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Gender-preferential Intergenerational Patterns in Primary Education Attainment: A Quantitative Analysis of a Case of Rural Mindanao, the Philippines

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Abstract

The Philippines has achieved a relatively high standard of education. Previous researches, most of which deal with Luzon Island, have indicated that rural poverty alleviation began partly due to the increased investment in education. However, the suburban areas beyond Luzon Island have rarely been studied. This study examines a case from rural Mindanao, and investigates the determinants and factors associated with children's education, with a special focus on delays in schooling, which may be a cause of dropout and holdover incidences, as well as exploring gender-specific differential patterns. The result shows that after controlling other socioeconomic attributes, (1) delays in schooling, as well as years completed, are more favorable for girls than boys; (2) the level of maternal education is equally associated with the child(ren)'s education level regardless of their gender; and (3) paternal education is preferentially and favorably influential to the same-gender child(ren), i.e., son(s). To reduce the boy-unfriendly gender bias in primary education, this study suggests two future tasks, i.e., providing boy-specific interventions to enhance the magnitude of the father-son educational virtuous circle, and comparing the magnitude of gender-equal maternal education influence and boy-preferential paternal education influence to specify which effect is larger.

Keywords: Delays in years of schooling; Gender-preferential and intergenerational effect; Primary education; Poverty; Limited dependent variable regression; Rural Mindanao; The Philippines
JEL classification: I20, I21, I24, I25, I29, O53

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The Philippines has achieved a relatively high standard of education. Previous researches, most of which deal with Luzon Island, have indicated that rural poverty alleviation began partly due to the increased investment in education. However, the suburban areas beyond Luzon Island have rarely been studied. This study examines a case from rural Mindanao, and investigates the determinants and factors associated with children's education, with a special focus on delays in schooling, which may be a cause of dropout and holdover incidences, as well as exploring gender-specific differential patterns. The result shows that after controlling other socioeconomic attributes, (1) delays in schooling, as well as years completed, are more favorable for girls than boys; (2) the level of mother's education is equally associated with the child(ren)'s education level regardless of their gender; and (3) father's education is preferentially and favorably influential to the same-gender child(ren), i.e., son(s). To reduce the boy-unfriendly gender bias in primary education, this study suggests two future tasks, i.e., providing boy-specific interventions to enhance the magnitude of the father-son educational virtuous circle, and comparing the magnitude of gender-equal mother's education influence and boy-preferential father's education influence to specify which effect is larger.

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1 Introduction

This study investigates what factors are associated with education attainment, with a special focus on delays in schooling, using a case of Rural Mindanao, the Philippines. Above all, the study examines gender patterns in educational attainment. A background of my research interest is exploring how education attainment may be biased in terms of gender in contrast with other developing countries and how this may lead to internal inefficiency, although the Philippines has achieved a relatively high standard of education attainment compared to other developing countries (Nakanishi 1990). Certainly, its net enrolment ratio in primary education has been over ninety percent since 1990s (Figure 2). In terms of primary education attainment, it can be said that, out of developing countries, the Philippines has reached the passing grade.

Having a background where many clergy training institutes were established during the Spanish colonial eras, the Philippines first experienced the development of higher education institutes. Subsequently, coming into harmony with international development policies' recent movement toward basic Education for All (EFA), the primary education sector became a focus for expansion and improvement for the past quarter century. Philippine primary education became free and compulsory under the Constitution, which was changed in 1987 under Corazon Aquino administration (Tandora 2003). The Philippines has been recognized as achieving a relatively high level of education despite its relatively low economic performance and poverty status.

In turn, the country has long suffered from poverty. A prevailing image of the Philippines is one of the slums or Smoky Mountain. Recent development studies, however, have revealed that even in such a poor country, poverty has begun to ease. In particular, poverty alleviation in rural areas, where the poor and potential poor live, is believed to be making significant progress (Maluccio 1998, Estudillo *et al*. 2008, Estudillo *et al*. 2009). This may seem like small inroads, considering the Philippines' development and poverty issues. However, the symbolic urban poor, like those living in slums, are linked to poverty in rural areas, which is one trigger for emigration from rural to urban areas. Therefore, even in the 1990s, the importance of rural development was indicated (Nakanishi 1991). It is, therefore, always important to look at rural areas both economically and

socially. Education has also been identified as contributing to poverty alleviation in rural areas (Otsuka and Sakurai ed. 2007).

However, despite past high standards of education, current Philippine educational attainment has begun to stagnate (Okabe 2013), though some have called it a setback, rather than stagnation (Caoli-Rodriguez 2007, David *et al*. 2009). In terms of secondary education enrolment, it only reaches fifty percent of eligible students. Caoli-Rodriguez (2007) predicts the nearly impossibility of achieving the Education Millennium Development Goals (MDG) by 2015. In addition, Balisacan indicates that the cohort survival rates in the Philippines for public primary and secondary education, which show students' educational progress, barely increased during the 1980s and 1990s (Balisacan 2003: 289). Thus not only access but also educational progress in the Philippines seem to have faltered.

When considering the constraints to education attainment, poverty—an endogenous determinant—is often seen as a main factor. However, another characteristic of education in the Philippines is the country's gender-differentiated pattern of education attainment. David *et al*. (2009) bring up the lower levels of educational attainment by boys and men compared to girls and women. Not only the enrolment ratio but also learning performance and scores on national academic test show clear gender disparities. David *et al*. (2009) insists that empirical studies are necessary to learn the background to and current situation of the lack of educational achievement by boys and men. Such a study should consider that education quality and repetition of schooling are recognized as important elements to achievement, in addition to simple access to education. For example, if students are frequently held over instead of progressing, and the system has a high dropout rate, the internal efficiency of the educational system may suffer. In the Philippines, this problem has long been termed "out-of-school children."

2 Literature Review

2.1 Philippine-case Literature

Estudillo *et al.* (2001) used data from a microsurvey conducted in rural Central Luzon to investigate the gender-differentiated pattern between schooling and land inheritance.

