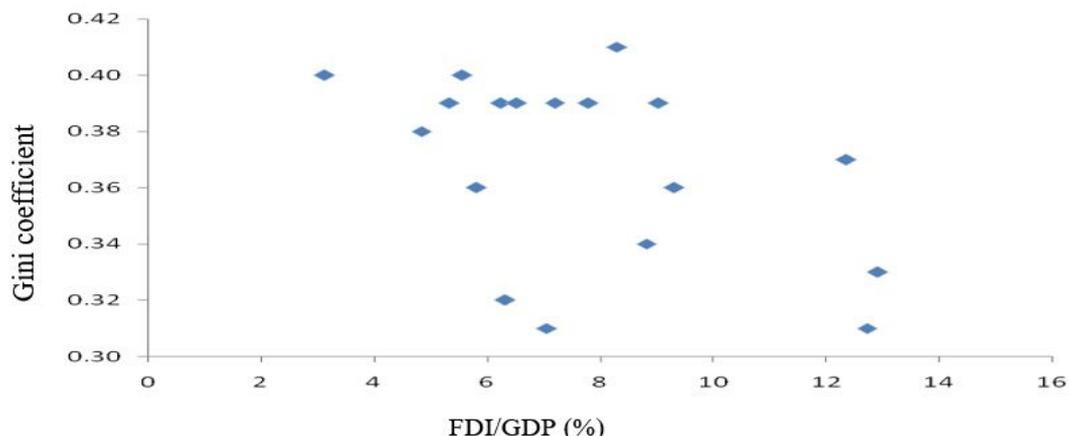


Figure 3: FDI/GDP and regional inequality, Indonesia, 1994-2012
(Source: BPS dan BKPM, various years)

3. Methodology

We used panel data involving 33 provinces within Indonesia over the period of 1994 to 2012. The income inequality is usually measured by the GINI coefficient while the GDP per capita characterizes the level of economic development. What all papers in this literature have invariably done, however, is to interpret Kuznets hypothesis as a relationship between GDP per capita and income inequality (Angeles, 2010). Multivariate regression analysis is widely used to estimate cross country relationships between the income shares of different percentile groups and selected variables reflecting aspects of the development process which are likely to influence income inequality. Unlike previous studies that rely on cross countries study, we employ data at subnational government (i.e. provinces). This paper takes a different route, we followed Ahluwalia's approach (1976) and Melikhova & Cizek (2012)'s model as follows:

$$\text{Gini}_{it} = \beta_0 + \beta_1 \log(\text{GRDP}_{it}) + \beta_2 \log(\text{GRDP}_{it})^2 + u_{it} \quad (1)$$

where Gini_{it} is Gini coefficient of provinces i in Indonesia at time t ; i is number of provinces while t is time period from 1994 to 2012; GRDP_{it} is GRDP per capita of provinces; $(\text{GRDP}_{it})^2$ is GRDP per capita of provinces in Indonesia on quadratic form; β_0 is constant; u_{it} is error term. Terms of quadratic equation is $\beta_2 \neq 0$. If $\beta_1 > 0$ and $\beta_2 < 0$ then inverted U curve is form, on the other hand if $\beta_1 < 0$ and $\beta_2 > 0$ then U curve is form. Positive coefficient of β_1 and negative β_2 obtained from regression are viewed as a support of the validity of Kuznets hypothesis. The maximum of the inverted U-curve described by Equation (1) occurs at GRDP per capita the 'turning point' (GRDP_{TP}) i.e. the level of development from which inequality should decline with further stage of development:

$$\text{GRDP}_{\text{itT}} = 10^{-\frac{\beta_1}{2\beta_2}} \quad (2)$$

The maximum value of GINI coefficient predicted by the Kuznets U-curve is:

$$\text{GINI}_{\text{itMA}} = -\frac{\beta_1^2}{4\beta_2} + \beta_0 \quad (3)$$

Researcher	Method	Period	Findings
Lo (1990)	Absolute deviation coefficient, Williamson index and factor analysis	1980-1986	<ul style="list-style-type: none"> ▪ Inequality in rural areas increased in line with the existence of modernization program in China. ▪ There is a direct relationship between rural development and industrial development in the core areas in China.
Ying (1999)	Theil entropy index	1978-1994	Inequality between provinces in China decreased as the impact of reformation.
Jones (2002)	Absolute convergence and coefficients variation	1960-1990	There is a tendency of convergence of income per capita and reduction of standard deviation of income per capita over the time.
Kuncoro (2004)	Theil entropy index and Chow test	1976-2001	<ul style="list-style-type: none"> ▪ The pattern of spatial gap curved "U" which reflects the dispersion period of manufacturing activities that has been replaced by a period of increasing geographic concentration. ▪ In Java island, an island where most of manufacturing companies are located, so spatial concentration trend can be explained by the degree of difference in the labor share of district / city in the province.
Milanovic (2005)	<ul style="list-style-type: none"> ▪ GGini coefficient ▪ Theil index. ▪ GMM. 	China, India, Amerika Serikat, Indonesia, and Brazil 1980-2000.	<ul style="list-style-type: none"> • Oopenness influenced an increase in inequality. (Gini and Theil). ▪ GDP per capita brought an impacts on increasing inequality (Gini) but declining inequality (Theil).
Gajwani, <i>et al.</i> (2006)	Gini coefficient and generalized entropy class (GE) of inequality measures	India (periode 1957-2003) dan Cina (periode 1952-2000)	Inequality of area in China is higher than inequality of area in India.
Hill, <i>et al.</i> (2008)	Coefficients of variation, structural transformation index absolute convergence	1975-2004	<ul style="list-style-type: none"> ▪ There are various economic and social outcomes, however it can be determined that there are growth and social progress. ▪ Inequality of areas is high and has a tendency to decrease. ▪ Bali, DKI Jakarta, East Kalimantan and Riau are the provinces with good performance; these provinces are varied in terms of size, location and characteristic of socio-economic.
Kuncoro (2013)	Theil entropy index	2001-2010	<ul style="list-style-type: none"> ▪ Regional inequality tends to increase in 2001-2010 periods, either inequality between islands or in the island. ▪ Java and Sumatera island dominated economy of Indonesia

Table 2: Empirical studies on regional inequality

The second model that applied is a general model which has been used and developed by previous researchers to analyse the impact of economic openness to inequality. By extending Shorrock's (1982) decomposition method and Zhang & Zhang (2012) model as well as incorporating Benar (2007) and Kuznets hypothesis, we propose the following model:

$$\log \text{Gini}_{it} = \beta_0 + \beta_1 \text{openness}_{it} + \beta_2 \log(\text{FDI}_{it}) + \beta_3 \text{HDI}_{it} + \beta_4 \log(\text{GRDP}_{it}) + \beta_5 \log(\text{GRDP}_{it}^2) + \beta_6 \text{dummy}_{it} + u_{it} \quad (4)$$

Where $\log(\text{GINI}_{it})$ is logarithm of Gini coefficient for all provinces in Indonesia in time t ; OPENNESS is openness degree (sum of export and import to GRDP); $\ln \text{FDI}$ is FDI logarithm to GRDP; HDI is Human Development Index (HDI); $\ln \text{GRDP}$ is real GRDP per capita in logarithm; $\ln \text{GRDP}^2$ is real GRDP per capita logarithm in square; dummy is dummy variables in which 1 is provinces in Java island, 0 represent outside Java island; u_{it} is error term.

Economic openness. In its simplicity form, trade intensity is usually measured by a ratio of export (X) and import (M) to GDP, or in the regional context measured by $(M+X)/\text{GRDP}$. This ratio is also known as *economic openness*. Based on the formula structure, sum of M and X can

show the import and export intensity level from a region with specific economy level (GRDP). The more open of a region (in the export and import context), the higher the flow of investment on its goods and services. Benar (2007) found that economic openness increased income inequality in many countries which classified in the Middle East North Africa (MENA) including Algeria, Egypt, Iran, Kuwait, Israel, Jordan, Morocco, Syria, Tunisia and Turkey in 1960-2004. Level of Indonesian integration in globalization can be seen from the increase of international trade and FDI flow. Trade ratios (total exports and imports) to GRDP increased from 52,18% to 85,96% since 1994-2012. As synchronized with the study above, this study take a hypothesis where the higher the degree of economic openness will impact in increase of inequality.

