Education Inequality in Thailand: The Case Study of Ordinary National Educational Test Score (O-NET)

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Abstract

Due to a high level of competition in the 12th grade for university entrance examination, leading to popularity in taking extra classes among high school students. This is limited to poor people who cannot afford the course fees and may affect their O-NET scores. Our objective tried to answer that whether education inequality existing between the rich and the poor or not. We use O-NET score of 3 subjects (Mathematics, Science, and English) in 2013 and average household income of each province to locate the inequality of the test score between the rich and the poor. We selected the concentration curve to measure the inequality and the educational results were grouped into the quintile according to the household income in each province. The concentration index is computed and the results reveal that there is no strong inequality between the rich and the poor much following the test year. The results of concentration index are 0.0136, 0.007, and 0.0208 for the 6th grade, the 9th grade, and the 12th grade respectively. The index valued in positive area implied that the advantage group (Rich People) are having poor scores and other results are discussed.

Keywords: Education Inequality, O-NET Results, Concentration Index

Introduction

The Ordinary National Education Test (O-NET) is held by the National Institute of Educational Testing Service (NIETS) and the objectives are mainly to provide the national testing services to every student as the assessment guide to develop the curricula. O-NET examination is for the 6th grade, the 9th grade, and the 12th grade students covering 8 major subjects: Thai, Mathematics, Science, Social Science, English, Health and Physical Education, Art, and Career and Technology. The O-NET score is also used in the admission system of higher education in Thailand. These reasons make it more important for the 12th grade students when it is considered to be a part of university admission criteria.

Recently, there has been more competition among the high school students to enter the university since bachelor degree could provide a better chance for a better career path. The rivalry urges the tutoring business growing faster and, for students, studying in the classroom seems not enough to qualify university's criteria. The limitation of the poor occurs when they cannot afford the price of tutorial school fees. Such an example can wider education inequality where it should be possible to reflect this gap in the test score between the rich and the poor.

The objective of the article is to estimate the educational inequality in the provincial level by using the concentration index which is a tool for measuring the educational inequality. We used household income to sort population's wealth and sum of average scores from the 3 subjects. The key parts of this article include literature reviews, methodology, results, and its conclusion.

Literature reviews

During a decade the globalization rapidly changed the characteristics of the society, unexceptionally Thai society has also changed due to the fast development of globalization. Apparently, nowadays there is less percentage of farmers than the past, internet and

technology have reached almost every remote area since the emergence of the broadband internet and mobile phone. However, the change can cause inequality in the society. There are some underprivileged groups of people who are living among this fast moving society. In this article we focus on the inequality among the rich and the poor through the ONET test score. Our literature reviews directed to the relationship of income and test score and the concentration index concept.

Income and test score

In Thailand the universal coverage schemes were applied to handle the gap in the society such health universal coverage, universal coverage for the complimentary education. Every child, regardless of low income families, avails the policy by reaching the compulsory education without financial obstacles. We questioned that are there still existence of the educational inequality left among the rich and the poor? With a high competition among the high school students to enter into higher education, could income of the household affect test results? Several articles reported similar situations of SAT scores and income correlation (VanTassel-Baska & Willis, 1987; Marklein, 2009; Rampell, 2009) that many students who came from richer family were having higher SAT scores. The result from College Board Total group profile report 2013 displayed an explicit trend of the SAT scores compared with their family incomes that families with an average income of 0-6000 USD a year tended to have scores lower than 500 points in all subjects. In contrast, people from higher income families tended to have SAT scores higher than 500 points in all subjects. The study of Klebanov et al. (Klebanov, Brooks-Gunn, McCarton, & McCormick, 1998) could give us a clue on why higher income family performed better than others. Their population in the research were 1-3 years old from 347 children who took part in the test of effect of neighborhood and family income on developmental test score. They found that family income affected the score at age 2-3 years, while the development of the children during younger age could be an evidence. Other factors may come from the socio-economic factors related income, such as children living in Jobseeker claimants, Children living with lone parents, Low education parent could affect the child development. If we concentrated closely on these points, it seemed that all factors related to each other. The PISA test score from OECD 2009 (Schleicher, Zimmer, Evans, & Clements, 2009, p. 3) explained that "Socio-economic background and reading performance is particularly strong in France, New Zealand and the partner country Bulgaria and the partner economy Dubai (UAE)". Those groundworks displayed an existence of the relationship of income and test score directly and indirectly.

