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An Educational Access of the Disadvantaged Children in Thailand

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บทคัดย่อ

งานศึกษานี้มีวัตถุประสงค์เพื่อหาตัวกำหนดและวิเคราะห์การเปลี่ยนแปลงของอัตราการเข้าเรียนของกลุ่มเด็กปกติเปรียบเทียบกับเด็กด้อยโอกาสในระดับการศึกษาภาคบังคับตั้งแต่เริ่มมีการบังคับใช้พระราชบัญญัติการศึกษาแห่งชาติ พ.ศ. 2542 โดยใช้ข้อมูลจากการสำรวจสำมะโนประชากรหน่วยครัวเรือนในปี พ.ศ. 2541 และ พ.ศ. 2549 การศึกษาครั้งนี้ใช้แบบจำลองแบบโลจิตในการวิเคราะห์หาโอกาสของการได้รับการศึกษาของเด็กด้อยโอกาสในหลายกลุ่มช่วงอายุเพื่อที่จะลดอคติที่เกิดจากตัวแปรที่ไม่สามารถสังเกตได้ ผลการศึกษาพบว่าปัจจัยที่กำหนดการได้รับการศึกษาสำหรับเด็กปกติและเด็กด้อยโอกาสได้แก่ คุณลักษณะของหัวหน้าครอบครัว และตัวนักเรียนเอง ได้แก่ เพศ อายุ ขนาดครัวเรือน ที่ตั้งของครัวเรือน สถานะภาพทางการสมรสของพ่อแม่ ระดับการศึกษาของพ่อแม่ และโดยเฉพาะอย่างยิ่งรายได้ของครัวเรือน อย่างไรก็ตามผลกระทบที่เกิดจากปัจจัยเหล่านี้จะเกิดขึ้นในกลุ่มเด็กด้อยโอกาสมากกว่าในกลุ่มเด็กปกติ กล่าวคือหากรายได้ต่อหัวรายเดือนของครัวเรือนเพิ่มขึ้นร้อยละ 10 โอกาสในการได้รับการศึกษาของเด็กกลุ่มปกติจะเพิ่มขึ้นร้อยละ 13 ในขณะที่ของกลุ่มเด็กด้อยโอกาสจะเพิ่มขึ้นร้อยละ 16 โดยที่การใช้พระราชบัญญัติการศึกษาแห่งชาติ มีผลทำให้ผลกระทบทางด้านรายได้มีอิทธิพลมากขึ้น และเป็นการส่งเสริมให้พ่อแม่สามารถสนับสนุนเด็กด้อยโอกาสให้มีได้รับการศึกษามากขึ้น และพบว่าระดับการศึกษาของหัวหน้าครอบครัวเป็นปัจจัยหลักที่สำคัญที่สุดที่ทำให้เด็กด้อยโอกาสจะได้รับการศึกษามากขึ้น ยิ่งไปกว่านั้นการวิเคราะห์ในช่วงอายุที่แตกต่างกันของเด็กด้อยโอกาสพบว่าเด็กด้อยโอกาสที่มีอายุน้อยจะมีโอกาสในการได้รับการศึกษามากกว่าเด็กด้อยโอกาสกลุ่มอายุมากขึ้น ทั้งนี้เพราะต้นทุนค่าเสียโอกาสในการเข้าเรียนสูงขึ้นเมื่อนักเรียนมีอายุมากขึ้น

คำสำคัญ : กลุ่มเด็กด้อยโอกาส กลุ่มเด็กปกติ อัตราการได้รับการศึกษา อัตราการหยุดเรียนกลางคัน

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Abstract

The study finds determinants and analyzes the changes in school attending of the normal and disadvantaged children in the compulsory level since the 1999 NEA enforcement, using 1998 and 2006 SES. This study employs the logistic model (maximum likelihood function) to analyze the probability of school attending of the disadvantaged children in various age cohorts to overcome the self-select and biased estimates problem from unobservable variables. The results indicate that the determinants of school attending for the normal and disadvantaged children were characteristics of household heads and pupils such as sex and age, household size, location of household, parental status, parental education level, and particularly income of household. However, the impacts for the disadvantaged were more than the impacts for normal children. If the current monthly incomes per capita increase 10%, it pushes the probability of school attending increase 13% for normal children and 16% for disadvantaged children. Implementing NEA caused stronger income effects, and also encouraged the parents to support their disadvantaged children to attend school more. The findings also found that the academic level of household heads was the main factor encouraging the disadvantaged children to attend school. Furthermore, analysis of various age cohorts of disadvantaged children found that the younger cohort had more probability of school attending than the older cohort. This is probably because the opportunity cost of study is higher when the pupils are older.

Keywords : disadvantaged children, normal children, school attending rate, school dropout rate

1. Introduction

Improving educational access has been one of the main policy priorities of Thai government, especially since the implement of 1999 National Education Act (NEA).[2] Although there has been a steadily increasing trend for school enrollment rates in Thailand for more than ten years, the non-enrollment rate, particularly, dropout rate is still high.[3] Most recent evidence from the Child Survey (2006) of the National Statistics Office, indicates that the dropout rate of the disadvantaged children aged 5-17 was about 11 percent in 2006 which is surprisingly a high rate, despite the NEA enforcement.[4]

This paper examines the underlying factors for attending school for the disadvantaged in Thai education. Most previous of studies has only provided cross tabulation between educational outcomes and sample characteristics. The exception is Ahuja, Chucherd, and Pootrakool (2006) which estimated the effects of different characteristics of household and regional of household on the probability of attending school. In addition, their study focused on the normal children.

The paper extends the literature by examining student's (or household's) decision to attend (and or retain in) school by estimating a logit model. Moreover, we detect different periods of study to compare the effects of the 1999 NEA on education for the disadvantaged children.

This study expands the analysis to cover on three age's cohorts: 7-12 years in primary, 13-15 years in secondary, and 16-18 years in high school level. Data used in this study was the household socio-economic survey in 1998 and in 2006 to compare the results before and after the National Education Act (NEA).

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[2] Under the 1999 National Education Act, Thai children can go to school with free of charge by government support in 12 years formal basic education.