According to Neo-Classical Theory (NCT), a trade is always rated positive for economic development and economic as a whole. In that case, economic openness of a region can reflect to what extent the trade intensity brought positive or negative impacts on the economy. Argument about trade and economic openness, according to NCT that based on Heckscher-Ohlin theory, located on its efficiency and comparative advantage which produce labour division or known as specialisation (Kuncoro, 2001). New Trade Theory (NTT) argued that trade might reflect an overlay of increasing-returns specialization on comparative advantage was not there at all: instead, the ruling idea was that increasing returns would simply alter the pattern of comparative advantage (Krugman, 1980; 2008). Then, this prediction has been empirically tested by determined empirical equivalent of regional inequivalent on economic openness. Elizondo & Krugman (1996) found that the giant Third World metropolis is an unintended by-product of import-substitution policies, and will tend to shrink as developing countries liberalize.

FDI. Myrdal's approach is argued superior as it taking into account backwash and spread effect within a framework of circular and cumulative causation to explain the persistence inequality between German's western and eastern regions (Hall & Ludwig, 2009). In the developing regions, the demand of product and services will push investment, and hence increase income. In the other hand, in the backward regions, demand of investment is low because of low income per capita. Investment especially private investment is determined by the market power. Some studies, for example Jin (2009), Shahbaz & Naveed (2008), and Reuveny & Quan (2003), found that FDI contributed to the increase of inequality. On the contrary, Jensen & Guillermo (2007) found that the increase of FDI flow related to decrease on income inequality. FDI flow between provinces in Indonesia fluctuated from year to year, 4.08% in 1994, while in 2012 reach 9.04%. Thus, this study take a hypothesis which the higher the FDI ratio to GRDP gives influence to the increase of inequality.

HDI. Solow highlighted to the role of knowledge and capital investment human resource in the economic growth so inequality development can decrease. From the Solow theory which was develop to a new economic growth theory (NGT), it explains there is an increase in the result and the pattern of the country's long-term growth. A country that has limited human capital and physic, their GDP is hard to be compared with a country that has high capital. Alvan (2007) and Nurhuda, et al. (2013) found that inequality has a negative relation and significant to HDI. So, this study took a hypothesis that the higher its HDI number can give an impact to reduce inequality.

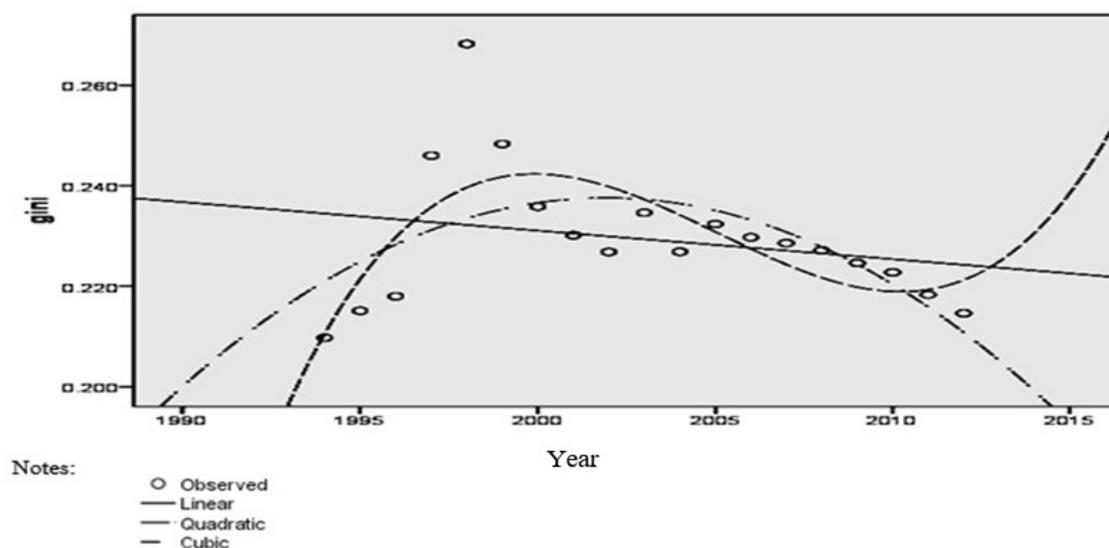
GRDP per capita. NCT and NGT argued that there were a relation between national economic development index of a country with its regional development inequality. At the early stages of growth, inequality tend to get worse and then at the next stage inequality decrease, but inequality will enhance and weaken again so this situation can happen repeatedly (Kuznets, 1955). A theory stated that there is a trade-off between inequality and growth (Kuncoro, 2006). But the reality proves that inequality in developing countries this decade back is related to low

growth, so there is no trade-off in most developing countries between growth and inequality. Sutarno & Kuncoro (2003) found Kuznets hypothesis applied in Banyumas district. Milanovic (2005) and Jin (2009) found that inequality have a positive relationship and significant to GRDP growth per capita. With this, the study take a hypothesis that the higher its GRDP per capita can give an influence to regional inequality.