Concentration index

Concentration index has long been a tool for measuring inequality since Wagstaff used it to measure the health inequality (Wagstaff, Paci, & Doorslaer, 1991; Wagstaff, 2009) and income and poverty dimension (Wagstaff, Doorslaer, & Rutten, 1993; Kakwani, Wagstaff, & Doorslaer, 1997; Wagstaff, 2000). The concept of concentration index is measuring of concentration curve (Kakwani, 1977a; Kakwani, 1977b) by comparing the degree of socioeconomic-related inequalities with selected dimension such as health outcome. The concentration index is defined as twice of the concentration curve and the equity line (45 degree line) (O'Donnell, Doorslaer, Wagstaff, & lindelow, 2008). In case that there is no socioeconomic-related inequality, the concentration index appeared zero. The negative value existed when the curve lies above the line of equality and illustrated disproportionate concentration on the measured dimension. The positive

value occurred when the concentration curve located lower than the line of inequality. The Concentration index (Kakwani, Wagstaff, & Doorslaer, 1997) was defined as

$$C = 1 - 2\int_0^1 L_h(\rho)\mathrm{d}\rho \qquad (1)$$

Where h is health sector variable, d ρ is the cumulative percent of sample ranked by economic status and L (ρ) is corresponding concentrate curve ordinate where the index normally bound between -1, 1. The negative value of the index means that the high mortality rate among the poor (in case of health). There are not many applications of the concentration index in education equality, but also recommended in Inequality in the tertiary education system report (D'Hombres, 2010), because education is being considered as a social determinant of health where it is a variable that explains health outcome (Dixon, 2000; Marmot & Wilkinson, 2005; Shaw, 2008; Raphael, 2009) rather than being explained by some factors. By the way, there were evidences that concentration index used in education in Manila (Son, 2013) and South America (Stallings & Peres, 2010). They measured the utilization of the education and health policy in Philippines by using data from 1998 to 2007. Son reported that the index was applied to estimate the equality of educational and health care opportunities, while Stalling and Peres observed the distribution of the budget allocation comparing between the health and educational sector in South America. The two examples were evidences of using concentration index in education.

Method

Data

Concentration index was selected to measure the differences of education outcomes related to average household income in the provincial level. The index compared relative values between each subgroup of the household income where can be categorized by quintile classification following average income levels and the difference between mean values of test score in each subgroup. The average household income of each province in 2013 retrieved from the Thailand National Statistical Office and ONET scores in 2013 of three main subjects (Mathematics, Science and English) were from the National Institute of Education Testing Service (Public Organization). We calculated the average household income and the average ONET score for each province totally 77 provinces in Thailand. Consequently, the average household incomes in the provincial level were sorted ascendingly into the quintile group and later were imported to the concentration model.

Model

The concentration index (C) measured inequality of the focus variable across multiple subgroups by natural ordering unit such as wealth and education (O'Donnell, Doorslaer, Wagstaff, & lindelow, 2008). Our variables were the educational test results (ONET) of the 77 provinces of Thailand and the average household income of each province. The 77 provinces were ranked with an equally range by their average household income data and categorized into 5 multiple subgroups (Quintile). Sum of ONET score of three subjects was computed, the mean and standard deviation of each subgroup were used in concentration index calculation as the following equation (Fuller & Lury, 1977) as cited in (O'Donnell, Doorslaer, Wagstaff, & lindelow, 2008).

$$C = (p_1L_2 - p_2L_1) + (p_2L_3 - p_3L_2) + ... + (p_{r-1}L_r - p_rL_{r-1}) \quad (2)$$

As mentioned above that average value from each subgroup used in index calculation and it contained some errors. The standard error of estimated C can be computed (Kakwani, Wagstaff, & Doorslaer, 1997 as cited in (O'Donnell, Doorslaer, Wagstaff, & lindelow, 2008) after we ranked and grouped population.

Above equation is the way that groups of sample are ranked where f_t the proportional of sample in *t* group. The variance of C can be calculated by

$$\text{var}(C) = \frac{1}{n}\left[\sum_{t=1}^{T} f_t a_t^2 - (1+C)^2\right] + \frac{1}{n\mu^2}\sum_{t=1}^{T} f_t \sigma_t^2 (2R_t - 1 - C)^2 \quad (3)$$

Where *n* is the sample size and σ_t^2 is the variance of test scores in the t^{th} group. The μ refers to its mean,

$$a_t = \frac{\mu_t}{\mu}(2R_t - 1 - C) + -q_{t-1} - q_t \quad (4)$$

, and

$$q_t = \frac{1}{\mu}\sum_{k=1}^{t} \mu_k f_k \quad (5)$$

is the ordinate of $L_h(p)$, $q_0=0$, and $p_t = \sum_{k=1}^{t} f_k R_k$ (Kakwani, Wagstaff, & Doorslaer, 1997) as cited in (O'Donnell, Doorslaer, Wagstaff, & lindelow, 2008).