[3] Estimates are based on SES surveys indicate that the Net Enrollment Rate (NER) was 92% in 1994 and 98% in 2002.

[4] The term disadvantaged children in this study is defined as the children who grow up in disadvantaged environments: low income families, fatherless and /or motherless, broken home problem (widows, divorces, separated), worse school locations, and blue-collar household head occupations.

2. Model for the School Attendance Decision

This study applies the school dropout model of Hanushek, Victor, and Hitomi (2006). The central focus of this study is to find the probability of attending school for the disadvantaged at the basic education level (12 years for primary, secondary, and high school level). Attending school decisions are directly related to trading off current income and future income of pupils, academic achievement of pupils, and socioeconomic factors such as pupil characteristics, household characteristics, household head's characteristics, and community characteristics (i.e. region, remote area). We assume that attending school decision directly depends on the parent's decision.

The opportunity facing pupils both in and out of school are important to understanding school leaving. The underlying conceptual framework is a simple optimization model on the part of the pupil. The pupil's objective is to maximize lifetime utility through the choice of schooling level. A key element of this choice is the earnings opportunity of the pupil, which is a function of the past and future schooling experiences of the pupil. This section exhibits the underlying theoretical model of attending school. The subsequent section describes the empirical implementation.

The optimization problem that has been proved in many contexts is the maximization of lifetime income with respect to years of schooling. While the details vary depending on the structure of the problem analyzed, the key idea is trading off between forgone current earnings and enhances future earnings.

$$\max \Psi = \int_0^T e^{-rt}\left[Y_t\left(H_t, Z_t\right) - c\left(t\right)\right]dt$$

$$= \int_0^S e^{-rt}\left[Y_t\left(H_t, Z_t\right) - c\left(t\right)\right]dt + \int_{S+1}^T e^{-rt}Y_t\left(H_t, Z_t\right)dt \qquad (1)$$

Income *(Y)* is a function of human capital *(H)* and other factors *(Z)* affecting wages and earnings. *c (t)* is the direct cost of schooling in each period. Here, we suppose direct cost of basic education levels are supported by government. (12 years schooling free of charges by NEA). In order to concentrate on the schooling investment, the maximization problem is separated into a schooling period *(S)* and a post-schooling period. *T* is the relevant time horizon, assumed to be known and fixed*; r* is the discount rate.

Investment in human capital involves schooling, an individual's ability and prior achievement, and prior human capital accumulation. Thus, in discrete form and ignoring any depreciation,

$$H_t = H_{t-1} + h(s_t, X_t, g, A_{t-1}) \quad (2)$$

where s_t is the quantity of schooling (years of schooling), X are other factors affecting human capital and own characteristics including family inputs such as pupil characteristics, household characteristics, household's head characteristics, and community characteristics, g is innate ability, and A_{t-1} is prior achievement which cannot be observed. It is normal to think that the value of schooling in human capital production is enhanced with higher years of schooling, with greater family inputs, with higher ability, and with more prior achievement. Thus, school attainment solely is not a complete measure of human capital; we cannot observe the school quality and innate ability of pupil.

Finally, and central to this discussion, it has been common to assume that schooling is homogeneous and directly measured by the years of schooling. Such an assumption, which greatly simplifies analysis by restricting attention to just the quantity margin, gives the hypothesis that the more learning during any period of time, the more likely a pupil will attending school rather than dropout.

However, Hanushek (1979) argued that the model might have omitted variable problems from unobserved school quality and innate ability. For example, making quality adjustments may be hard because the analysis did not identify the specific school factors that add up to variations in school quality.

The empirical structure is composed of schooling investment (here is supported by government under NEA), pupil academic achievement, and school dropouts. The pupil academic achievement formula (equation 3) follows from the common employed educational production function estimation.[5] This estimation is matched with a model indicating the inherent dropout propensity *(D*)*, as shown in equation 4.

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[5] See details in Hanushek (1979)

$$A_{it} = f\left(X, F_A\right) + \gamma_A A_{it-1} + \sum_s \delta_s S_{ist} + \varepsilon_{it} \quad (3)$$

$$D^*_{it} = g\left(W, F_D\right) + \gamma_D A_{it-1} + \lambda\{\sum_s \delta_s S_{ist}\} + \nu_{it} \quad (4)$$

where F_A are family inputs which influence pupil's achievement such as pupil characteristics and household characteristics, F_D are family inputs such as household's head characteristics, and X and W are exogenous influences on *A* and *D,* respectively. S_{ist} is an indicator that equals 1 if pupil *i* attends school *s* in year *t* and equals 0 otherwise. Both equations can be jointly estimated given availability of data on A_{it} and S_{ist} .

A Single-Equation Logit Model of School Attendance Decision

Since we cannot observe both school quality and innate ability of pupil, we purpose the attending school decision by a single equation model. Let the indicator variable Y_i = 1 if pupil decides to attend school, and let Y_i = 0 otherwise. The problem is described by the latent variable model. We omit time subscript for less confusion.

$$\begin{aligned} &Y_i^* = \mathbb{C}_i\boldsymbol{\beta} + \mathbb{Z}_i\boldsymbol{\delta} + \varepsilon_i \\ &and \\ &\mathbb{C}_i = [F_A F_D] \\ &\mathbb{Z}_i = [X_{ij} W_{ij}] \end{aligned} \quad (5)$$

where Y_i^* is the net benefit a pupil receives from attending school, $\mathbb{C}_i$ is a vector of family inputs and pupil characteristics, $\mathbb{Z}_i$ is a vector of exogenous variables, and ε_i is a normally distributed random error with zero mean and unit variance.

