Education Performance and the Determinants of Secondary School Enrolment in Indonesia

by Lilik Sugiharti

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ABSTRACT

Objective – The development in education sector as one form of human capital development has been implemented in Indonesia. Some government programs have been attempted as an alternative solution to improve the quality of education. **Methodology/Technique** – The paper calculates and analyses an education inequality in Indonesia from 2005 to 2012, and the logit model conducted to estimate the probability of school attendance particularly in secondary school, both in junior and high school. **Findings** – The result was very significant which is in term of enrolment rate, the primary education was more equal. However, the data found that the enrolment rate of secondary school was lower than the primary school which was 89.29% of junior school, and 68.45% of high school in 2012. In general there has been education performance improvements in Indonesia during 2005 to 2012.There was a magnitude decrease of education Gini index from 0.353 in 2005 to 0.318 in 2012. In term of location, using the education Lorenz curve it was found that the education inequality was higher in rural than in urban area. There was a strong negative correlation between Mean Years of Schooling and the education Gini index, increasing the mean years of schooling, the education performance will be more equal. Moreover, gender of a child, household characteristics, i.e. father's education, mother's education, poverty status, and geographic location of households, in rural and urban area had a strong and significant effects on secondary school enrolment in Indonesia. **Novelty** – The study uses Gini index, Lorenz Curve and Logit model to determine educational performance. **Type of Paper:** Empirical.

Keywords: School Enrolment; Gini Index; Lorenz Curve; Education Inequality; Logit Model; Indonesia.
JEL Classification: I20, I21, I23.

1. Introduction

Education has a major role in the accumulation of human capital (Galor & Moav, 2004), while Easterly (2004) found that inequality in education is positively correlated with income inequality, however there is a weak association between education attainment and output per worker. Education as a form of human capital investments has an impact on the aggregate output growth, because human capital is one of input used in the production function. Higher levels of education can encourage a production level and a country's export.

The development in the education sector as one form of human capital development has been implemented in Indonesia. Some government programs have been attempted as an alternative solution to improve the quality of education, one of those is the compulsory nine-year basic education contained in the regulation of the Government of the Republic of Indonesia No. 47 in 2008. The result was very significant which was more than 100% people in the age group were completing of primary school. It means that in term of enrollment rate, the primary education was more equal or there was not different in accessibility of primary school among people. Moreover, the education performance has been improved such as Mean Years of Schooling (MYS), and literacy rates. Indonesia has been experienced with a moderate increasing in MYS and literacy rates, respectively, 6.74 years in 2001 and 8.08 years in 2012, and literacy rates were 89.27% in 2001, and 93,10% in 2012. Actually, the main focus should be not only on the growth, but also the education distribution among people and regions.

However, the data found that the enrollment rate of secondary school was lower than the primary school, which was 89.29% of junior school, and 68.45% of high school in 2012. Therefore, to improve the development of human capital, since 2012 the Government has already begun a 12-year compulsory education program in several areas in Indonesia (Bappenas, 2015). The Indonesia primary and secondary school systems contain 12 grades in total, where the primary level is made up of the first 6 grades, and the secondary level is divided into junior (3 grades) and senior/high (3 grades) secondary levels. Under normal circumstances, a child starts the first grade of primary school at around 6 years old and graduates from senior secondary school when he or she is around 18 years old.

The main findings that there have been education performance improvements in Indonesia during 2005 to 2012 such as education attainment, school enrollment ratio, literacy rates and mean years of schooling. There was a magnitude decrease of the education Gini index from 0.353 in 2005 to 0.318 in 2012. Meanwhile, in term of the provinces in Indonesia, mostly they have improved, however the highest inequality was in Papua respectively, followed by Gorontalo, South Sulawesi, West Nusa Tenggara, East Nusa Tenggara, Bangka Belitung, East Java, West Kalimantan Central Java, and Bali. In terms of location, using the education Lorenz curve it was found that the education inequality was higher in rural than in urban area. There was a strong negative correlation between Mean Years of Schooling and the education Gini index. Moreover, the gender of a child, household characteristics, i.e. father's education, mother's education, poverty status, and geographic location of households, in rural and urban area had a strong and significant effects on secondary school enrollment in Indonesia.

In this paper, firstly we observe the general performance of education in Indonesia, particularly in secondary school level. This is essential since there may be differences in educational performance between the primary school level and secondary school level as well. Secondly, we analyze the determinants of school participation in secondary school level, junior school and senior/high school levels using a panel data set which is attributed by both of individual and household characteristics.