Results

This section is the results of the concentration index calculation. Our focus variables were the ONET results of the 6th grade, the 9th grade, and the 12th grade in Thailand. We had an average test score of each province in the year 2013 derived from the NIETS. The ONET scores of three subjects (Mathematics, Science and English) were summed and used as a proxy of the education result for each province. The score of each province was grouped into quintile which were ranked following the provincial average household income. In the table 1, we display the descriptive statistic results for the 77 provinces of Thailand. The average income is 23,182 Baht per household and varied (SD) 6,698 Baht among the 77 provinces. We select the 7 highest and lowest results (10% of the population) to see the advantage and disadvantage groups in the table. Bangkok had the highest average income per household (49,191 Baht) and other high income provinces were Surat Thani, Chachoengsao, Prathum Thani, Trang Saraburi, and Chai Nat province respectively in 2013. Mae Hong Son was the most disadvantage province with average income per household (8,821 Baht) and Chiang Rai, Kalasin, Nakhon Phanom, Chiang Mai, Yasothon, and Nong Bua Lamphu were in the 7 poorest provinces.

Among the 6th grade, the average ONET score for 77 provinces is 111.55 and standard deviation is 8.89. Yasothon had the most impressive score (132.76) in this education level and other doing-well provinces in 2013 are Bangkok, Nonthaburi, Phrae, Nakhon Pathom and Phayao. Yala had poorest performance (89.76) on ONET test in 2013 and other provinces with the poor scores are Mukdahan, Pattani, Amnat Charoen, Nong Khai, Mae Hong Son and Sa Kaeo in 2013. Among the 9th grade, the average score is 92.49 and standard deviation was 3.85 meaning that there is low variation of the test score among this education level. Bangkok also had highest score (106.16) among the top 7 highest group; Phuket, Nonthaburi, Nakhon Pathom, Roi Et, Trang and Yasothon. Yala (83.68) again stayed in lowest score group together with Amnat Charoen, Sa Kaeo, Buriram, Si Sa Ket, Chai Nat, Phetchabun. In the 12th grade, the average score of 77 provinces is 73.47 and

standard deviation is 6.55. Bangkok was still the province with the highest score. The other provinces in the high performance were Nakhon Pathom, Phuket, Nonthaburi, Nakhon Nayok, Chon Buri and Chiang Mai in 2013. The poor performance group in the 12th grade among 77 provinces were Yala, Narathiwat, Pattani, Sa Keao, Bueng Kan, Kalasin and Si Sa Ket.

We also tested the correlation between average income per household and the test score of 77 provinces by Pearson correlation. We found that in the 6th grade and 9th grad, there was low relationship (0.37) between average income per household and the test score. Interestingly, the correlation raised up to 0.52 when we considered in the 12th grade. By the way, only Pearson correlation is not enough to prove that there is a gap of the test score among the rich and the poor.

Table 1 The descriptive statistics and the 7 highest and lowest performers among the 77 provinces of Thailand

	Variables	Avg. Income/Household (Baht/Month)		ONET (6th Grade)		ONET (9th Grade)		ONET (12th Grade)	
Descriptive Statistics	Min	8,821		89.86		83.68		61.78	
	Max	49,191		132.76		106.16		96.85	
	Mean	23,182		111.55		92.49		73.47	
	SD	6,698		8.89		3.85		6.5548	
	Income Correlation	1		0.3730		0.3702		0.5250	
Top 7 provinces	1	Bangkok	49,191	Yasothon	132.76	Bangkok	106.16	Bangkok	96.85
	2	Surat Thani	36,865	Bangkok	131.87	Phuket	100.78	Nakhon Pathom	88.66
	3	Chachoengsao	34,548	Nonthaburi	131.49	Nonthaburi	99.54	Phuket	88.4
	4	Pathumthani	33,461	Phrae	125.78	Nakhon Pathom	98.95	Nonthaburi	85.19
	5	Trang	33,270	Nakhon Pathom	125	Roi Et	98.84	Nakhon Nayok	84.89
	6	Saraburi	32,834	Nakhon Phanom	124.10	Trang	97.65	Chon Buri	83.80
	7	Chai Nat	32,754	Phayao	122.63	Yasothon	97.51	Chiang Mai	83.18
7 least provinces	1	Mae Hong Son	8,821	Yala	89.86	Yala	83.68	Yala	61.78
	2	Chiang Rai	13,510	Mukdahan	94.62	Amnat Charoen	86.13	Narathiwat	62.45
	3	Kalasin	13,921	Pattani	96.43	Sa Kaeo	86.29	Pattani	62.61
	4	Nakhon Phanom	14,310	Amnat Charoen	96.89	Buriram	86.25	Sa Kaeo	65.9
	5	Chiang Mai	14,393	Nong Khai	99.13	Si Sa Ket	87.35	Bueng Kan	65.98
	6	Yasothon	14,418	Mae Hong Son	99.43	Chai Nat	87.68	Kalasin	66.01
	7	Nong Bua Lamphu	15,390	Sa Kaeo	100.38	Phetchabun	88.11	Si Sa Ket	66.67