Their results revealed that education level showed sustained improvements over several generations. They also determined that girls/women were more apt to receive education, that is, human capital, while men were more likely to receive land, that is, physical capital. They explained these gender-differentiated patterns as reflecting the relative comparative advantages for each gender in terms of engaging in the agricultural or nonagricultural sector; women, who have their comparative advantage in the nonagricultural sector, are more likely to be enrolled in education. Similarly, Otsuka *et al.* (2003) conducted an empirical analysis regarding the importance of income, especially nonagricultural income, and asset such as land on education investment, and concluded that it is a necessity for mitigating credit and financial constraints. Takahashi and Otsuka (2009) used a different dataset and also determined that women have a higher level of education than men. These studies indicate that the female-favorable result is robust in Central Luzon, the Philippines. In contrast, Yonemura and Tamagake (2003), focused on supply-side associates (e.g., types of schools) and conducted regression analyses on the relation between primary school completion and population density, income standards, and mother tongues using more country representative data. Though representative data such as population census and Family Income Expenditure Survey were used, the range of explanatory variables seems to be limited.

Case studies focusing on the Philippines are generally concentrated on Luzon Island, which includes more relatively developed and fecund areas than rest of the country. In this context, however, it is important and necessary to expand case studies to other less developed and less fertile areas such as Mindanao Island (Takayama *et al.* 2010). This implies that relatively less is known about education and development on Mindanao Island.

2.2 Holdover, Dropout, and Internal Efficiency of Education

As discussed above, the school enrollment ratio in the Philippines is relatively high, but high enrollment does not always indicate efficiency (Balisacan 2003). For example, a system can be inefficient if a pupil is enrolled but experiences a holdover or drops out. Enrollment is important, but repetition and internal efficiency within education are also

central.

Holdovers and dropouts result in delays in educational progress. Once a pupil experiences at least one of either a holdover or dropping out, a gap will emerge between the ideal grade that the pupil should achieve considering his or her age and his or her actual grade. Enrollment delays generally results in an individual experiencing a decline in lifetime welfare in terms of the intertemporal optimization problem (Glewwe and Jacoby 1995). Being a dropout leads to even greater negative consequences. Out of the literature examining the determinants of delays in education in developing countries, Randall and Anderson (1998) examined Latin American countries; Glewwe and Jacoby (1995) and Glewwe *et al.* (2001) looked at poverty and nutrition in Ghana; Yamano *et al.* (2001) focus on the association between household income, education expenditures, family-wide education level, and universal primary education policy in Uganda; and Miwa (2008) explores poverty and malnutrition in Cambodia. In Philippine-centric case studies, however, except for the above studies dealing with Central Luzon rural villages, relevant studies taking a quantitative approach are rare.

Apart from these above quantitative and econometric analyses, Bouis *et al.* (1998) conducted anthropological surveys and interviews with *barangay*[1] leaders and adults, more than a few of whom are parents as well. According to their research, interviewees cited the dropout problem as the reason for delays in schooling, and added that boys and men are more likely to experience it.

This type of research has the advantage of explaining qualitative or descriptive reasons for the phenomenon. Interviewees attributed the male bias in frequency of dropout status to the fact that boys are criticized for being less responsible and are seen as being prone to "vices" (for example, drinking), overly fond of "roaming around" and "playing with their *barkada*"[2] (Bouis *et al.* 1998: 22)[3]. Though education and labor are seen as trade-offs, interviewees did not claim economic reasons for children dropping out,

[1] *Barangay* is a minimum unit of the administration in the Philippines.

[2] *Barkada* means peer group, and sometimes is interpreted as a gang in English.

[3] Interestingly, aside from this perspective, Bouis *et al.* (1998: 22) provides the economic reason that boys have more opportunities than girls in rural settings, and these opportunities may serve as incentives for boys to quit schooling as soon as they find a job or income generating activities. Furthermore, boys may perceive schooling as having a lower payoff since they know they eventually will be farmers, which requires less education.

such as having to get a job or work on the farm. In fact, they responded that children dropped out due to being “sick," “ashamed," “a slow learner," “had lost interest in schooling," “played hooky from school," “influenced by his *barkada*," “did not like school and teachers," and "played too much" (Bouis *et al.* 1998: 22-23). This field survey was conducted in the same area as the dataset used in this present study, i.e., Mindanao Island, but those results were subjective and nonquantitative. Accordingly, it is necessary to conduct a quantitative analysis on gender patterns in educational progress in Mindanao Island, i.e., the non-Luzon area, to confirm whether findings in Luzon also apply to Mindanao, which is geographically remote and has a different agricultural culture of corn cropping.

The field survey based on interviews with *barangay* leaders and parents revealed that parents neither wanted their children to work nor thought it a help if their children stop schooling. Rather, it indicates circumstances where dropouts occur due to perceptual reasons such as parents or children losing interest in school.

However, rather than simply laying the onus for dropping out on personal factors such as personality and parental expectations, the associated socioeconomic factors should be examined quantitatively. In this study, the delay in years of schooling, defined as the gap between ideal and actual grades in school, is the dependent variable for the regression analysis. In this regard, however, “delay" is a normative concept that indicates a gap between “ideal" and actual grades, and secondary and tertiary education are not compulsory. Therefore, the delay analysis is applied only to primary education schooling.

The remainder of this paper is as follows: Section 3 explains the dataset and the surveyed area. Section 4 describes the current situation and provides basic information on the Philippine education system, including information specific to the surveyed province. Section 5 explains the empirical analysis. Section 6 presents the results, and Section 7 concludes and offers some concluding remarks.

3 Dataset and Surveyed Area

This study uses a dataset from the Bukidnon Panel Data Survey (henceforth, BPDS) (IFPRI 2008). BPDS is a household data conducted in Bukidnon Province, Northern

Mindanao Region (Region X), the Philippines (see, for the map, Figure 1). Basic information on the survey can be obtained by referring to Bouis and Haddad (1990), Scott and Quisumbing (2007), and Takayama *et al.* (2010).