2. Literature Review

The role of human capital (education and health) is recognized both in theoretical and empirical economics literature. Investment in human capital is the precondition for developing countries to absorb modern technology and improve productivity, which in turn leads to higher income and improved economic performance. It is also considered as an effective tool to improve the welfare of people. Better education and health services enhance productivity and earnings of the workers. The importance of human capital in the form of education and experience has often been emphasized as a particularly main determinant of income or production (Mincer, 1958) (Schultz, 1988). Also, an improvement in a country's educational level not only increases its citizen's understanding of their rights and opportunities, but also has an empowering effect on women, which can lower the fertility rates and child mortality rates (World Bank, 2005).

Human capital is defined as the skill, education, health, and training of individuals and it is capital because these skills or education are an integral part of us that is long lasting, in the way a machine, plant, or factory

lasts (Becker, 1962). Parallel with the statement, all those qualities of a person such as knowledge, health, skills, and experience that affects his or her possibilities of earning current and future money income, psychological income, and income in kind is called human capital (Kooreman, 1997). Furthermore, human capital theory is mainly based on education because it imparts knowledge and skills (Tilak, 1994). Numerous studies showed that investment in education allows the poor to escape from poverty. Investment in education increases the ability of the individual and makes them more productive and more efficient. An individual with more productivity and better skilled has more choices and opportunities. Better opportunities help in getting good jobs and in doing good business and hence increase the income level. In a competitive market, wages paid equal marginal productivity of the labor, so higher the productivity higher the returns. Poverty is negatively linked with the income level of household, so higher wages implies low poverty.

Government has to have a proper policy on educational development, concerning not only in demand side but also supply side of education. There are four factors affecting individual demand of education (Digdowiseiso, 2010). Firstly, household characteristics (i.e., income, wealth, family size, and education level of the parents). Secondly, child characteristics (i.e., innate ability, health, nutrition, cognitive growth, and gender). Thirdly, the quality of schooling (i.e., teaching quality, pupil/teacher ratio, class size, teacher qualification, quality of classrooms and reading writing equipment, curriculum, school infrastructure and regular maintenance, electricity supply, drinking water facilities and toilets), and lastly, return from school. Meanwhile, factor affects the individual supply of education is a quantitative factor (the availability of school facilities, access to schooling, school location and distance that influence the travel cost in education, and size and the quantity of school).

According to Suryadarma et al. (2006), there are many demand side factors affecting an enrollment rate. Firstly, household welfare, children from poor households experience dropped out because their parents have no supports for paying the education expenses especially in developing countries. Secondly, education level of parents, children from more educated parents are much less likely to experience dropped out. Thirdly, the expected future returns on education, and lastly, there is an indication of gender discrimination in school participation in some developing country.

In relevance with the determinants of school enrollment, several studies found that demand side intervention such as increasing the parents' income and literacy have a stronger impact on school enrollment rate than supply side intervention in Mozambique, and building schools increased female enrollment among poorer households more than those such richer households (Davis et al., 2002). Meanwhile, from supply side Filmer (2004) found in 21 developing countries that building schools in several areas reduced the travel time and cost to get to school which increased an enrollment even at a small rate. Moreover, Handa (2005); Kevane and Levine (2000) concluded that there were no influences of gender on enrollment rate, and there was a small gap at secondary school level, and no gap at all primary school level.

Regarding a trade-off between education and work, Federman and Levine (2003) observe the impact of industrialization on enrollment of secondary school level. They stated that industrialization may affect an enrollment rate through two ways, changing the returns on education, and increasing the opportunity cost of sending the children to school. However, there was not a conclusive relationship between the two such things. Generally, industrialization was associated with the junior secondary enrollment rate, and specifically it was associated with girls' enrollment rate decreases when they live with working mother in a manufacturing sector.

In the perspective of household welfare, Cameron (2001) used a panel data from 100 villages in Indonesia found that there was a small reduction in school attendance during the crisis of 1997/1998, which was immediately rebounded after the crisis. Meanwhile, Hardjono (2004) observed the impact of poverty on school dropouts in two provinces in Indonesia, Bali and West Nusa Tenggara. Cultural aspects influence the persons' perceptions of educational values, which Balinese were more concerning on education. As a result, the primary school completion rate in Bali was higher than it was in West Nusa Tenggara. Another finding stated that the high dropout rates in junior secondary school in the both provinces were more caused by parent inability to

pay for school expenses especially for transportation cost, and an inadequate capacity or availability of junior secondary school buildings.