Based on the assumption that if D^* = 1 the pupil decide to drop out, it implies that the pupil doesn't attend school or Y^*_i = 0 , given the time dimension. On the other hand, if $D^* = 0$ the pupil decides to continue schooling, it implies that the pupil will attend school or Y_i^* = 1 (given the time dimension). Therefore, the probability that a pupil decides to attend school can be written as follow:

$$\Pr(Y_i = 1) = \Pr[\mathbb{C}_i\boldsymbol{\beta} + \mathbb{Z}_i\boldsymbol{\delta} + \varepsilon_i > 0] = \Phi[\mathbb{C}_i\boldsymbol{\beta} + \mathbb{Z}_i\boldsymbol{\delta}], \quad (6)$$

Where Y_i = 1 if a pupil was reported to have attending school

Y_i = 0,otherwise

$F_{A_{ij}}$ = a set of characteristics of pupil *i* of household j and a set of household characteristics of pupil *i* of household (include innate ability)

$F_{D_{ij}}$ = is a set of household head characteristics of pupil *i* of household *j*

X_{ij} = W_{ij} are exogenous influences on *A* and *D*, respectively such as in a set of community characteristics where household *j* resides.

and $\Phi[\cdot]$ is the evaluation of the standard normal cumulative distribution function.

We assume that a pupil is observed to attend school when *Y* = 1 and not to attend school when *Y* = 0.This specification implies that the attending school decision in this study is a logistic problem, the specification of the logit model presented in the appendix.[6]

When estimating, in particular equation (6), a problem about the unobserved variable (A_{it-1}) may occur. The SES dataset did not report about the academic performance of pupils. Therefore, we cannot obtain the data for A_t and A_{t-1}. Consequently, we solve the problem by using the proxy that can substitute the A_{t-1} and relate to A_t. Next section presents the methodology and the dataset of the study.

3. Definition of the Disadvantaged

From the working definition, this researcher's definition of the disadvantaged is as follows: *children who grew up in disadvantaged environments: low income families (below the poverty line)*, *single parent homes (widows, divorces, separated), remote area schools, and blue-collar household head occupations, low nutrition*, *and other factors that can lead into bad health.* Because of limited feasible dataset in Thailand, we ignore some conditions of the disadvantaged, such as refugee, disabilities people, and immigrants. In this study, we selected the poverty line from Teawkul*, et.al*. (2007)

Table 1 : Low Income Index in Thailand

Low income index	2545	2547	2549
Poverty line(Bht/mth)	1,190	1,242	1,386

Source : Teawkul, *et.al*.(2007)

[6] See details of the logit model in appendix.

Therefore, this study technically defines the term “the disadvantaged children” as the pupils who have the following characteristics i.e. broken home (marital status: widowed, divorced, separate), family located in rural areas, household head is blue-collar occupations, family’s income (current income per capita) is not greater than poverty line (1,386 baht), while the term “normal children” are otherwise.

4. Data Source and Overview

We utilized the SES data which provided characteristics of households and year of schooling of offspring within the household to find the educational access of the disadvantaged children. The SES data set categorized 76 provinces into 5 regions. The dataset shows the sampling units are counted 8,276 units, 39,057 units, 32,168 units, 38,238 units and 38,238 units from Bangkok, the Central (excluding Bangkok), the North, the Northeast and the South of Thailand, respectively.

Table 2 : Descriptive Statistics for Variables in the Logit Model

Variable	1998 Mean	Std.	2006 Mean	Std.
Current monthly income per capita(baht)	3663	5882	6103	13247
Age of pupils(yrs)	14.40	1.76	12.73	5.27
Sex of pupils (female=1)	0.52	0.49	0.51	0.50
Education attainment of pupils(yrs)	5.64	4.76	7.33	4.51
Household size	4.50	1.90	4.07	1.78
Age of household head(yrs)	49.12	14.27	49.86	14.85
Sex of household head (female=1)	0.25	0.41	0.33	0.47
Education attainment of household head (yrs)	6.98	3.54	8.03	4.18
Household head is parent (0,1)	0.34	0.47	0.24	0.43
Marital Status (married=1)				
Widowed (0,1)	0.06	0.24	0.07	0.25
Divorced (0,1)	0.01	0.09	0.01	0.12
Separate (0,1)	0.01	0.10	0.01	0.12

Table 2 (Continued)

Variable	1998 Mean	Std.	2006 Mean	Std.
Regional (yes=1)				
Rural Location (0,1)	0.52	0.49	0.40	0.49
Central Region (0,1)	0.25	0.43	0.28	0.45
North Region (0,1)	0.21	0.41	0.23	0.42
Northeast Region (0,1)	0.31	0.46	0.28	0.45
South Region (0,1)	0.17	0.38	0.14	0.35

Source : SES (1998) and SES (2006)

5. Results and Discussion

We found the probability of attending school depended on the similar socioeconomic factors, as reported in four different models [7](see table 4-7). For example, it shows that sex of pupils positively influenced on the normal and disadvantaged children at all three age cohorts. This suggests that, as the pupils were older, the probability of attending school of the girls were higher than the boys. It is probably because the boys were usually pushed into the labor market as soon as they could be.

According to the 1999 NEA enforcement, the marginal effects show that the probability of attending school of the girls improved (see table 5 and 7). While sex of household head were contrarily significant, it means that the female households heads were less likely to push their children for attending school than the male household heads, given the other factors remaining constant. It might be because government cannot actually support 100% of expense of schooling. Some expense of schooling must be incurred by the parents. Thus, if the male household head has more potential characteristics (e.g. physical and social factors) to support the children than the female household head, he will support the children more than the female household head.

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[7] Model I: Comparing Logit Model for all normal pupils in the sample in 1998 and in 2006
Model II: Logit Model for normal children in the age cohort 7 to 12 in 1998 and in 2006 with regional dummy
Model III: Logit Model for normal children in the age cohort 13 to 15 in 1998 and in 2006 with regional dummy
Model IV: Logit Model for normal children in the age cohort 16 to 18 in 1998 and in 2006 with regional dummy

The consequence of NEA implementation indicates that there was increased in the probability of attending school with age of pupils both normal and disadvantaged children. This means that the younger child has the higher probability of attending school. While the coefficient of age of household head was positively significant, it suggests that, as household head age increases, the probability of attending school increases.

Household regions were also the important factor in the study. Living in the rural area was associated with the chance of leaving school early. Moreover, living in the north and northeastern regions reduced the probability of attending school in schools more than living in the other regions for both groups of children. However, after the NEA enforcement the probability of attending school in the central and the southern regions were higher, while in the north and northeastern it was still low.