==Figure 1 about here==

The survey was conducted by the IFPRI and the Research Institute for Mindanao Culture. The first survey in 1984-85 was intended to gather information on food and nonfood expenditures, agricultural production, and other socioeconomic attributes. The survey sampled 29 communities from the southern half of the landlocked province of Bukidnon. Around 20 years since the first survey was conducted, the 2003 and 2004 rounds, with closely relevant questionnaires, were conducted. The data cover topics similar to those in the 1984/5 survey.

The original survey aimed to examine agricultural commercialization effects on consumption, expenditure, nutrition, and household welfare. In 1977, Bukidnon saw the opening of the sugar mill company, called Bukidnon Sugar Company (BUSCO). This provided farmers with the option to commercialize their farms by switching from subsistence corn production to sugar production. Farmers' choices depended on their proximity to the sugar mill. The initial sample included 510 households, although 448 households were interviewed in all four rounds.

The original case study (Bouis and Haddad 1990) examined the effects of the shift from subsistence corn production to sugarcane following the BUSCO sugar mill construction. In 1992, 352 of the original 448 households were reinterviewed as part of a study focusing on adolescents (Bouis *et al*. 1998). The 1992 survey included only one round of data collection and used a condensed survey instrument.

4 Outline of Education in the Philippines and Survey Area

4.1 Nationwide Overall Conditions

Basic education in the Philippines follows a 6-4-4 system, i.e., six years for primary education, four years for secondary education, and four years (in general) for higher

education[4]. Children formerly entered primary school at age seven, but this changed to six in 1995. The trend since 1990 is confirmed by Figure 2, which utilizes data from the World Bank's EdStats.

A constitutional amendment in 1997 set down the subsequent educational policy and made primary education free and compulsory as part of a commitment to quality education for all. Secondary education became free as well through the Free Public Secondary Act of 1988. In accordance with EFA, the Philippines designed its own EFA Philippine Plan of Action 1991-2000, and Department of Education formulated the Schools First Initiative to expand the school improvement movement through community participatory school management, and laid down the Basic Education Sector Reform Agenda for promoting continuous basic education and learning (Yonemura and Tamagake 2003).

4.2 Summary of Education in Bukidnon

According to the census by the National Statistics Office (NSO), out of the population aged five years or older, the proportion of people currently attending or having graduated from primary education is 53.90% (56.65% for males and 50.97% for females), the proportion for secondary education is 22.63% (20.91% for males and 24.46% for females), and the proportion of degree holders is 1.82% (1.40% for males, 2.27% for females) in 2000 (NSO 2003). At all the levels of education, women comprise a higher proportion than men. These figures included adults who concluded their education at the primary or secondary level. The portions of the school-age population are shown in Figure 4. The proportion of primary school-aged children occurs in the late 80s%, with a peak of 95% for the age of 11. The proportion of secondary school-aged children, in turn, is 40s%, with a peak of 50% for age 16. The gender pattern that women have higher attainment at all education levels can be clearly seen.

Figure 3 shows information by age. However, in keeping with the central research question of this study, a grade one child who is much older than usual grade one children may be counted equally compared to other children, with no weighting. Accordingly,

[4]This information was the case during the year when the data were gathered. Since 2012, however, the Philippines has overhauled its basic education by establishing a K to 12 program. See Okabe (2013) for details.

let us examine the proportion of grade 5-6 completion in primary education (Figure 4). This figure shows a considerable number of students continuing to attend primary education though they had already reached the right age for enrolling in secondary education (high school), but this number decreases as age increases. Interestingly, the proportions of males and females flip at the tipping point occurring at the ages 13-14. Compared to men, in primary education, women attain higher grades relatively faster than men, and even the women with delays in schooling attain those grades faster than men. Furthermore, with regards to secondary education, no more than 10.8% of the 16-year-old population has completed secondary education.

==Figures 3–4 about here==

The overall educational situation in Bukidnon, the Philippines, is presented in *Philippine Human Development Index Report 2000*, which conducted comparative analyses at a nationwide level. According to the report, the Province of Bukidnon is ranked in the worst ten provinces in basic education attainment (National Statistical Coordination Board (NSCB) 2002). The worst province, ranked 77, is Sulu, followed by Sarangani (76), Maguindanao (75), and Bukidnon (74). Furthermore, although Bukidnon was ranked 64 in 1994, its rank worsened to 76 in 1997 and had only recovered as far as 74 in 2000 (NSCB 2002: 17). In particular, Bukidnon's recent yearly drops should be seen in the context of its steady position at rank 64 through 1994. In addition, the cohort survival (Figure 5) and dropout (Figure 6) rates show Bukidnon's consistent bad educational attainment compared not only to Luzon island areas but also Mindanao Island areas and the Northern Mindanao Region as a whole.

==Figures 5–6 about here==

In the nationwide context, more than a few regions and areas in the Philippines succeeded in improving access to education following the Philippine government's launch of various educational policies as an international development scheme prioritized the education field. However, the descriptive statistics information implies that Bukidnon has been overtaken by other regions and areas. According to Mesa (2007), which compared the average years of education and inequality index (Gini coefficient), Bukidnon

was ranked in the lowest three in terms of fewest years of education and ranked in the lowest four in terms of the level of inequality. Similar trends in survival and dropout rates were observed, as shown in Figures 6–7.

On Mindanao Island, the Province of Sulu ranked nearly worst in human development and education attainment. In this province, i.e., the Islamic province, the people have long suffered from conflict and violence in addition to socioeconomic underdevelopment and poverty. In contrast, the Province of Bukidnon, being located in the Northern Mindanao Region, is not necessarily connected to Muslim conflicts and violence. Nevertheless, education in Bukidnon has nonetheless faced challenges. One possible explanation is that schools are concentrated in the flatland[5], and so schools were scarce in upland areas, which would influence the poor's access to schooling. To determine the association between schools and regional conditions, disaggregate analyses are needed (Mesa 2007: 17).