3. Methodology

This research used the National Social Economic Survey (SUSENAS) data 2012 which was published by Bureau Statistics Indonesia (BPS). For the purpose of calculating education inequality in Indonesia, two methods are used, direct method for capturing education Gini index, and indirect method for describing the Lorenz curve based on the cumulative proportion of population and that of schooling. The direct method states that the education Gini is defined as the ratio to the mean (MYS) of half of the average over all pairs of the absolute deviations between all possible pairs of people (Deaton, 1997) which was adopted by Thomas et al (2000).

$$GINI = \frac{1}{\mu}\sum_{i=2}^{n} \quad \sum_{j=1}^{i-1} p_i \left|y_i - y_j\right| p_j \qquad (1)$$

where GINI is an education Gini index based on educational attainment distribution, μ is mean years of schooling for the concerned population, n is the number of levels/categories in attainment data, in this research n=5, p_i dan p_j is a proportion of population with certain levels of schooling y_i and y_j is the years of schooling at different educational attainment levels.

The indirect method constructs the education Lorenz curve, the combination between the cumulative percentage of the population on the horizontal axis, shown in Q. The forty-five degree line is the education egalitarian line which represents a perfect equality of schooling. Therefore, the education Gini is the ratio between the area of A and the area of OWQ.

$$GINI = \frac{region \ A \ (between \ egalitarian \ line \ and \ Lorenz \ Curve)}{Region \ OWQ \ (triangular \ of \ equality)} \qquad (2)$$

To sum up the brief discussion of theoretical considerations above, the determinants of school attendance or participation are the individual characteristic, i.e. gender of a child, household characteristics, i.e. father's education, mother's education, poverty status, and geographic location which describes the variation of school attendance or participation across households due to location, in rural and urban area. Combining the theoretical discussion above with the available data from SUSENAS, it is possible to formulate an empirical model for testing the determinants of school attendance or participation in Indonesia using a binomial logistic regression model. The dependent variable is dichotomous, 1 if an individual/child attend or participate in schooling, and 0 otherwise. Let Pi denotes the probability that the ith an individual or a child attends or participates in schooling. It is assumed a Bernoulli variable and its distribution depends on the vector of predictors X, so that:

$$P_i(X) = \frac{e^{\alpha + \beta X}}{1 + e^{\alpha + \beta X}} \qquad (3)$$

where β is a row vector and α is a scalar. The logit function to be estimated is then written as:

$$ln\frac{P_i}{1-P_i} = \alpha + \sum_i \beta_i X_{ij} \qquad (4)$$

The logit variable, $ln\frac{P_i}{1-P_i}$ is the natural log of the odds in favor of the individual or the child is not attending or participating in school. Equation (4) is estimated by maximum likelihood method, and the procedure does not require assumptions of normality or homoscedasticity of errors in predictor variables (Mok, 2007). The explanatory variables contain three factors, individual characteristic (gender of a child), household

characteristics (father's education, mother's education, and poverty status), and geographic characteristics (household location, in urban or in rural areas). It contains dichotomous variables.

4. Results and Discussion

4.1 Indonesia's Education Performance

Generally, there has been an improvement in education performance during eight years, the education attainment in Indonesia 2007 and 2012 was dominated by people group who completed of primary school which is low education level, and otherwise the completed of university. People group who completed of primary school was 30% on average, and the completed of the university only around 5%. However, the proportion of completed junior school, high school, and university have been increased during 8 years, and otherwise the rates of not completed primary school declined drastically almost 10%, and also completed of primary school was more than 4%. In terms of school enrollment ratio (APK), the primary education has been more equally in Indonesia, people group who completed primary school was more than 100%. Respectively followed by people group completed junior school, high school, and the lowest was completed university. Even though, the school enrollment ratio does not reflect the stock of human capital (Thomas et al., 2001), it means that the people access of primary school was not different. In addition, it must be appreciated that for eight years there has been a significant increase in people group completed junior school (7.2%), high school (13.24%), and completed university (7.79%).
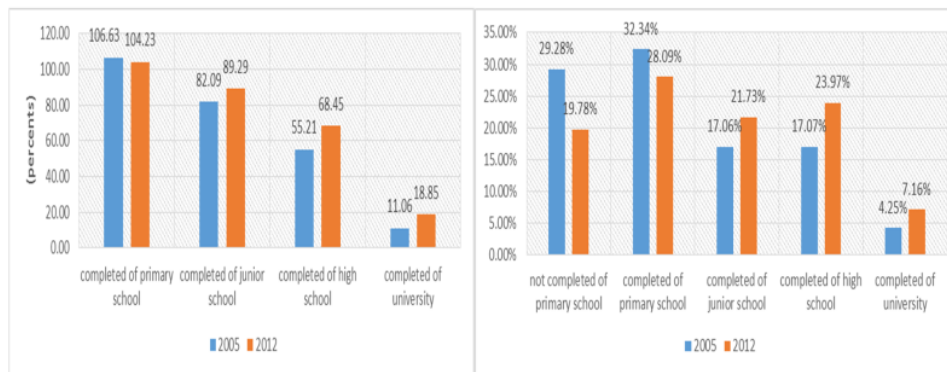