The household's income effect, measured by current income per capita has significantly positive effects on the school attending of the normal and disadvantaged children for both before and after the NEA implementation. An increase in household income increases the probability of attending school for the disadvantaged children, especially after the NEA enforcement.

Household head's education effect, measured by the household heads years of schooling, unambiguously increased the probability of attending school for the disadvantaged children at all three age cohorts, especially after the implementation of NEA.

For the household characteristics effect, if household heads were the parents of the children, they would be more influential on the children. Hence, there was higher probability of attending school for the disadvantaged children at all three age cohorts, given the parents being well-educated.

Table 3 indicates that the probability of attending school in several age cohorts is different. The higher age cohorts have the lower probability of attending school. Surprisingly, the result in table 3 shows that the predicted probabilities of attending school of the disadvantaged pupils were 99.84 % for the age cohort 7-12 years, 95.55 % for age cohort 13-15 years, and 75.55% for age cohort 16-18 years respectively. It implies that the younger cohort of the disadvantaged pupils had the chance to attend school continuously more than the older cohort of the disadvantaged pupils. It may be because, when the children are older, the opportunity cost of learning is higher. This means that the older pupils can get into the labor market before the younger does.

Table 3 : Estimated Response Probability of Attending School for the Disadvantaged Children

Logit Model	(II) 7-12 yrs	(III) 13-15 yrs	(IV) 16-18 yrs
Probability of Attending School for the Disadvantaged Children (Y_i)	0.9984	0.9555	0.7555

Source : SES 2006, Author's estimation

Table 4 : Determinants of Probability of Attending School of Normal Children: 1998 and 2006

Variable	(I) 1998	(I) 2006	(II) 1998	(II) 2006	(III) 1998	(III)2006	(IV)1998	(IV)2006
Age of pupils	-0.082 (5.29)***	-0.040 (15.30)***	-0.327 (6.28)***	-0.213 (2.36)**	-0.64 (4.16)***	-0.219 (7.39)***	-0.44 (2.19)**	-0.375 (2.34)**
Sex of pupils (female =1)	0.010 (5.07)***	0.260 (4.68)***	0.012 (2.02)**	0.012 (2.18)**	0.020 (3.38)***	0.112 (2.07)**	0.014 (2.14)**	0.115 (2.48)**
Log income per capita	0.106 (4.73)***	0.171 (2.10)**	0.203 (2.53)**	0.212 (2.81)**	0.544 (8.59)***	0.551 (5.83)***	0.546 (2.04)**	0.226 (2.74)**
Education of pupils (yrs)	0.224 (7.46)***	0.256 (11.05)***	0.410 (5.64)***	0.216 (2.65)**	0.280 (5.24)***	0.323 (9.32)***	1.001 (1.97)*	0.390 (12.12)**
Age of hh. Head	0.008 (1.99)*	0.030 (2.69)**	0.010 (5.03)***	0.016 (8.79)**	0.034 (2.86)**	0.012 (2.43)**	0.567 (2.08)**	0.052 (8.95)***
Sex of hh. head (female =1)	-0.120 (3.20)***	-0.106 (3.56)***	-0.032 (2.10)**	-0.170 (2.32)**	-0.055 (5.56)***	-0.011 (2.05)**	-0.009 (2.98)**	-0.244 (2.96)**
hh. head education (yrs)	0.110 (3.48)***	0.231 (10.23)***	0.026 (4.03)***	0.100 (1.98)*	0.103 (3.54)***	0.194 (8.55)***	0.109 (2.73)**	0.229 (4.76)***
HH. head is parent (0,1)	1.155 (2.98)***	1.122 (2.40)**	1.104 (7.25)***	1.012 (2.12)**	0.424 (2.80)**	1.193 2.82)**	0.132 (1.98)*	0.234 (1.98)*
Marital : Widow (0,1)	-0.223 (1.26)	-0.445 (1.02)	-1.112 (0.78)	-0.989 (1.17)	0.533 (1.60)	0.968 (1.04)	-0.122 (0.98)	-0.463 (1.06)
Divorce (0,1)	-0.135 (0.46)	-1.122 (0.54)	-0.332 (1.08)	1.116 (0.69)	-0.450 (1.18)	-0.446 (0.88)	-0.221 (0.66)	-0.342 (0.19)
Separate (0,1)	-0.156 (1.21)	-0.436 (0.89)	-0.017 (0.64)	1.82 (1.05)	-0.232 (0.67)	-0.743 (0.88)	-0.043 (1.09)	-1.008 (0.58)
HH. size	-0.440 (4.07)***	-0.110 (2.15)**	-0.142 (3.81)***	-0.130 (2.22)**	-0.180 (2.09)**	-0.002 (3.87)***	-0.114 (3.03)**	-0.022 (1.97)*
Rural ,yes=1 (0,1)	-0.200 (3.71)***	-0.046 (2.83)**	-0.043 (2.94)***	-0.180 (2.19)**	-0.017 (3.09)***	-0.518 (2.70)**	-0.117 (2.76)**	-0.181 (2.39)**
Central (0,1)	-0.003 (7.01)***	-5.12 (5.15)***	-0.411 (3.96)***	-0.386 (1.94)	-0.067 (1.97)*	-0.219 (2.11)**	-0.215 (2.08)**	-0.360 (2.10)**
North (0,1)	-0.060 (2.04)**	-10.83 (39.21)***	-1.009 (4.84)***	-0.826 (1.52)	-0.545 (3.89)***	-1.003 (2.85)**	-1.020 (3.26)**	-1.056 (4.23)***

Table 4 (Continued)

Variable	(I) 1998	(I) 2006	(II) 1998	(II) 2006	(III) 1998	(III)2006	(IV)1998	(IV)2006
Northeast	-0.112	-12.08	-0.447	-1.262	-0.146	-1.02	-0.336	-0.189
(0,1)	(3.02)***	(40.75)***	(3.12)***	(2.27)**	(8.96)***	(7.91)***	(2.10)**	(4.06)***
South	-0.012	-9.26	-1.057	-0.364	-0.507	-0.260	-0.202	-0.332
(0,1)	(2.15)**	(24.80)***	(2.56)**	(1.07)	(3.19)**	(2.19)**	(2.03)**	(3.03)***
No. of obs.	44918	56058	9301	17087	4760	7534	4450	5680
Pseudo R^2	0.3738	0.4178	0.3060	0.2528	0.4090	0.3970	0.4980	0.3348

Source : SES 1998, SES 2006, Author's estimation. Robust. z statistics in parentheses, *significant at 10%, **significant at 5%, ***significant at 1%

Notes : I: Model for all normal children in the sample.