5 Empirical Analysis

5.1 Dependent Variable and Regression Model

To determine the association between individual- and household-level characteristics as well as region-specific fixed effects, we conduct a regression analysis to calculate the significance and signs on the coefficients of each dependent variable. Let the number of years delay in schooling experienced by pupil i be denoted as ΔA_i, and defined as

$$\Delta A_i = \begin{cases} A_{1i} - A_{2i} & \text{if} \quad 6 \leq Age_i \leq 12, \\ (A_{1i} - A_{2i}) + (Age_i - 12) & \text{if} \quad Age_i = 13, \text{and} \\ (A_{1i} - A_{2i}) + (Age_i - 13) & \text{if} \quad Age_i \geq 14, \end{cases} \tag{1}$$

where A_{1i} is the ideal year of schooling calculated from Age_i, the pupil i's age, and A_{2i} is the actual year of schooling when the research was conducted. The case of no delay in schooling means $A_{1i} = A_{2i}$ and $\Delta A_i = 0$.

Here, by the way, we have to ask ourselves normative question. At least in the case of the Philippines, education is only mandatory at the primary stage. No other educational stage is compulsory, while public secondary education is free. Considering the norm of

[5]Bukidnon is mountainous and landlocked.

Education MDGs, all the children should ideally complete primary and elementary education. However, secondary and tertiary educations are neither compulsory nor attained by all people even in developed countries. Therefore, the analysis in this study limits its range to only primary education[6].

Usually, children are expected to enter primary schools at the age of six[7]. Ideally thinking, the completed year will be year one at the age of seven, and be year six at the age of 13 at the end of primary education, and be year 10 at the age of 17 when secondary education is completed. The sample includes pupils older than 13 years. Therefore, for those pupils, the difference between age of 13 and the real age is adjusted. Figure 8 is a histogram of ΔA_i by age and by sex.

We assume the functional relation of ΔA_i is

$$\Delta A_i = A_i(\boldsymbol{X_{1}}_i, \boldsymbol{X_{2}}_i, \boldsymbol{R}_i),$$

and derive the multiple regression model is

$$\Delta A_i = \beta_0 + \boldsymbol{X_{1}}_i\boldsymbol{\beta_1} + \boldsymbol{X_{2}}_i\boldsymbol{\beta_2} + \boldsymbol{R}_i\boldsymbol{\beta_3} + \varepsilon_i, \tag{2}$$

where ΔA is the dependent variable; β_0 is an intercept; $\boldsymbol{X_1}$ is a vector of other pupil characteristics and attributes, including gender dummy variable taking the value of 1 if the i-th pupil is girl and zero otherwise; $\boldsymbol{X_2}$ is a vector of the ones of the pupil's household and family; $\boldsymbol{R}$ is a vector of fixed effects of municipality dummies for unobserved geographic and community-level heterogeneity; ε is a disturbance term; and $\boldsymbol{\beta}$'s are the coefficients to be estimated.

5.2 *Independent Variables*

For $\boldsymbol{X_1}$, the following characteristics and attributes of pupil and students are used: age, a dummy of minority language, which takes the value of one if speaking a language other than Tagalog (an official language of the Philippines: *Pilipino*) and Cebuano (the majority language in Northern Mindanao), pupil height and weight, a dummy of food-snack experience, which takes a value of one if experienced during school, the period

[6]It is the author's further and future assignment to analyze in an appropriate manner factors apart from delay analysis for secondary and tertiary education.

[7]Sometimes, some start at the age of five or seven.

of labor regardless of whether it is nonfree or free[8], and the interaction terms of these variables.

For $\boldsymbol{X_2}$, the following characteristics and attributes of households and families are used: number of brothers and/or sisters[9], a shock experience dummy that takes a value of one if shocks caused by weather and crime were experienced, the amount of bank savings (taking the value of zero if the family has no bank account), a dummy of credit constraints[10], and social network[11]. Furthermore, an income variable is introduced: per capita agricultural income, per capita nonagricultural income, and per capita amount of remittances received. Here, however, we have to consider the possibility that the coefficients of income variables have an endogeneity bias. Accordingly, the endogeneity may also be present for the coefficient of pupil's labor. To mitigate these endogeneity biases, one resolution is to use two-step least squares estimation using instrument variables (IVs). Since the good and appropriate IVs cannot be found from datasets, the asset variables (owned and rented-in land, dummy variables of taking a value of one if the household can obtain bikes and cars, respectively, and dummy variables taking a value of one if the household is unelectrified and has no running water) are introduced instead of income variables.

Lastly, for $\boldsymbol{R}$, as a municipality-level fixed effect, dummy variables taking a value of one if the household lives in the specified municipality, where the base category is being a municipality of Quezon, are introduced to a set of independent variables for unobserved geography- and community-specific heterogeneities.

5.3 Basic Information from Descriptive Statistics

Before talking about the regression analysis and estimation, let us confirm the basic information from a set of dependent and independent variables from the descriptive

[8]This variable is calculated as the difference between the real age and the age when the pupil began working.

[9]This variable would imply the household size and the probability of competition to obtain educational opportunities.

[10]This dummy variable takes a value of one if the household head has been both refused by moneylenders and incapable of coming up with needed money from other moneylenders or his relatives.

[11]Social network is regarded here as the number of friends and acquaintances upon whom the household head can rely in emergency.

statistics (Table 2). The dependent variable is the number of years delay in schooling, i.e., ΔA. For a robustness check, years completed, i.e., A_2 are also used. On average, the children in the sample have a schooling delay of one year and completed 2.7 year of schooling. The average age is 9.7 and 52% of the sample is girls (i.e., 47%-48% of the sample is boys). Out of the children in the sample, 32% of them have school snacks and 18% have school lunches. Less than 1% of the children in sample speaks languages other than Tagalog and Cebuano, respectively.

