Education inequality: become better or worse?

Tan, Sui Chin and Ho, Chong Mun and Pang, Vincent

Faculty of Science and Natural Resources, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia, Faculty of Science and Natural Resources, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia, Centre for the Promotion of Knowledge and Language Learning, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia

2015

Education inequality: become better or worse?

Sui Chin Tan[a,*], Chong Mun Ho[a] and Vincent Pang[b]

[a]*Faculty of Science and Natural Resources, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia*

[b]*Centre for the Promotion of Knowledge and Language Learning, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia*

Inequality measured by using Theil index, can be decomposed into between and within–groups. Normally, studies only focus on the inequality within-group due to high percentage of inequality within-group as compared to the between-group. Therefore, the conclusions that have been made in the past have neglected the between-group inequality. In this study, education achievement is used as indicator, and between-group inequality is observed for the case study in Sabah, Malaysia. It is noted that while the education inequality in urban and rural areas as well as its overall level has decreased, the gap between two areas has become more distinct.

Keywords: Between-group inequality, Education achievement, Education inequality, Theil Index.
JEL: I24, I21

I. INTRODUCTION

In recent years, there are a number of research papers have been done to uncover the distribution of education inequality. The findings are generally rooted in standard deviation (Lam and Levison, 1992; Ram, 1990) and Gini index (Thomas *et al.*, 2001, 2002), which cannot be easily decomposed. Therefore, Theil index is employed in this paper; in which it can be decomposed into between and within–group components. In economics, recent studies make used this advantage to decomposed income inequality into groups; which included Kanbur and Zhuang (2013) and Segala *et al* (2014).

*Corresponding author. E-mail: suichintan@gmail.com

During the interpretation of inequality decompositions, there are issues where within-groups inequality is often found to be higher than between-group (Elbers *et al.*, 2008). In an empirical study done by Akita *et al.* (1999), the between-province inequality in Indonesia accounted for only 17-18% of the total inequality in early 1990s. However, due to this smaller percentage account for between-group inequality has made them to recommend the policy maker to focus more on within-province inequality, rather than between them. A similar conclusion was made by Agrawal (2014) for a case study in India. In fact, relatively smaller share of between–group inequality does not mean it is less important than inequalities within such groups (Kanbur, 2000). Between-group inequality reflects the social stability and racial harmony, which would break down once the average differences between groups go beyond a certain threshold. To avoid this situation happening, the gaps among groups have to be minimized and become more convergence. According to Solow-Swan growth theories, to reach the convergence state, the poorer groups need to grow faster than the better groups; as shown in the empirical study on global income by Park(1997).

Another highlighted issue is the usage of indicator in measuring education inequality. Most literatures were using education enrolment or education attainment as indicator, and show that education inequality is inversely related to the education enrolment average (Maas and Criel, 1982) or average year of schooling (Thomas *et al*., 2002). In other words, as the average number of education enrolment or years of schooling increases, the education inequality will be smaller. However, there are critics stated that education enrolment only represents the flow of population access to education (Hanushek, 1986), while education attainment research often assumes that the quality of schooling is equivalent for everyone with similar years of schooling (Thomas *et al*., 2001). Thus, both indicators are only able to measure the quantity of education, and ignore the important of the quality of schooling. According to Behrman and Birdsall (1983), and Card and Krueger (1992), quality of schooling is an important contribution in the understanding of education distribution. Therefore, education achievement is proposed as a better measurement.

Nevertheless, without knowing the average performance, knowledge on education inequality alone may not be informative enough. This is because of the inequality can be minimal in two conditions: either when most of the students have poor grades, or when majority of them score good marks. Therefore, in this paper, interpretation is done by combining education inequality and the average performance.

II. DATA AND METHODOLOGY

This study utilizes information about the results of the Malaysian Certificate of Education (SPM) Examination from the Sabah State Education Department (JPN) in 2009-2013. SPM is administrated to all fifth year secondary school students. 188 secondary schools are included in the sample. However, only result from mathematics subject is included in the calculation, as it is a strong predictor of performance (Bishop, 1991; OECD, 2013).