II: Model for normal children in age cohort 7 to 12 with regional dummy.

III: Model for normal children in the age cohort 13 to 15 with regional dummy.

IV: Model for normal children in the age cohort 16 to 18 with regional dummy.

Table 5 : Marginal effects[8] on Probability of Attending School of Normal Children: 1998 and 2006.

Variable	All Ages		7-12 Years Old		13-15 Years Old		16-18 Years Old	
	(I)1998	(I)2006	(II)1998	(II)2006	(III)1998	(III)2006	(IV)1998	(IV)2006
Age. of pupils	-0.002	-0.003	-0.114	-0.119	-0.064	-0.119	-0.024	-0.175
	(3.29)***	(11.30)**	(2.28)**	(2.36)**	(2.76)***	(7.89)***	(2.19)**	(7.34)***
Sex. of pupils (female =1)	0.001	0.100	0.008	0.012	0.020	0.032	0.048	0.115
	(6.07)***	(5.08)***	(3.02)***	(2.09)**	(3.38)***	(5.07)***	(2.14)**	(4.48)***
Log current income per capita	0.104	0.130	0.120	0.152	0.134	0.225	0.196	0.228
	(9.50)***	(3.10)***	(2.53)**	(1.98)*	(5.66)***	(4.98)***	(2.04)**	(3.74)***
Education attains. of pupils (yrs)	0.124	0.256	0.110	0.216	0.280	0.323	0.160	0.390
	(7.46)***	(11.05)**	(5.64)***	(2.65)**	(5.24)***	(9.32)***	(1.97)*	(12.12)**
Age of hh. Head	0.002	0.054	0.128	0.136	0.030	0.042	0.067	0.152
	(1.97)*	(2.18)**	(2.03)**	(8.79)***	(3.86)**	(2.43)**	(6.08)**	(7.35)***
Sex of hh. head (female =1)	-0.006	-0.106	-0.004	-0.130	-0.005	-0.011	-0.011	-0.143
	(4.18)***	(3.56)***	(2.10)**	(1.98)**	(7.56)***	(8.05)**	(3.98)**	(8.66)***
Education attainment of hh. head (yrs)	0.020	0.254	0.178	0.198	0.103	0.192	0.105	0.228
	(1.99)*	(5.82)***	(5.24)***	(1.96)*	(4.54)***	(6.55)***	(2.73)**	(3.96)**
HH. head is parent (0,1)	1.055	1.232	1.004	1.012	0.224	1.096	0.152	0.295
	(1.98)*	(3.40)**	(2.25)**	(8.12)***	(3.80)**	(2.02)**	(1.98)*	(2.48)**

[8] See details of the marginal effects in appendix.

Table 5 (Continued)

Variable	All Ages		7-12 Years Old		13-15 Years Old		16-18 Years Old	
	(I)1998	(I)2006	(II)1998	(II)2006	(III)1998	(III)2006	(IV)1998	(IV)2006
Marital:	-0.123	-0.485	-1.712	-0.985	0.523	0.368	-0.522	-0.063
Widow (0,1)	(0.26)	(0.42)	(0.44)	(1.89)	(1.70)	(1.00	(1.08)	(1.03)
Divorce	-0.122	-1.767	-0.222	1.112	-0.880	-0.267	-0.771	-0.387
(0,1)	(0.36)	(0.84)	(0.03)	(0.69)	(1.28)	(0.58)	(0.34)	(0.89)
Separate	-0.146	-0.336	-0.019	1.343	-0.632	-0.223	-0.063	-1.005
(0,1)	(1.05)	(1.09)	(0.54)	(1.25)	(0.87)	(0.71)	(1.13)	(0.77)
HH. size	-0.340	-0.120	-0.122	-0.120	-0.170	-0.032	-0.113	-0.122
	(3.05)***	(3.15)**	(2.81)**	(2.12)**	(1.99)**	(3.27)**	(2.03)**	(2.27)**
Rural ,yes=1	-0.108	-0.086	-0.067	-0.144	-0.027	-0.623	-0.127	-0.151
(0,1)	(3.61)***	(2.36)**	(3.94)***	(3.19)**	(4.09)***	(3.34)***	(2.96)**	(2.09)**
Central (0,1)	-0.002	-4.12	-0.451	-0.166	-0.045	-0.242	-0.343	-0.250
	(5.01)***	(3.13)***	(2.06)**	(1.63)	(1.98)*	(2.87)**	(2.07)**	(2.11)**
North	-0.110	-1.453	-1.405	-0.626	-0.345	-1.023	-1.034	-1.087
(0,1)	(2.02)**	(9.22)***	(2.84)***	(1.82)	(2.89)***	(2.65)**	(2.26)**	(7.23)***
Northeast	-0.154	-2.33	-0.456	-1.254	-0.186	-1.032	-0.343	-0.145
(0,1)	(4.12)***	(10.85)***	(2.67)**	(2.31)**	(3.96)***	(3.82)***	(2.10)**	(3.06)***
South	-0.021	-4.232	-1.032	-0.322	-0.343	-0.356	-0.222	-0.832
(0,1)	(3.15)**	(12.48)***	(3.56)**	(2.07)**	(3.19)**	(4.19)**	(3.07)**	(4.08)***
N	44918	56058	9301	17087	4760	7534	4450	5680

Source : SES 1998, SES 2006, Author's estimation. Robust z statistics in parentheses, *significant at 10%, **significant at 5%, ***significant at 1%

Notes : I: Model for all normal children in the sample.

II: Model for normal children in age cohort 7 to 12 with regional dummy.

III: Model for normal children in the age cohort 13 to 15 with regional dummy.