Thirteen percent of the children in the sample experienced labor with payment, and they started around 0.13 year. The interaction of the labor term with the girl dummy, showing 0.05 (5%) on average, is much smaller than 13%, which implies that boys commenced labor with payment far earlier than girls. On average, each child has 2-3 siblings. Most households in the sample experienced a negative shock, one quarter of households have a saving account, five fifths of households experienced being refused credit, and social networks, which includes friends, relatives, and acquaintances upon whom the household can rely, is around two people a household on average.

Regarding parental education level, the average father's education is primary school and one additional year of secondary education, and mother's education is one year longer than the father's. Comparing fathers (male) and mothers (female), educational attainment is higher in females than in males[12]. Turning our focus to income variables, on average, households mainly depend on the agricultural income in this village and, unlike central Luzon villages, the households earned small amount (also proportionally) of nonagricultural income, which is less than remittances received. Asset variable statistics, in turn, show that mobile facilities such as motorbikes and cars are a type of rare asset that are seemingly not affordable for average households. One-third and one half of households are not electrified and do not have a water pipe inside the house, respectively. Households in the sample seem to display some typical characteristics of rural poverty.

[12]As seen in the later discussion, this trend, seemingly opposite to the general developing countries case, is robustly observed among the generation of children.

5.4 Estimation Method

To estimate equation (2), ordinary least squares (OLS) method is usually used. However, the dependent variable, ΔA, theoretically does not take a value less than zero. In other words, the dependent variable is censored at the value of zero, i.e., $\Delta A \geq 0$ or ΔA is a limited dependent variable. If equation (2) is estimated by OLS without considering this variable, the OLS estimation is inappropriate. To estimate the limited dependent variable model, the standard method is Tobit. The Tobit model is rewritten as below.

First, let the latent variable of ΔA be denoted as ΔA^*, and the latent variable is regressed as the same set of independent variables as equation (2):

$$\Delta A_i^* = \beta_0 + \boldsymbol{X_{1i}\beta_1} + \boldsymbol{X_{2i}\beta_2} + \boldsymbol{R_i\beta_3} + \varepsilon_i. \tag{3}$$

In this setting, the true dependent variable ΔA is equal to ΔA^* if ΔA^* takes a nonnegative value, and ΔA is equal to zero if ΔA^* takes a negative value including the value of zero. Namely, the Tobit model is written as follows:

$$\Delta A_i = \begin{cases} \Delta A_i^* & \text{if} \quad \Delta A_i^* > 0, \text{and} \\ 0 & \text{if} \quad \Delta A_i^* \leq 0. \end{cases} \tag{4}$$

Tobit model estimations use the maximum likelihood (ML) method. The sample includes the children who had attended primary schools within one year from the research time.

5.5 Robustness Check

To consider whether or not the results are robust, the author adds three supplementaries, namely first adding the interaction terms of the gender dummy variable with other individual and household characteristics. By so doing, we can in more detail compare the magnitude of each gender with respect to other independent characteristics variables.

The second is to add not only the ΔA but also the number of school years completed, i.e., A_2, to the equations (2) and (3) instead of ΔA. In so doing, we can confirm whether or not the coefficient estimates show qualitatively the same results.

Finally, the third is to calculate the estimates again using another regression model, i.e., Poisson regression. Observing the dependent variable ΔA_i, as shown in Figure

7, the distribution of ΔA_i certainly appears to be left-censored, but we also find that it only takes on integer numbers, such as $0, 1, 2, \cdots$. For such a type of dependent variable that takes on integer numbers beginning from the value of zero and has a high density in accordance with the value of zero, the Poisson rather than the Tobit model is recommended for the regression. The model is termed "the count data model" and assumes that the dependent variable follows the Poisson distribution

$$\Pr(\Delta A = a) = \frac{\exp(-\mu)\mu^a}{a!}, \quad \text{where} \quad a = 0, 1, 2, \cdots, \tag{5}$$

where μ in equation (5) is the intensity term. Under the Poisson distribution, we have the following property:

$$\begin{aligned} \mathrm{E}(\Delta A) &= \mu, \\ \mathrm{V}(\Delta A) &= \mu. \end{aligned}$$

This is called the equidispersion property of the Poisson distribution (Cameron and Trivedi 2005). From the equidispersion property, the Poisson regression model can be expressed as

$$\mu_i = \exp(\boldsymbol{X_i\beta}), \quad i = 1, 2, \cdots, \tag{6}$$

where $\boldsymbol{X_i\beta}$ is the same linear combination of regressors as in equation (2) or (3) and u is stochastic disturbance term.[13] The most natural estimator is ML. The maximization problem of the log-likelihood function is

$$\max_{\{\beta\}} \ln \mathcal{L} = \sum_{i=1}^{N} (\Delta A_i \boldsymbol{X_i\beta} - \exp(\boldsymbol{X_i\beta}) - \ln \Delta A_i!).$$

The Poisson MLE, $\hat{\boldsymbol{\beta}}_P$, is the solution corresponding to the first-order condition (FOC) for maximum likelihood

$$\frac{\partial \ln \mathcal{L}}{\partial \boldsymbol{\beta}} = \sum_{i=1}^{N} (\Delta A_i - \exp(\boldsymbol{X_i\beta}))\, \boldsymbol{X_i} = \mathbf{0}.$$

[13] Identically, regression equation (6) can be also written as

$$\ln \mu_i = \boldsymbol{X_i\beta}.$$

Although the interpretation of the coefficients estimated in linear models is the marginal numerical effect in accordance with a one-unit change in the corresponding independent variable, the Poisson model is so nonlinear that we cannot interpret the coefficients in the same way, as the values shown in Table 5 are only the coefficients and do not include the marginal effects. Here, similar to the Tobit estimation, only the statistical significance, signs (negative or positive), and magnitude relation are informative.