4. Findings and discussion

4.1 Testing Kuznets hypothesis

Trend analysis is used to get the idea of tendency from a specific variable in a study period. In this study, trend analysis is used to get the growth point of view from all provinces in Indonesia through its inequality level between 1994-2012. Comparing between linear, quadratic, and cubic trend is the way to get the right point of view. Selecting the trend model is based on R^2 value and the significance level on $\alpha = 0,01$, $\alpha = 0,05$, or $\alpha = 0,10$. Trend of inequality level is using Gini coefficient for all provinces shows a fluctuative trend from 1994 until 2012. To see which trend is better, the linear, quadratic, and cubic trend are compared by examining the value of R^2 . Value of R^2 on cubic trend is far higher than that of linear and quadratic. Figure 4 shows that inequality trend shows a declining pattern up till 2010 but turns to increase after 2010.



Comparison of R^2 using linear, quadratic, and cubic model

Inequality Index	Linear	Quadratic	Cubic
Gini coefficient	0,055	0,334	0,500

Figure 4: The trend of Gini coefficient of all provinces in Indonesia, 1994-2012

Kuznets's hypothesis is used in Indonesia from 1994-2012 can be proven with an estimation between Gini coefficient with GRDP per capita logarithm shown on Figure 5. At the beginning of growth, inequality tend to degenerate and inequality decrease on its next steps however it will rise again and then decline. So it can be said that the Kuznets hypothesis applies in Indonesia.

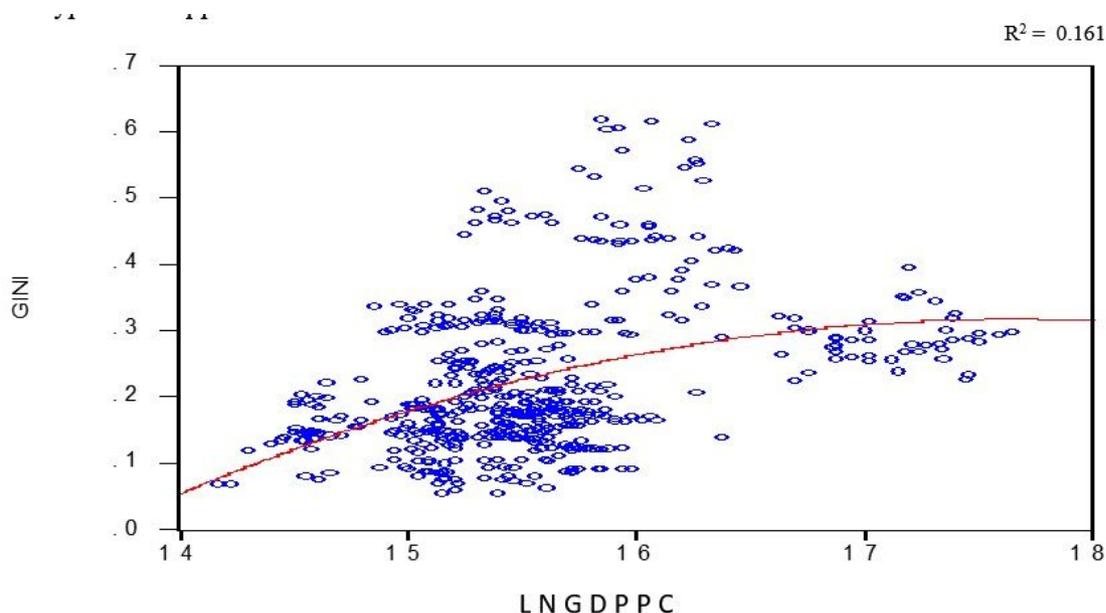


Figure 5: Dependence of the GINI Index on the Common Logarithm of GDRP per Capita for 33 provinces in Indonesia, 1994-2012

The regression estimation on Table 3 shows the comparison between linear regression, quadratic and cubic. From all of the estimation the significant variable model is known where $\ln\text{GRDP}$, $\ln\text{GRDP}^2$, and $\ln\text{GRDP}^3$. Based on the theory that has been discussed, quadratic regression estimation is used to explain Kuznets hypothesis. However *adjusted* R^2 in quadratic estimation is relatively lower than cubic regression although quadratic regression has higher F value than cubic regression.