The SPM results are divided into four general categories and for calculation purposes, each grade is assigned with a point value as shown in Table 1. The mean grade (MG) is the average grade which is calculated based on these points assigned as shown below:

Table 1. Classification of grades and their respective points

Classification	**Distinction**			**Credit**				**Pass**		**Fail**
Grade	A+	A	A-	B+	B	C+	C	D	E	F
Point value	10	9	8	7	6	5	4	3	2	1

Education inequality is estimated by using the Theil T index, the Theil T model used is:

$$\mathrm{T} = \sum_i^n \sum_j^{N_i} \left(\frac{Y_{ij}}{Y}\right) \ln[\frac{\left(\frac{Y_{ij}}{Y}\right)}{\left(\frac{1}{N}\right)}]$$

where Y_{ij} is the grade for individual student j, group i, n is the number of groups, N is the group size and Y is the cumulative grade of every student in group. n = 2 for urban-rural, n = 24 for districts and n = 188 for schools.

Theil inequality is ranges from 0 (perfect equality) to 1 (perfect inequality). If all candidates are achieving the similar grade, Theil index will be equal to zero. Otherwise, if only one candidate is achieving maximum marks while the rest of them are achieving zero mark, Theil index will be 1. The decomposition of Theil T is shown as following:

$$T = \sum_i^n \left(\frac{Y_i}{Y}\right) T_i + \sum_i^n \left(\frac{Y_i}{Y}\right) ln \left(\frac{Y_i/Y}{N_i/N}\right) = \mathrm{T_W} + \mathrm{T_B}$$

where $T_i = \sum_j^{N_i} \left(\frac{Y_{ij}}{Y_i}\right) \ln \left(\frac{{}^{Y_{ij}}/_{Y_i}}{{}^{1}/_{N_i}} \right)$. T_W and T_B are between and within decomposition component respectively.

III. RESULTS

From the overall results, MG for rural and urban areas indicated an increase in the past five years and slight improvement in the percentage of candidates who obtained distinction, credit and pass from 2009 to 2013 and reduction of candidates who failed the subject in 2013. As seen in Table 2, the MG was higher in urban areas as compared to rural areas each year. The percentage of candidates who failed the examination in rural areas was still high, which was 25.6% in 2013. The variance shows that the performance of students in rural areas had a narrower spread around the mean compared to those in urban areas.

Table 2. Percentage of population taken SPM across grade levels

Grades	Urban					Rural				
	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013
Distinction	18.7	21.0	19.7	23.7	25.0	10.0	10.6	10.0	12.1	12.4
Credit	22.9	25.0	25.9	25.7	26.5	20.0	22.1	21.0	21.9	22.9
Pass	34.0	32.6	34.7	31.7	32.4	37.2	36.7	39.0	37.4	39.2
Fail	24.4	21.4	19.8	18.9	16.0	33.0	30.6	30.0	28.5	25.6
Total (%)	100	100	100	100	100	100	100	100	100	100
MG	4.0	4.2	4.2	4.5	4.7	3.1	3.3	3.2	3.4	3.5
Variance	8.5	8.9	8.4	9.3	9.2	6.1	6.4	6.1	6.9	6.7

Rural areas have relatively high inequality compared to urban areas (Table 3), and it was shown by poorer result of students' achievement for rural areas in Table 2. Based on Table 3, the education inequality for urban, rural area and overall inequality has decreased over the past five years. In addition,

the within-urban-rural inequality component has also shown an improvement of performance over the years.

Table 3. Inequality decomposition by urban-rural in Sabah, and inequality in urban, rural area decomposed for schools.

	Theil Index				
	2009	**2010**	**2011**	**2012**	**2013**
Total Sabah	0.275	0.263	0.255	0.255	0.243
Between-urban-rural	0.007	0.008	0.009	0.009	0.010
Within-urban-rural	0.268	0.255	0.246	0.246	0.233
Total Urban	0.261	0.245	0.235	0.232	0.217
Between-school	0.052	0.043	0.044	0.041	0.040
Within-school	0.209	0.202	0.192	0.191	0.177
Total Rural	0.277	0.267	0.262	0.265	0.247
Between-school	0.024	0.035	0.031	0.029	0.028
Within-school	0.252	0.231	0.231	0.235	0.220

Notes: Figures in parentheses are percentages.

In Table 3, between-urban-rural component shows an increase of the inequality over the years. This implied that gap between rural and urban areas has become wider; which, contradict with convergence hypothesis where the gap should be narrowed. The gap may cause by different rate of improvement between both areas. Rural area has experienced slow improvement in education, which shown with the risen of between-school inequality from 0.024 in 2009 to 0.028 in 2013, and reaching a maximum of 0.035 in 2010. On the other hand, urban areas have shown a better improvement, where between-school inequality has exhibited a slight decline from 0.052 in 2009 to 0.040 in 2013.