Unlike the assumptions made under Tobit estimation, Poisson estimations are considered more sensitive to minor increases and decreases in a set of regressors if the dependent variable comprises count data. Indeed, the histogram of the dependent variable shows that the distribution is localized in ΔA's value of zero and in the area of smaller integer numbers. Then, using the Poisson estimation, we will check 1) the eligibility of the utilized Poisson regression model by the chi-square (χ^2) test with its null hypothesis H_0: the dependent variable, ΔA, follows the Poisson distribution, and 2) whether the result produced by the Tobit estimation is qualitatively similar to the result yielded by the Poisson estimation.

==Figure 7 about here==

6 Results

The regression table is shown in Table 3.[14]

==Table 3 about here==

6.1 Individual Backgrounds

While age is not statistically significant in relation to the dependent variable of delays in schooling, it is positively and statistically significant in terms of the dependent variable of years completed, and the age square (age^2) is negatively and statistically significant in relation to the dependent variable of years of education completed. This means that

[14]Due to space limitations, the results of the independent variables included in the regression analysis but not statistically significant are omitted from this Table 3 (and Table 4, as well). See Table 2 to learn all the used independent variables.

$\frac{\partial A}{\partial (age)} > 0$ and $\frac{\partial^2 A}{\partial (age)^2} < 0$, implying that years completed increase as age increases and at the same time the marginal increase in years completed is declining. The purpose of including the age variable in regression equations is to control for age effects to reveal the magnitude of other variables. Furthermore, height is statistically positively significant in terms of years completed as well, albeit controlling for age; it may show the possibility that the height is a proxy of nonage attributes such as health.

As presumed regarding gender variables, we can say that girls complete more years of education and experience fewer delays in schooling than boys. Though models including interaction terms of gender with other variables should show a diluted magnitude of the coefficient for gender dummy variable alone, they continue to show that being a girl is favorable for the robust abovementioned results.

Furthermore, we found that receiving school lunches and snacks is associated with both fewer delays in years of schooling and more completed years of schooling. Both estimates show similar associations, while receiving snacks is statistically significant at a higher level.

On the other hand, from the visual and descriptive statistics information, we find that few children at the primary education stage experience(d) labor; education is a substitute for labor. Although the variable of the length of time children experienced labor is not significant statistically on its own, the interaction term with the gender dummy variable is positively statistically significant in relation to the delay of schooling and negatively to the completed years of schooling. This interaction term result implies that girls who experience(d) labor are more associated with both a delay in schooling and fewer completed years of schooling compared to boys[15].

[15] In this context, based on the estimation result, the author can mention only the association (correlation) but cannot identify causality. The decision making regarding labor and education may be determined simultaneously. In this case, the coefficient may include a simultaneity bias, one type of endogeneity bias. To discuss and identify the causal inference between labor and education, the bias needs to be treated econometrically appropriately by, e.g., instrumental variable method. In this version, however, the author does not cope with the endogeneity bias and so causality should not be discussed. This is a future task.

6.2 Family Backgrounds

The shock dummy variable is positively statistically significant in terms of the delays in schooling and negatively related to the number of school years completed, while the interaction term with the gender dummy is insignificant. These estimation results show that the influence of shock status is related to schooling variables regardless of gender. Next, the estimation result of the social network variable shows that larger networks are associated with fewer delays and more years of schooling completed. The results of these two variables may be interpreted as indicating a situation where children or family members (especially parents) must rely on their friends and relatives even in a shock affecting status.

Next, let us examine parents' educational attainment levels. First, mother's education level negatively influences schooling delays and positively impacts the completed years of schooling. In contrast, father's education level shows insignificance if inserted alone, though Model 2 shows that the father's education negatively influences delays in schooling. In addition, seeing the models 3, 4, 7, and 8 where the interaction terms on the children's gender dummy are added, although father's education level alone is negative to the delay and insignificant in relation to the completed years of schooling, father's education and the interaction terms of father's education with the girl dummy variable show the opposite relation.

Father's education alone is seemingly negative in terms of the delay and insignificant in relation to the number of completed years of schooling, and the interaction terms' magnitudes are larger than in the case of father's education alone. These findings would probably imply that the level of father's education preferentially and favorably influences the level of same-gender children, that is, sons, because the magnitude of interaction is larger than that on father's education alone. In contrast, mother's education alone is negatively significant in terms of the delay in schooling and positively significant in relation to number of school years completed. However, in models with interaction terms, both mother's education alone and its interaction terms with the girl dummy are insignificant. This implies that, unlike father's education, mother's education equally influences children regardless of their gender.

The income variables do not show significant results, while per capita nonagricultural income is barely significant to school years completed (albeit at the 10% level). Like child labor, it is usually assumed that income and education are simultaneously determined so that a causal relationship is not specified within the analysis of this study. In fact, looking at the asset variables, the more assets (proxied by having motorbike) the family owns, the smaller the delays in the children's schooling and the more the years of schooling the children complete. The coefficient on the interaction of rented-in land with the girl dummy also implies that the asset effect is favorable for girls.

Furthermore, although omitted from the estimation results table, the regression includes municipality-specific fixed effect variables. The municipality effect can therefore be demonstrated. This means that even after controlling for individual and household attributes, region- and municipality-specific effects remain unexplained by the individual and household attributes in terms of delay in schooling and the number of completed years.

6.3 Comparison with the Poisson Estimation

As noted in subsection 5.5, the Poisson regression as well as the Tobit regression is estimated. The results are shown in Table 4. Comparing Tables 3 and 4, it is seen that the statistical significance, the signs of the coefficients, and the magnitude relations are almost identical. This result shows that the alternative estimation model (Poisson regression) delivers quantitatively similar findings compared with the Tobit estimation model. The main differences found between the results presented in Tables 3 and 4 are as follows: (1) *Age* is statistically positively significant in relation to both the years delayed and years completed. (2) *Weight* is statistically positively significant in relation to the years completed, though is insignificant in terms of years delayed. (3) *Per capita agricultural income* becomes negatively significant in relation to the years delayed. (4) Robustness of asset variables in relation both to the years delayed and to the years completed is enhanced.