IV: Model for normal children in the age cohort 16 to 18 with regional dummy.

Table 6 : Determinants of Probability of Attending School of Disadvantaged Children: 1998 and 2006

Variable	All Ages		7-12 Years Old		13-15 Years Old		16-18 Years Old	
	(I)1998	(I)2006	(II)1998	(II)2006	(III)1998	(III)2006	(IV)1998	(IV)2006
Age of pupils	-0.120 (51.25)***	-0.080 (25.63)***	-0.421 (16.63)***	-0.364 (19.86)**	-1.54 (14.96)***	-0.654 (12.34)***	-0.998 (11.79)**	-0.877 (5.34)***
Sex of pupils (female=1)	0.003 (5.09)***	0.360 (7.88)***	0.016 (4.10)***	0.020 (3.88)***	0.060 (5.34)***	0.365 (3.47)***	0.034 (3.84)***	0.195 (2.38)**
Log income per capita	0.108 (5.73)***	0.381 (3.58)***	0.453 (6.93)***	0.556 (3.31)**	0.775 (5.59)***	0.751 (4.41)***	0.876 (2.80)***	0.987 (4.87)***
Education attains. of pupils(yrs)	0.424 (67.78)***	0.216 (31.45)***	0.483 (10.68)***	0.491 (12.96)***	0.490 (20.24)***	0.585 (18.22)***	1.101 (25.46)***	0.890 (33.68)***
Age of hh. Head	0.018 (11.99)***	0.034 (9.69)***	0.010 (10.03)***	0.056 (8.87)***	0.024 (3.89)***	0.055 (10.11)***	0.117 (2.50)**	0.112 (8.45)***
Sex of hh. Head(female =1)	-0.140 (3.40)***	-0.156 (3.56)***	-0.045 (4.16)***	-0.187 (4.32)***	-0.095 (6.57)***	-0.211 (2.35)**	-0.029 (2.36)**	-0.544 (7.66)***
Education attains. of hh. head (yrs)	0.150 (60.78)***	0.315 (12.69)***	0.055 (5.13)***	0.210 (3.98)***	0.106 (4.33)***	0.454 (6.38)***	0.174 (4.73)***	0.997 (6.56)***
Marital: Widow (0,1)	-0.213 (3.26)***	-0.167 (4.02)***	-1.232 (3.78)***	-1.123 (2.16)**	-0.656 (2.23)**	-0.476 (2.29)**	-1.232 (2.98)**	-1.063 (1.96)*
Divorce (0,1)	-0.124 (2.46)**	-0.554 (3.54)***	-0.432 (2.08)**	-1.142 (0.69)	-0.656 (1.18)	-0.846 (2.05)**	-1.220 (0.66)	-1.342 (0.19)
Separate (0,1)	-0.154 (1.21)	-0.336 (1.99)*	-0.217 (0.64)	-1.72 (1.35)	-0.445 (2.67)**	-0.833 (2.88)**	-0.043 (1.09)	-1.021 (0.58)
HH. size	-0.440 (4.07)***	-0.016 (3.15)***	-0.152 (2.81)***	-0.230 (4.22)***	-0.340 (3.90)***	-0.802 (2.72)**	-0.214 (3.63)***	-0.032 (5.67)***
Rural ,yes=1 (0,1)	-0.400 (3.81)***	-0.067 (0.83)	-0.078 (3.54)***	-0.580 (2.51)**	-0.046 (3.49)***	-0.308 (2.17)**	-0.187 (2.36)**	-0.381 (4.39)***
Central (0,1)	-0.004 (4.01)***	-13.12 (75.02)***	-0.848 (3.80)***	-0.986 (1.98)*	-0.467 (2.77)***	-0.641 (2.41)**	-0.515 (7.70)***	-0.660 (3.10)**
North (0,1)	-0.060 (3.84)***	-13.56 (79.45)***	-1.069 (3.81)***	-0.982 (1.92)	-0.987 (3.49)***	-1.060 (3.85)***	-1.120 (3.56)***	-1.156 (5.23)***
Northeast (0,1)	-0.152 (5.32)***	-13.70 (80.99)***	-0.697 (3.66)***	-1.462 (2.87)**	-0.546 (4.46)***	-1.32 (4.84)***	-0.936 (4.13)***	-1.089 (5.06)***
South (0,1)	-0.022 (2.35)**	-13.36 (74.20)***	-1.077 (2.56)**	-0.864 (1.77)	-0.817 (2.59)**	-0.606 (2.21)**	-0.902 (3.93)***	-0.809 (4.03)***
N	48820	47287	8745	14374	4164	6518	3854	5168
Pseudo R^2	0.5741	0.4693	0.5505	0.2026	0.4491	0.3617	0.5984	0.3980

Source : SES 1998, SES 2006, Author's estimation. Robust z statistics in parentheses, *significant at 10%, **significant at 5%, ***significant at 1%,

Notes : I: Model for all disadvantaged pupils in the sample.

II: Model for disadvantaged in age cohort 7 to 12 with regional dummy.

III: Model for disadvantaged in the age cohort 13 to 15 with regional dummy.

IV: Model for disadvantaged children in the age cohort 16 to 18 with regional dummy.

Table 7 : Marginal effects[9] on Probability of Attending School of Disadvantaged Children: 1998 and 2006.