Figure 1. School Enrolment Ratio and Education Attainment in Indonesia, 2005 and 2012
Source: Calculated from Indonesia Statistic

The literacy rates also increased from 89.27% in 2001 to 93.10% in 2012. Even though there was an improvement in education performance in term of education attainment, school enrollment ratio, and literacy rates, it cannot depict the variations or dispersions among regions. Therefore, it needs to explore more about the dispersion of the education distribution using the education Gini index and education Lorenz curve. Mean years of schooling in Indonesia have been increasing significantly, it means that there is an improvement in education quality, but it did not fulfill the nine years compulsory education program yet. The Indonesia MYS on average was 7.45 years, and it increased from 6.74 years in 2001 to 8.08 years in 2012, it means that the majority of Indonesian people did not complete the junior school yet. In the future, it will be a hard assignment for increasing the MYS more than nine years or equal to a group of high school completed.
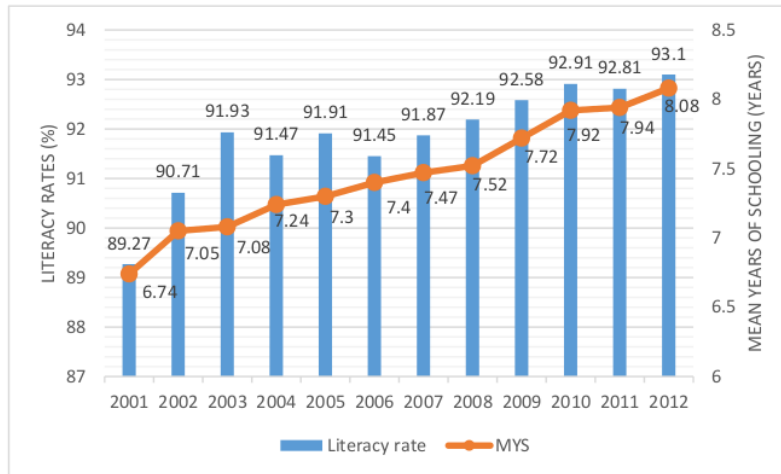
Figure 2. Literacy Rates and Mean Years of Schooling in Indonesia, 2005 and 2012
Source: Calculated from Indonesia Statistic

Generally, education equality improved significantly from 2005 to 2012. The education Gini index has been declining for eight years, it means that education was more equal in Indonesia. In 2005, the index was categorized as moderate inequality (0.353), and in 2006 there was a slightly declined (0.350), but in 2007 it had been a slight increased (0.351). During eight years (2007-2012), it has been a magnitude decline from 0.351 to 0.318 in 2012, and it was categorized as a low inequality. In terms of provinces, Papua exposed to the highest education Gini index in Indonesia. The education Gini index in Papua was 0.441, almost doubling to the DKI Jakarta which was the lowest, 0.222. There were ten provinces with an education Gini index above the national average, i.e. the province of Bangka Belitung, Central Java, East Java, Bali, West Nusa Tenggara, East Nusa Tenggara, West Kalimantan, South Sulawesi and Gorontalo. However, generally in 2012 educational inequality in Indonesia has improved drastically, which illustrated by declining of education Gini index across provinces from 0.353 in 2007 to 0.315 in 2012.
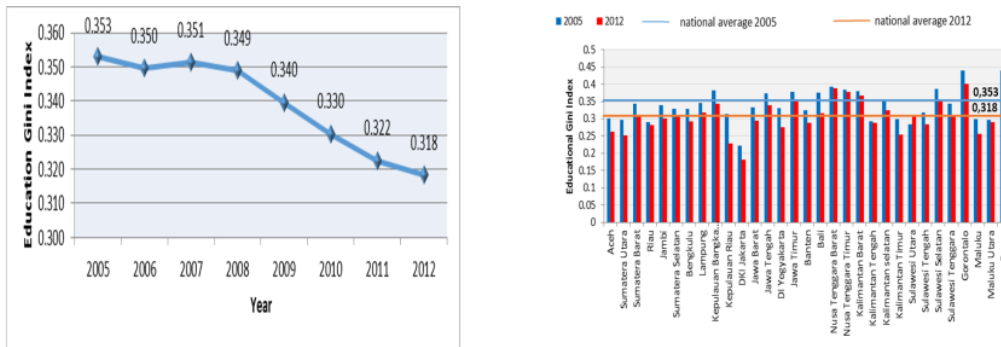