These new results derived using the Poisson regression imply that (a) older pupils tend to experience delays more frequently and, at the same time, also attain more years

in primary education; (b) even after controlling age effect, pupil weight continues to have a positive impact on completing grades in primary school, implying that nutrition—the key to having sufficient weight—is favorable towards education; (c) although coefficients of the income variables are faltering, not only nonagricultural but also agricultural income may be correlated; and (d) the affordability still matters albeit with a little effect, as indicated by the results of the asset variable's explanation for the attempts to mitigate the endogeneity of income variables with education.

==Table 4 about here==

7 Discussions and Some Concluding Remarks

When making decisions on education investment, it is certain that affordability, as determined by income and assets, will be crucial. The results of the analysis conducted in this study reveal a positive association between affordability and the unfavorable effect of negative shocks upon education investment, especially among the poor, all of which are consistent with the literature. These results confirm the importance and the necessity of subsidy program interventions such as insurance and scholarships. In line with these findings, school snacks and lunches, thought to be part of demand-side interventions to promote education, will help those pupils and students attain high educational achievement and reduce delays in schooling that may cause lifelong welfare inefficiencies. In addition, the magnitude and significance of school snacks and lunches are greater than those of income and assets. Moreover, social network density is positively correlated with education (whether to delays or completed years), implying the presence of certain mechanisms or utilities of the community's social network work positively with the education of children living there.

However, even after controlling for those individual- and household-specific attributes by multiple regression analysis, a significant gender-specific differential pattern remains evident. Girls experience fewer delays in and complete primary education at greater rates than boys. This finding is robust for the dependent variables, whether they are the years delayed or years completed. This result implies that boys and men face disadvantages in the field of education compared to girls and women. Not only years of

schooling completed but also delays in schooling compared to the norm shows unfavorable attainment by boys and men compared to girls and women.

In contrast, by considering parental education and its interaction with gender, we can reveal a different story. Mother's education equally influences their children's education attainment regardless of their gender. Father's education does not influence child educational attainment in the same manner. However, father's education seems to positively influence the education of the same-gender children, i.e., sons. Although if this father effect is bigger than mothers then the pernicious girls friendly gender bias shall be reduced, although the reduction cannot be gauged without the quantitative comparison of the magnitudes of the education effect of both parents. Without conducting such an analysis, this study cannot discuss the possibility of gender bias reduction. However, it can be stated at least that in primary school, the effect of mothers is robustly positively influential upon their children's education.

Therefore, after controlling for other individual and household socioeconomic characteristics as well as for regional fixed effects, gender-specific differential patterns persist in education attainment, as revealed by two variables, namely years delayed and years completed in primary education. In addition, father's education history has a preferential and favorable influence on sons' education. To reduce the gender gap, it is necessary to increase the magnitude of the father-son educational virtuous circle. Accordingly, boys-specific interventions and policies will be needed in future generations.

Lastly, let us discuss future research directions and this study's limitations. First, we have to consider the problem of expanding the delay analysis framework to the higher educational stages. The concept of delay is normative because it uses the initial standard to measure the size of delay. Primary education is mandatory and compulsory in the Philippines, meaning this type of normative analysis is applicable. However, for educational stages higher than secondary education, the applicability of normative analysis is unclear. A different type of framework should be introduced to explore the impact of secondary and tertiary education. Second, the analysis within this article is purely a static analysis. Additional dynamic consideration is therefore required. Third, it is necessary to deal with endogeneity for certain endogenous-looking variables such as income and child labor. This study includes few resolutions for endogeneity bias.

The author should expand the scope of the analysis to widen its applicability to other educational stage as well.

Reference

Balisacan, Arsenio M. 2003. *The Philippine Economy: Development, Policies, and Challenges*. Quezon City: Ateneo de Manila University Press.

Bouis, H. E., and L. J. Haddad. 1990. *Agricultural Commercialization, Nutrition, and the Rural Poor: A Study of Philippine Farm Households*. Boulder and London: Lynne Riener.

Bouis, H. E.; M. Palabrica-Costello; O. Solon; D. Westbrook; and A. B. Limbo. 1998. "Gender Equality and Investments in Adolescents in the Rural Philippines." Research Report 108. Washington, D.C.: International Food Policy Research Institute.

Cameron, A. Colin, and Pravin K. Trivedi. 2005. *Microeconometrics: Methods and Applications*. NY: Cambridge University Press.

Caoli-Rodriguez, Rhona. 2007. *Education for All Global Monitoring Report 2008: Education for All by 2015 : Will We Make It? The Philippines Country Case Study* Paris: UNESCO.

David, Clarissa; Jose Ramon G. Albert; and Sheryl Lyn Carreon-Monterola. 2009. "In Pursuit of Sex Parity: Are Girls Becoming more Educated than Boys?" Policy Notes PN2009-005. Manila: Philippine Institute for Development Studies.

Estudillo, Jonna P.; Agnes Quismbing; and Keijiro Otsuka. 2001. "Gender Differences in Land Inheritance and Schooling Investment in the Rural Philippines." *Land Economics* 77, no. 1, 130-43.

Estudillo, Jonna P.; Sawada Yasuyuki; and Otsuka Keijiro. 2008. "Poverty and Income Dynamics in Philippine Village 1985-2004." *Review of Development Economics* 12, no. 4. 877-90.

———. 2009. "Income Dynamics, Schooling Investment, and Poverty Eeduction in Philippine villages, 1985-2004." In Otsuka, Keijiro; Jonna P. Estudillo; and Yasuyuki Sawada. eds. *Rural Poverty and Income Dynamics in Asia and Africa*. NY: Routlege. 22-46.