Variable	All Ages		7-12 Years Old		13-15 Years Old		16-18 Years Old	
	(I)1998	(I)2006	(II)1998	(II)2006	(III)1998	(III)2006	(IV)1998	(IV)2006
Age of pupil	-0.004 (35.18)*	-0.005 (10.45)**	-0.118 (4.91)***	-0.212 (2..23)**	-0.052 (2.74)**	-0.134 (5.56)***	-0.038 (2.13)**	-0.112 (8.78)***
Sex of students (female =1)	0.001 (2.09)**	0.002 (7.22)***	0.001 (1.03)	0.028 (4.40)***	0.002 (3.39)***	0.015 (3.49)***	0.008 (2.29)**	0.036 (2.38)**
Log income per capita(baht)	0.106 (2.55)**	0.165 (3.48)***	0.117 (5.35)***	0.171 (6.21)***	0.142 (4.52)***	0.318 (4.63)***	0.214 (2.19)**	0.789 (4.92)***
Education of pupils (yrs)	0.115 (2.36)**	0.205 (2.86)**	0.152 (7.46)***	0.356 (3.87)***	0.180 (15.10)**	0.244 (2.81)**	0.193 (2.16)**	0.224 (3.06)***
Age of hh. Head	0.001 (2.51)**	0.002 (4.43)***	0.161 (2.63)**	0.032 (5.54)***	0.010 (3.87)***	0.004 (5.54)***	0.003 (2.22)**	0.123 (3.17)***
Sex of hh. head (female =1)	-0.005 (3.29)**	-0.104 (8.67)***	-0.003 (0.17)	-0.176 (4.87)***	-0.004 (2.38)**	-0.078 (4.56)***	-0.007 (0.20)	-0.121 (3.22)***
Education of hh. head (yrs)	0.010 (3.96)**	0.305 (10.79)**	0.102 (3.32)***	0.178 (8.24)***	0.105 (4.35)***	0.185 (5.45)***	0.140 (3.73)***	0.209 (5.08)***
Marita: Widow (0,1)	-0.3 23 (2.96)**	-0.245 (2.02)**	-1.103 (2.78)**	-0.458 (3.17)***	-0.633 (2.30)**	-0.468 (2.04)**	-0.152 (1.98)*	-0.363 (2.06)**
Divorce (0,1)	-0.105 (2.46)**	-1.122 (2.54)**	-0.322 (2.09)**	-1.216 (1.99)*	-0.343 (1.78)	-0.222 (0.38)	-0.234 (1.66)	-0.378 (1.18)
Separate (0,1)	-0.146 (1.21)	-0.336 (1.89)	-0.117 (0.74)	-1.860 (1.65)	-0.347 (1.67)	-0.563 (1.58)	-0.035 (2.09**)	-1.038 (2.58)**
HH. size	-0.002 (2.07)*	-0.009 (2.15)**	-0.010 (2.61)**	-0.009 (1.23)*	-0.001 (1.90)*	-0.003 (2.71)**	-0.005 (2.65)**	-0.006 (2.33)**
Rural, yes=1 (0,1)	-0.001 (3.21)**	-0.004 (7.81)***	-0.003 ()3.54)***	-0.121 (8.44)***	-0.002 (2.49)**	-0.013 (2.76)**	-0.045 (2.29)**	-0.070 (4.39)***
Central (0,1)	-0.101 (0.01)	-0.078 (4.97)***	-0.075 (2.63)**	-0.022 (4.43)***	-0.057 (1.36)*	-0.023 (2.73)**	-0.125 (2.68)**	-0.112 (3.38)***
North (0,1)	-0.002 (0.12)	-0.964 (3.55)***	-0.007 (3.73)***	-0.112 (3.66)***	-0.031 (3.11)***	-0.036 (4.74)***	-0.272 (3.69)***	-0.178 (6.40)***
Northeast (0,1)	-0.005 (2.31)**	-0.087 (5.45)***	-0.004 (3.57)***	-0.177 (4.98)***	-0.031 (3.56)***	-0.047 (5.49)***	-0.225 (3.18)***	-0.177 (5.80)**
South (0,1)	-0.007 (2.05)**	-0.012 (6.57)***	-0.070 (2.73)**	-0.021 (2.22)**	-0.027 (2.59)**	-0.021 (2.68)**	-0.220 (3.96)***	-0.141 (4.92)***
N	48820	47287	8745	14374	4164	6518	3854	5168

Source : SES 1998, SES 2006, Author's estimation. Robust z statistics in parentheses, *significant at 10%, **significant at 5%, ***significant at 1%

Notes : I: Model for all disadvantaged pupils in the sample.
II: Model for disadvantaged in age cohort 7
III: Model for disadvantaged in the age cohort 13 to 15 with regional dummy.
IV: Model for disadvantaged children in the age cohort 16 to 18 with regional dummy.

[9] See details of the marginal effects in appendix.

If we analyze in equation (1), we can see that the higher cost pushes to the lower lifetime income. Therefore, it is a reason to show that the probability of attending school will be lower when the age of cohort is higher. Moreover, the probability of attending school of the higher age cohort is lower because of the indirect cost of schooling. The higher education levels usually have the higher cost of schooling.

Furthermore, under the current NEA, government does not support the total expense of schooling for households. The higher age cohort or higher education level has higher cost of schooling. If the parent cannot get money from the capital market to finance their children's education, it will be the barrier to attending school. These are the reasons to explain why the higher age cohort or higher education level has the lower probability of attending school.

In sum, the results show that the determinants of school attending of normal and disadvantaged children are similar. But, the impact of the NEA for the disadvantaged is more than the normal children. The findings indicate that age of children is the important factor (see table 3). The younger age cohorts have the higher probability to attend school. Therefore, it implies that the early education program is important for the disadvantaged children. Because the earlier the child attends school, the higher probability the child continues schooling. In addition, table 3 also implies that, if the government provides subsidy to households' income, it will increase the higher probability for the older age cohorts' pupils.

Since the higher education level of household head implies the higher income, and incurred the higher probability of attending school. Therefore, the government should help the low education level of household head. For example, launch a measure in credit market or loan for the low education household head for supporting their children's schooling.

Moreover, the disadvantaged children in the remotd area, particularly in the northeast and the south, should be helped by extra campaign to support schooling, especially for the higher age cohorts. Such as the provision of the extra loan or income subsidy for the youngster who are studying, with the government measurement for the evaluation performance.

6. Policy Implication

Since the main determinants of attending school of the disadvantaged are the income and the education of household head. Therefore, the government policies should subsidize the expense of the education of households and support the education of household head in the next generation (who are the children in the current generation). This implication can be confirmed by the finding that probability of school attending of the disadvantaged increased by the effects of household heads' education at all three age cohorts. It means that the next generation educated parents will encourage their children to go to school in the future, and then the probability of school attending of the disadvantaged children will be increase gradually. This is the opportunity to reduce the high dropout rate of the disadvantaged children step by step in the long run.