Explanatory variable	Linear	Quadratic	Cubic
C	-0,842 (-7,413)***	-5,849 (-3,097)***	133,614 (3,618)***
$\ln\text{grdp}$	0,068 (9,399)***	0,699 (2,943)***	-25,760 (-3,680)
$\ln\text{grdp}^2$	-	-0,020 (-2,656)***	1,650 (3,736)***
$\ln\text{grdp}^3$	-	-	-0,035 (-3,782)***
Adjusted R-squared	0,150	0,161	0,183
F-Statistics	88,337	48,239	37,797

Explanation ***alpha = 1%

Table 3: The results of linear regression, quadratic, cubic model with Gini coefficient as dependent variables (t-statistics in the parentheses)

From the regression result, GRDP has a significant positive effect on the increase of inequality. While the GRDP^2 variable effect in the decrease of inequality among provinces in Indonesia. This result is in line with studies by Milanovic (2005) and Jin (2009). The positive relation between GRDP per capita with inequality income due to the increase in income per capita where its people income has not distributed evenly. In most of developing countries emphasis more on the use of capital so its economic benefit is only enjoyed by those who have access to capital.

This result was in line with Neo Classical hypothesis that said in its early days of growth, inequality tends to deteriorate, and in later stages it will decline, but in some time the inequality will rise and finally decrease again so it can be said that such events recur. At the beginning, the degree of inequality among provinces in Indonesia increased but gradually decreased during the study. The increase of GRDP per capita in the study was actually experience an increase in income inequality. On average, GRDP per capita between provinces in Indonesia is likely to be high which concentrated in few regions that has not been evenly spread.

4.2 Key Determinants of Regional Inequality

The inequality function outlined in equation (4) is estimated under different specifications. Regression (1) without GRDP² variable; regression (2) adding GRDP² variable; regression (3) adding the dummy variable of Java island and without GRDP²; and regression (4) including GRDP² variable and the *dummy* of Java island. Table 4 reports the comparison of estimation results.

To check the sensitivity of including dummy variable as a separate variable, we also present estimates with and without fixed effects. Considering that exchange rate is year-specific and common to all provinces, including year dummies in estimations can eliminate this particular and other year-specific effects. As all the variables are in logarithmic form, the difference in conversion factor for total trade only affects the year-specific intercepts. In another specification, a regional dummy is included to capture the inequality difference between Java and non-Java islands.

Within its four estimation, only (3) and (4) estimation that can be classified into the *period fixed effects* category based on Hausman test however in (3) and (4) regression estimation there are not any FDI that can explain significantly. Also with (2) estimation, FDI variable is not significant. However, based on the theory it is concluded that (4) regression that has been used to address the research question. So, only (4) regression estimation will be discuss thoroughly.

*Adjusted R*² that has been used to estimate inequality is about 0,524. It implies taht the 52.4% variation of regional inequality can be explained by independent variables in the model, involving economic openness, FDI, HDI, GRDP, GRDP², and *dummy*. While the rest is about 47,6% explained by the other variables which is not specified in the model. This also in line with F result (22.65) which is significance with $\alpha = 1\%$. It means all explanatory variables (economic openness, FDI, HDI, GRDP, GRDP², and regional dummy) can explain regional inequality.

The variation in the degree of globalisation across provinces, indicated by foreign trade and foreign capital, shows that globalisation through foreign trade, rather than foreign capital, is still a important force behind the widening regional disparity. Economic openness had positive impact and significant to inequality growth. This result correspond to its previous studies by Benar (2007), Elizondo & Krugman (1996), and also Daumal (2010). It is also in line with NTT (Krugman, 1980). The high level of economic openness depends on the value of exports affected by its potential while the high level of import affected by the demand of capital goods, raw material, auxiliary materials for domestic consumption. A high degree of economic openness especially high export expansion push the region to produce a commodity that has *comparative advantage*. Trade push economy source to flow from a sector that has low productivity to a sector that has *comparative advantage* and region has new technology access and international market.