Figure 3. Trend of Education Gini Index in Indonesia 2001-2012
Source: Calculated from Indonesia Statistic

Education equality improved significantly from 2005 to 2012. The education Gini index has been declining for eight years from 0.353 which was categorized as moderate inequality to 0.318 which was a low inequality, it means that education was more equal in Indonesia. However, in terms of provinces, Papua exposed to the highest education Gini index in Indonesia. The education Gini index in Papua was 0.441, almost doubling to the DKI Jakarta which was the lowest, 0.222. There were ten provinces with an education Gini index above the national average, i.e. the province of Bangka Belitung, Central Java, East Java, Bali, West Nusa Tenggara, East Nusa Tenggara, West Kalimantan, South Sulawesi and Gorontalo.

The change of educational inequality can be seen from the shift of the education Lorenz curve. The figure shows that in the period of 2005-2012, Indonesia experienced an improvement in educational inequality. This is shown by the shifting of the education Lorenz curve closer to the egalitarian line, and it indicated that educational achievements in Indonesia tend to be equal. The MYS in 2005 was 7.3 years and it increased to 8.08 years in 2012, while the education Gini index was 0.353 in 2005 and it decreased to 0. 318 in 2012. In terms of location, the education inequality was higher in rural than in urban area. The education achievement gap between rural and urban area was high. Respectively in the rural area, the MYS was 6.70 years, which was equal to completed of primary school, and the education Gini index was 0.350, a moderate inequality. Meanwhile, in an urban area the MYS was 9.19 years equal to completed of junior school and the education Gini index was 0.248, a slight inequality. From a public policy perspective, it has proven that Indonesia must concern on education improvement especially in rural area.
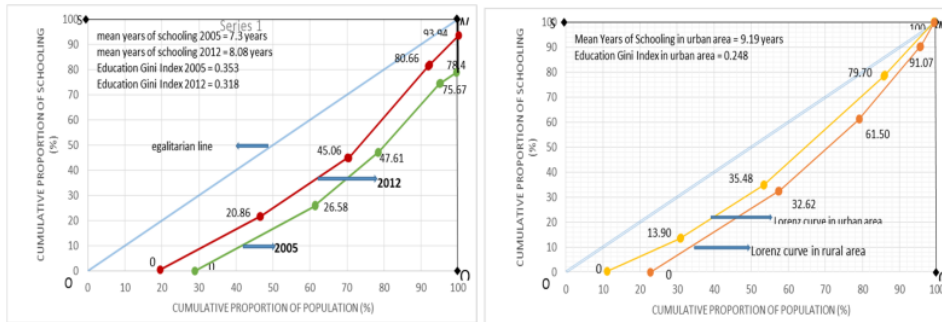

Figure 4. Education Lorenz Curve in Indonesia, 2005 & 2012, and Based on Rural and Urban Area
Source: Calculated by Author

There was a negative correlation between Mean Years of Schooling and the education Gini index. It means that if the mean years of schooling increase the education Gini index will be declined. The correlation coefficient was -0.97456, it was highly correlated between the MYS and the education Gini index in Indonesia. This result supported Thomas's et al. (2001) finding, and it implies that for proper public policy, increasing the MYS is one of the important targets for reducing education inequality in Indonesia.
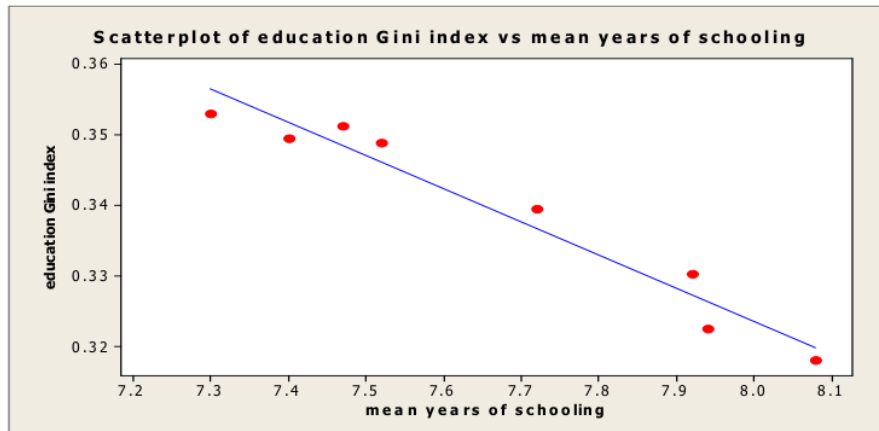
Figure 5. Scatter Plot between the MYS and Education Gini Index, 2005-2012
Source: Calculated from Indonesia Statistic