Moreover, our finding has policy implication that the early education program is important for the disadvantaged children. Because the earlier the child goes to school, the higher probability the child attends school.

In addition, the result also implies that, if the government has subsidized the family income, it will increase the higher opportunity for the older age cohorts' pupils to access to education because the older age cohorts' (high school level) can generate income for their family in the labor market, if the government can subsidize the foregone earning for their family, the children in the older age cohort will have more chance to continue schooling.

The higher education level of household head implies the higher income, and incurred the higher probability of attending school. Therefore, the government should support the low education household heads by launching a measure in credit market or loan for the low education household head for supporting their children's schooling.

Furthermore, the findings indicate that the single parent, particularly the widowed have more influences on school attending of the children. Thus, it will be better if government has any measurements for helping the children's schooling such as loan or policy in credit market for the widowed. ✍

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Appendix

The Logit Model

Specification of the Logit Model

The *logit model* is an estimation technique for equations with dummy dependent variables that avoid the unboundedness problem of the linear probability model by using the (cumulative) logistic distribution function.[10] This section is cited quote from Gujarati (2003).

The bivariate model is used in general notation. The model is

$$Y_i^* = \beta_1 + \beta_2 X_{i2} + u_i \qquad (1)$$

Where Y_i^* is an unobservable variable. In this case, Y_i^* represents the years of schooling that pupil i has spent on education in school. What we observe is a dummy variable Y_i defined by:

$Y_i = 1$ when a pupil decides attending school with probability P_i, and

$Y_i = 0$ otherwise with probability $(1- P_i)$

P_i denoted the probability that the event $Y_i^*>0$ occurs:

$$\begin{aligned} P_i &= \Pr(Y_i = 1) \\ &= \Pr(Y_i^* > 0) \\ &= \Pr(\beta_1 + \beta_2 + X_{i2} + u_i > 0) \\ &= \Pr(u_i > -(\beta_1 + \beta_2 X_{i2})) \end{aligned}$$

If we use a symmetric distribution of the disturbance term u_i that is symmetrical around its zero mean, then the following equation applies:

$$\Pr(u_i > -(\beta_1 + \beta_2 X_{i2})) = \Pr(u_i < \beta_1 + \beta_2 X_{i2}) \qquad (2)$$

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[10] The logistic model has been used extensively in analyzing growth phenomena, such as population,GNP,money supply,etc. For theoretical and practical details of logit and probitmodels, see J.S.Kramer, *The Logit Model for Economists,*Edward Arnold Publishers,London,1991; and G.S.Maddala.

This means that the probability P_i

$$P_i = \Pr(Y_i = 1)$$
$$= \Pr(u_i < \beta_1 + \beta_2 X_{i2})$$

The probability P_i depends on the distribution of the disturbance term u_i. Suppose the distribution in this case is logistic distribution. Thus we have the following distribution function:

$$F(\beta_1 + \beta_2 X_{i2}) = \frac{e^{\beta_1 + \beta_2 X_{i2}}}{1 + e^{\beta_1 + \beta_2 X_{i2}}}$$
$$= \frac{1}{1 + e^{-\beta_1 - \beta_2 X_{i2}}}$$
$$= \frac{1}{1 + \exp(-\beta_1 - \beta_2 X_{i2})}$$

A convenient notation is introduced in the last expression. The resulting model is called the *logit model.* With the logistic function, we have the following logit model for P_i :

$$P_i = \frac{1}{1 + \exp(-Y_i^*)}$$
$$= \frac{1}{1 + \exp(-\beta_1 - \beta_2 X_{i2} - u_i)} \qquad (3)$$

If Pi , the probability of attending school of a pupil, then (1- P_i), the probability of not attending school (dropout) of a pupil, is

$$1 - P_i = \frac{\exp(-(\beta_1 + \beta_2 X_{i2} + u_i))}{1 + \exp(-(\beta_1 + \beta_2 X_{i2} + u_i))} \qquad (4)$$

Therefore, we can write

$$\frac{P_i}{1 - P_i} = \frac{1 + e^{(\beta_1 + \beta_2 X_{i2} + u_i)}}{1 + e^{-(\beta_1 + \beta_2 X_{i2})}} = e^{(\beta_1 + \beta_2 X_{i2} + u_i)} \qquad (5)$$

Now $\frac{P_i}{(1-P_i)}$ is simply the *odds ratio* is favor of attending school, the ratio of the probability that a pupil decide to attending school to the probability that a pupil decide not attending school.

Then if we take natural log of (5), we obtain

$$\ln(\frac{P_i}{1-P_i}) = \beta_1 + \beta_2 X_{i2} + u_i \qquad (6)$$

This result is easily verified:

$$\ln(\frac{P_i}{1-P_i}) = \ln(\frac{1}{1+\exp(-Y_i^*)} * \frac{1+\exp(-Y_i^*)}{\exp(-Y_i^*)})$$
$$= \ln(\frac{1}{\exp(-Y_i^*)})$$
$$= Y_i^*$$
$$= \beta_1 + \beta_2 X_{i2} + u_i$$

The logit model (3) is a non-linear model. Its parameters have to be estimated by a non-linear estimation method.

Marginal effect

This section we derived from Gujarati (2003). We examine the range and the partial change in predicted probability of attending school. Measures of partial change can explain the effect of each independent variable on the probability of an event occurring. The partial change in the probability, or the marginal effect, can be computed by taking the partial derivative of the regression equation $\Pr(y=1|x) = F(x\beta)$ with respect to x_i.

$$\frac{\partial \Pr(y=1|x)}{\partial x_i} = \frac{\partial F(x\beta)}{\partial x_i} = \frac{dF(x\beta)}{dx\beta}\frac{\partial x\beta}{\partial x_i} = f(x\beta)\beta_i$$

The marginal effect means that for a unit change in x_i likelihood of y is expected to change in $f(x\beta)\beta_i$ percent, holding all other variables constant. When the explanatory variable is a dummy variable, the discrete change in x_1, means that if the variable changes from zero to one, the likelihood of y is expected to change in β_i, holding all other variable constant.