Table 2 Concentration Index results

Quintile	Provinces per group	6th Grade				9th Grade				12th Grade			
		means	std devs	Results		means	std devs	Results		means	std devs	Results	
Poorest	15	110.21	11.34	CI	0.0136	92.03	3.69	CI	0.007	70.55	5.86	CI	0.0208
2nd	33	108.47	7.91	var (CI)	0.0000	91.18	3.36	var (CI)	0.0000	71.69	5.20	var (CI)	0.0000

Table 2 (Cont.)

Quintile	Provinces per group	6th Grade means	6th Grade std devs	6th Grade Results		9th Grade means	9th Grade std devs	9th Grade Results		12th Grade means	12th Grade std devs	12th Grade Results	
Middle	24	115.19	6.72	se (CI)	0.0053	93.75	3.39	se (CI)	0.0029	76.22	6.19	se (CI)	0.0059
4th	4	115.18	3.28	t-test (CI)	2.5521	94.06	2.60	t-test (CI)	2.4173	76.72	3.53	t-test (CI)	3.5331
Richest	1	131.87	0.00			106.16	0.00			96.85	0.00		

The table 2 displays the result of concentration index by different education levels. We also provide the number of the provinces of each group together with mean and standard deviation of each group. The CI revealed a low inequality of the ONET scores among the rich and the poor. There was a stronger concentration than other grades in the 12th grade result (0.0208) which was in the same direction with correlation analysis and there was only some inequality in the test score among 6th grade and 9th grade (0.0136 and 0.007). The positive values of the concentration index through all levels of education mean that advantage population were having a poor performance, but not strong according to the CI results. Other interesting results would be discussed.

Discussion

The interesting points to be discussed in the finding results were the richest group in the top performances and the poorest group in the top performance. Our descriptive statistics displayed that Bangkok, Trang who are among the richest group through all education levels appeared in the top performance of the 9th and 12th grade. The two provinces 'results indeed proved that the rich seem to perform better according to the test. The results of Cross-country efficiency of secondary education provision (Afonso & Aubyn, 2006, p. 486) which used GDP as a dependent variable stated that "student coming from poorer countries where adults' education are low tend to underperform" which inclined to our results of Bangkok and Trang. More specifically, considering at the descriptive statistics at the 12th grad was full of the large economic cities such as Bangkok, Nonthaburi, Chon Buri and Chiang Mai. It is said that the socioeconomic factors in Thailand contributed to the education results more in the urban area rather than the rural area (Lounkaew, 2013). This point linked with the principle of the human capital (Mincer, 1984; Barro, 1992) that the growth of human capital is both a condition and consequence of economic growth.

Nevertheless, the performances from the two provinces, Nakhon Pathom and Yasothon which their average incomes per households were in the lowest group contrastingly from their education performances were outstanding. An article found small contribution of income to the education results (Blau, 1999, p. 261). Blau stated that "Family background characteristics play more important role than income in determining child outcomes". The results of the two provinces might explain by the other factors, for instance, teacher qualities will have strong dominations (Heyneman & Loxley, 1983).

Conclusion and Recommendation

In conclusion, our study intends to point out the existence of educational inequality in Thailand. We use 2013 O-NET score from National Institute of Educational Testing Services and average household income from the National Statistic Organization in our estimation. The population has been categorized into quintile following their average household income to prove our assumption that the rich tends to have higher test score

than the poor. We use concentration index to locate the degree of educational inequality. The results display that there is almost no inequality among the rich and the poor in Thailand since CI value stays very low. By the way, average household income does have a higher impact in the 12th grade than lower educational level since there are high rivalries to entry to higher education. When we roughly consider on the descriptive statistic of each variable, it seems that sole income could not make a great impact on education results. Other variables which are not mentioned in this article, for example, socio-economic factors should be investigated.

Recommendation

From our discussion points, the socio-economic score development should answer what are appropriate variables related to education results. The level of analysis or output area, such as small area analysis should be adapted for the forthcoming study as it has been shown in the results that average household income becomes skeptical where small area analysis could deliver a better result.

This can be seen in the high variation of the population in Chiang Mai which was classified in the poor group. As we know that Chiang Mai is a large province with different races living in this province, some districts are in very remote area like Doi Tao district, while in the city is considered to be a second large city after Bangkok. The use of average household income become a weak point and were diluted by the average value conducted to mislead grouping of the income for the Chiang Mai province.

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