4.2 The Determinants of Secondary School Enrollment in Indonesia

Table 1 showed that the gender of a child, household characteristics, i.e. father's education, mother's education, poverty status, and geographic location of households, in rural and urban area had a strong and significant effects on secondary school enrollment in Indonesia. Probability of male to attend the school was less than female in both junior school and senior school. It indicated that there was a trade-off between schooling and other activities such as working particularly for boys. The more educated parents the more probability of children to attend of school, in both education levels. If the household is categorized as non-poor, the probability of children to attend of school was greater than the poor in both education levels, and vice versa. Household location also had a significant effect on secondary school enrollment, the probability of urban household location was greater to attend of school than the rural one.

Table 1. Regression Result of Secondary School Enrollment in Indonesia

No.	Variables	Junior Secondary School			Senior Secondary School		
		Coef.	P>|Z|	Odds Ratio	Coef.	P>|Z|	Odds Ratio
1	Individual Characteristics						
	Gender of children	-0.30528	0.00000	0.73691	-0.24638	0.00000	0.78162
2	Households Characteristics						
	Father's education	0.47724	0.00000	1.61162	0.59424	0.00000	1.81166
	Mother's education	-0.13843	0.00000	0.87071	0.19129	0.00000	1.21081
	Poverty Status	0.90283	0.00000	2.46658	0.70107	0.00000	2.01592
3	Geographic Characteristic						
	Location	0.66722	0.00000	1.94882	0.35751	0.00000	1.42977
	Constant	1.35969	0.00000	3.89500	-0.16679	0.00000	0.84637
	Number of Observations	248603			210008		
	LR Chi^2(5)	8467.85			12653.97		
	Prob>Chi^2	0.0000			0.0000		
	Pseudo R^2	0.0519			0.0469		

Source: Calculated by Author

5. Conclusion and Policy Implications

This study calculated and analyzed an education inequality in Indonesia from 2005 to 2012 using the two methods, direct and indirect method. The education Gini index is used for the direct method while the education Lorenz curve is applied to the indirect method. Based on those two methods, several findings on educational performance in Indonesia can be presented. Firstly, in general there has been education performance improvements in Indonesia during 2005 to 2012 in term of education attainment, school enrollment ratio, literacy rates and mean years of schooling. Secondly, from the national perspective, education was more equal in Indonesia. There was a magnitude decrease of the education Gini index from 0.353 in 2005 to 0.318 in 2012. Meanwhile, in term of provinces, mostly they have improved, however the highest inequality was in Papua respectively followed by Gorontalo, South Sulawesi, West Nusa Tenggara, East Nusa Tenggara, Bangka Belitung, East Java, West Kalimantan, Central Java, and Bali. Thirdly, in term of location, using the education Lorenz curve it found that the education inequality was higher in rural than in urban area. The education achievement gap between rural and urban area was high, and this result also confirmed the finding that rural household location had a less probability to attend the school. Fourthly, there was a trade-off between schooling and working particularly for boys in both education levels. As a result, the drop-out rate in secondary school was very high. From a public policy perspective, it has proven that Indonesia must concern on education improvement particularly in rural areas, and has to maintain the dropout rate. Lastly, there was a strong negative correlation between MYS and the education Gini index. It means that if the mean years of schooling increase the education Gini index will be declined. Moreover, increasing the mean years of schooling, the education performance will be more equal. Based on these findings, it implies that education Gini index need to be incorporated with quality aspects and accounted the causal relationship between education Gini and income growth. In addition, it needs to examine the linkage between education inequality and other aspects of development such as income inequality, income level and growth, gender gap, and poverty in the future research. Furthermore, it is also important to incorporate the spatial or location factors in the models to analyze the convergence process and the spillover effects of education.

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