Explanatory variable	Model			
	1	2	3	4
C	-4,028 (-7,864)***	-31,735 (-4,326)***	-3,773 (-8,323)***	-28,988 (-4,589)***
Log(OPENNESS)	0,005 (7,024)***	0,005 (7,583)***	0,002 (3,199)***	0,002 (3,772)***
Log(FDI)	0,019 (1,823)*	0,016 (1,616)	0,013 (1,438)	0,011 (1,217)
Log(IPM)	-0,034 (-8,111)***	-0,036 (-8,494)***	-0,060 (-11,836)***	-0,061 (-12,087)***
Log(GRDP)	0,281 (7,279)***	3,778 (4,086)***	0,385 (10,933)***	3,562 (4,483)***
Log(GRDP) ²	-	-0,110 (-3,786)***	-	-0,100 (-4,002)***
Dummy	-	-	0,539 (12,446)***	0,536 (12,584)***
Adjusted R ²	0,330	0,348	0,508	0,524
F-statistic	59,204	51,575	22,200	22,652
Durbin Watson	0,325	0,323	0,371	0,365
Fixed Effect	No	No	Yes	Yes

Note: *** $\alpha = 1\%$ ** $\alpha = 5\%$ * $\alpha = 10\%$

**Table 4: Estimates of determinants of inequality in Indonesia in 1994-2012
(t statistics in the parenthesis)**

About 60% of export for this study period dominated by 3 provinces which is East Borneo, Irian Jaya, and DKI Jakarta. East Borneo and Irian Jaya are two provinces that are rich of its natural resources especially petroleum. What interesting is that DKI Jakarta hold a key position for national export activity. Exports from this province is actually not from or produce by the province itself. DKI Jakarta's export is high is because the effect of Tanjung Priok international seaport as the largest seaport in Indonesia. With a capacity and infrastructure that is relative better than other seaports, this port is able to attract trade activities from other region in terms of exports and imports. DKI Jakarta's economic openness level is lower than East Borneo because this province shifted to service based-economy, marked by the increase role of the non-trade sectors such as banking, electricity and water, construction, and tourism. Although East Borneo and Irian Jaya does not have a seaport as good as Tanjung Priok, because of the petroleum mining existence allowing exports activity done through the ocean shipping lanes. The ships that carry oil exports do not have to dock at the port but simply approach the offshore oil refineries and bring the oil to the export market.

Economic openness level is affected by how big the international trade activity is. Generally export commodity outside Java are products that has *resource base* with a price index that is usually unstable. So the impact on export values fluctuate. In the other hand, imports of capital goods are unavoidable for further processing of primary products with a tendency to increase. Almost 60% of national import came from DKI Jakarta and East Java, the presence of Tanjung Priok seaport is not only the horse block for export activities but also import especially provinces that is in Java. Similar story for Surabaya seaport, Tanjung Perak. The existence of Tanjung Perak seaport in addition to support trading activities in the province of East Java to support trading activities in eastern Indonesia.

Inequality distribution of investment in a region is one of a factor causing inequality or economic growth. Advantages of the presence from a multinational companies doing foreign investment in the *host country* is because it has more advanced production technology, internationally recognized patent rights, a product that already has brand names, as well as an effective marketing management strategy (Dunning, 1993). This *technology spillover* process help improve the ability (efficiency) production of domestic enterprises. Improved efficiency in the company's production will push up the value of domestic wages for workers to be more productive.

Based on estimation result shows a positive relation and significant between FDI with inequality in Indonesia (see regression 1). Myrdal stated that profit oriented encourage the development of construction in areas that have high earnings expectations, while other areas remain backward (Jhingan, 2004). This result is in line with theories and studies from Jin (2009), Reuveny (2003), also Shahbaz & Naveed (2008) stated that FDI has a contribution on the increase of inequality. From the direct data apparently the incoming of FDI have not felt by most local people in many regions in Indonesia. Provinces outside Java has a very limited infrastructure that can inhibit as well in terms of attracting FDI. Other than that, investment regulation in every provinces follow the policies from the central government. However, each provinces has different speeds in managing and issuing the investment license. Given that in mind, the provinces in Indonesia have different characteristics that will influence investors in choosing their location. These characteristics include infrastructure, economic structure and development stages, economic policy, the legal system, and natural resources.