The number of rural schools in district affects the education inequality for the district. This is shown from the disparity of achievement that caused by vary percentage of rural schools in districts. Thus, the MG will be higher for districts with more urban schools. In the decomposition of education inequality by districts, within-districts inequality was observed with a downward trend, while the between-districts

inequality was increasing. Besides that, there are certain cases where two districts have low inequality, yet they are having different MG; where one of them has better MG while the other one has poorer performance. Hence, the consideration of MG in the interpretation of education inequality is crucial.

IV. CONCLUSION

This article shows the role played by between-group inequality in overall education inequality. From the case study for Sabah from 2009–2013, it was found that education inequality in rural area is always higher than urban areas. Although there was a reduction in the levels of inequality in urban and rural areas, the study found that the gap between these two areas is still increasing due to the low improvement rate in rural schools.

Education achievement that is being used in this study is a better indicator, as it shows clearer picture of the education quality. As the decomposition is carried out for districts, the highest and lowest education inequalities were found in areas which have higher number of rural schools. At the same time, the interpretation with MG is needed, because low performing schools or districts may have lower inequality. Similar to decomposition of the urban-rural, the overall level of inequality has reduced. However, the between-districts inequality is increasing. If no action is taken to narrow or close the gap, it will create further disparity between students from urban-rural areas and districts. Therefore, a cogent commitment is needed for policy makers to cohesively address these issues for improving the quality of education, especially for the rural areas.

REFERENCES

Agrawal, Tushar. (2014) Educational inequality in rural and urban India, *International Journal of Educational Development*, **34**, 11-19.

Akita, T., Lukman, R., and Yamada, Y. (1999) Inequality in the distribution of household expenditures in Indonesia: A Theil decomposition analysis, *The Developing Economies*, **37**, 197-221.

Behrman, J. and Birdsall, N. (1983) The quality of schooling : Quantity alone is misleading, *The American Economic Review*, **73**, 928-946.

Bishop, A. (1991) Mathematical values in the teaching process, in *Mathematical Knowledge: Its Growth Through Teaching* (Eds) A. Bishop, S. Mellin-Olsen and J. Dormolen, Kluwer Academic Publisher, Dordrecht, pp. 193-214.

Card, D. and Krueger, A. (1992) Does school quality matter? Returns to education and the characteristics of public schools in the United States. *The Journal of Political Economy*, **100**, 1-40.

Elbers, C., Lanjouw, P., Mistiaen, J., and Ozler, B. (2008) Reinterpreting between-group inequality, *Journal Economic Inequality*, **6**, 231-245.

Hanushek, E. (1986) The economics of schooling: Production and efficiency in public schools. *Journal of Economic Literature*, **24**, 1141-1177.

Kanbur, R.. (2000) Income distribution and development, in *Handbook of Income Distribution* (Eds) A. Atkinson, F. Bourguignon, North Holland, Amsterdam, pp. 792-841.

Kanbur, R. and Zhuang, J. (2013) Urbanization and inequality in Asia, *Asian Development Review*, **30**, 131-147.

Lam, D., and Levison, D. (1992) Declining inequality in schooling in Brazil and its effects on inequality in earnings, *Journal of Development Economics*, **37**, 199–225.

Maas, J. and Criel, G. (1982) Distribution of primary school enrollments in Eastern Africa, *World Bank Staff Working Papers No. 511*. World Bank, Washington.

OECD. (2013) PISA 2012 result in focus: what 15-year-olds know and what they can do with what they know. Available at http://www.oecd.org/pisa/keyfindings/pisa-2012-results-overview.pdf (accessed 3 June 2014).

Park, D. (1997) An examination of global income convergence for 1960-1990, *Journal of Economic Development,* **22**, 43-55.

Ram, R. (1990) Educational expansion and schooling inequality: international evidence and some implications. *The Review of Economics and Statistics*, **72**, 266–274.

Segala, P., Akita, T. and Yusuf, A. (2014) Urbanization and expenditure inequality in Indonesia: testing the Kuznets hypothesis with provincial panel data, *Letters in Spatial and Resource Sciences*, **7**, 133-147.

Thomas, V., Wang, Y. and Fan, X. (2001) Measuring education inequality: Gini coefficients of education, Policy Research Working Paper, The World bank, Washington.

Thomas, V. , Wang, Y. and Fan, X. (2002) A new dataset on inequality in education : Gini and Theil indices of schooling for 140 Countries, 1960-2000, Policy Research Working Paper, The World Bank, Washington.