The uneven distribution of foreign direct investment (InFDI) has not been a dominant factor behind the increase in regional inequality in Indonesia. This finding challenges Zhang & Zhang (2012)'s findings that FDI and trade have played important roles in contributing to changes in overall regional inequality. Indonesia has adopted a preferential policy for the coastal regions since the 1980s. Almost all the inland provinces have set up offices or investing companies in the special zones in the coastal areas. Because of the favourable investment policy, even domestic capital has flown to south and east.

Another key explanatory variable is the human resources both in terms of quantity and quality. The differences in those characteristics enable each region to have the number and value of different investment. The uneven distribution of human resources really effect the level of economic development for the province. Solow's theory emphasized that the role of science and capital investment in human resources spurred the economic growth. Endogenous growth model was developed to complement Neo Classical growth theory, which focuses on the importance of human resources as the key economic variable. Referring to endogenous growth theory, human capital is a critical factor and major source of economic growth, and hence, the high levels of human development can boost economic growth so that inequality growth can be reduced. The extent of human well-being can be seen from the indicator of HDI. Life expectancy indicator measures health. Indicators of adult literacy rate and the average length of attending school measures education. Real income with purchasing power parity measures the standard of living. These three indicators affect each other, and it was also influenced by the availability of employment opportunities that is determined by the economic growth, infrastructure, and government policies. The coefficient of HDI has a negative and significant impacts on inequality. It implies that our finding is in favor of the theories and previous studies from Alvan (2008) and Nurhuda, et al (2013). With the trend of fiscal decentralisation, provinces are allowed to keep a larger share of revenues locally, which further reduces the central government redistribution power and enlarges the regional disparity. Education has been the only

equalising factor. The education disparity between inland and coastal regions has been much smaller and increased rather slower than most other factors.

Java's *dummy* variable provides a significant positive effect on regional inequality in Indonesia. From regions in Indonesia, Java's human resources are viewed both from its quality and quantity better than other regions because the existence of above average universities. Not only the physical infrastructure of Java is better than other regions but also the central government is located in Java. Besides that, the land on Java island is more fertile compared to other regions although judging from its area is relative narrow. Fertile land can be characterised by high productivity per hectare, making Java a good barns for grain production and horticulture, as well as having a relative growing plantations such as rubber, coconut, coffee and recently palm oil, cocoa and others are also evolving. Judging from industrial development, the industry in Java has evolved since a long time such as sugar industry and from government's point of view there is a tendency of central region associated with centralised governments which tends to be more rapid than areas that is far from the centre of government. These are the factors that characterise the diversity of Indonesia's GRDP.

4. Conclusions

Using panel data of 26 provinces in Indonesia during the period 1994-2012, the empirical results of this study shows that the trend of inequality tended to decline over the period of 1994-2012, albeit had a cubic form. Our findings support Kuznets hypothesis, i.e. the relationship between Gini coefficient with GRDP per capita formed an inverted U. In the early growth of inequality it tends to deteriorate and later it decline, but at some time inequality will rise and finally decreased again.

Economic openness affected regional inequality positively and significantly in Indonesia during the study period. Based on the regression result, economic openness has a positive effect on the increase of inequality. This is because about 60% of export is dominated by three provinces which is East Kalimantan, Irian Jaya, and DKI Jakarta. East Kalimantan and Irian Jaya are two provinces that are rich of its natural resources especially petroleum. DKI Jakarta hold a key position for national export activity which are not from or produce from the province itself, but because the existence of Tanjung Priok international seaport with a capacity and infrastructure that is relative better than other seaports.

The government should strive to increase technology and add more capacity for the port to increase its trade activity. In addition, it is also necessary to encourage an increase on number of investments by facilitating investment incentives so investors will be interested in investing. Investment is also directed at a less developed area by building facilities and supporting infrastructures.

There should also be an increase in education and health sector. In education, improving the quality of teachers and increase the number of schools will help to reduce the number of illiterate. In the health sector, increasing the distribution of medicines and health care, increase the number of doctors and midwives, as well as adding health centres or hospitals in remote areas that has difficult transportation to increase life expectancy and reduce death rate. In terms of GRDP per capita, the need to increase the quality and quantity of human resources in the outer island is with increase the number of schools, training centres, facilities and infrastructures, as well as an increase in industrial and agricultural sector (land on the island of Java are relative fertile and wider than areas outside Java). With this, incomes will be expected to increase.

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