Glewwe, Paul, and Hanan G. Jacoby. 1995. "An Economic Analysis of Delayed Primary School Enrolment in a Low Income Country: The Role of Early Childhood Nutrition." *Review of Economics and Statistics* 77, no.1: 156-69.

Glewwe, Paul; Hanan G. Jacoby; and Elizabeth M. King. 2001. "Early Childhood Nutrition and Academic Achievement : A Longitudinal Analysis." *Journal of Public Economics* 81, no. 3: 345-68.

International Food Policy Research Institute (IFPRI). 2000. "Philippines Cash Cropping Project, Southern Bukidnon Province, 1984-1985." Datasets.

———. 2008. "Philippines: Bukidnon Panel Survey, 2003- 2004." Datasets.

Maluccio, John. 1998. "Endogeneity of Schooling in the Wage Function: Evidence from the Rural Philippines." Discussion Paper 54, Washington, D.C.: International Food Policy Research Institute.

Mesa, Eirene P. 2007. "Measuring Education Inequality in the Philippines." Discussion Paper 2007, no. 04. School of Economics, University of the Philippines.

Miwa, Kana. 2008. "Child Halth and School Enrolment and Delayed Enrolment in Rural Cambodia." *Ajia Keizai* 49, no. 9: 2-21.

Nakanishi, Toru. 1990. "The Market in the Urban Informal Sector: A Case Study in Metro Manila, the Philippines." *Developing Economies* 28, no. 3: 271–301.

———. 1991. *Economics of Slum: Urban Informal Sector in the Philippines*. Tokyo: University of Tokyo Press.

National Statistical Coordination Board (NSCB). 2002. *Report on the 2000 Philippine Human Development Index*. Makati: NSCB.

National Statistics Office (NSO). 2003. *2000 Census of Population and Housing. Report No. 2-19 J (Bukidnon) Volume I: Demographic and Housing Characteristics*. Manila: NSO.

Okabe, Masayoshi. 2013. "Where Does the Philippine Education Go? The 'K to 12' Program and Reform of Philippine Basic Education." IDE Discussion Paper 425. Chiba: Institute of Developing Economies, JETRO.

Otsuka, Keijiro; Jonna P. Estudillo; and Yasuyuki Sawada. 2003. "Money Constraint and Education Investment: A Case of the Philippines." In Otsuka Keijiro and Kurosaki Takashi eds. *Education and Economic Development*. Tokyo: Toyo Keizai Shinpo-sha. 121-49.

Otsuka, Keijiro, and Takashi Kurosaki eds. 2003. *Education and Economic Development*. Tokyo: Toyo Keizai Shinpo-sha.

Otsuka, Keijiro, and Takeshi Sakurai. 2007. *Poverty and Economic Development.* Tokyo: Toyo Keizai Shinpo-sha Press.

Randall, L. and J. Anderson. eds. 1999. *Schooling for Success: Preventing Repetition and Dropout in Latin American Primary Schools*. NY: M. E. Sharpe.

Takahashi, Kazushi, and Keijiro Otsuka. 2009. "Human capital investment and poverty reduction over generations: a case from the rural Philippines, 1979-2003," In Otsuka Keijiro; Jonna P. Estudillo; and Yasuyuki Sawada. eds. *Rural Poverty and Income Dynamics in Asia and Africa*. NY: Routlege. 47-68.

Takayama, Nao; Nobuhiko Fuwa; and Takao Yurugi. 2010. "The Role of Non-agricultural Sectors in Rural Poverty Reduction: A Case Study in Mindanao, Philippines." *Japanese Journal of Southeast Asian Studies* 48, no.1; 46-73.

Tanodra, Elena Q. 2003. *Philippine Educational System*. Quezon City: Verh Educational Enterprise.

Yamano, Takashi; Mikiko Nishimura; and Yuichi Sasaoka. 2007. "The Effect and Issues of Universary Primary Education Policy in Uganda." In Otsuka Keijiro and Sakurai

Takeshi eds. *Poverty and Economic Development*. Tokyo: Toyo Keizai Shinpo-sha. 234-55.

Yonemura, Akio, and Mitsue Tamagake. 2003. "Development of Primary Education in the Philippines: Current Status and Statistical Analysis of Determinant Factors." In Yonmura Akio ed. *Education Development in the World: Social Scientific Analyses of Educational Development*. Akashishoten.

World Bank. Various Years. *World Development Indicator*. http://data.wo rldbank.org/data-catalog/world-development-indicators (accessed July 21, 2013).

APPENDIX: Interaction-term Interpretation

This appendix briefly reviews the interpretation of the estimation results of the regression, including interaction term(s). Let $Y, x, \boldsymbol{X}$, and u be denoted as the output variable, interest variable, a vector of other regressors, and disturbance term, respectively, and let us denote α_0, α_1, and $\boldsymbol{\beta}$ as the intercept, coefficient of x, and the coefficient vector of $\boldsymbol{X}$, respectively. The regression equation is written as follows:

$$Y = \alpha_0 + \alpha_1 x + \boldsymbol{X}\boldsymbol{\beta} + u.$$

Considering a dummy variable taking zero or one, D, the interaction term xD, and its coefficient α_2, the regression equation can be rewritten as follows:

$$Y = \alpha_0 + \alpha_1 x + \alpha_2 (xD) + \boldsymbol{X}\boldsymbol{\beta} + u.$$

Calculating this rewritten equation,

$$\begin{aligned} Y &= \alpha_0 + \alpha_1 x + \alpha_2 (xD) + \boldsymbol{X}\boldsymbol{\beta} + u \\ &= \alpha_0 + (\alpha_1 + \alpha_2 D)x + \boldsymbol{X}\boldsymbol{\beta} + u. \end{aligned}$$

If D takes the value zero, then the equation becomes

$$Y = \alpha_0 + \alpha_1 x + \boldsymbol{X}\boldsymbol{\beta} + u,$$

and if D takes the value one, then it becomes

$$Y = \alpha_0 + (\alpha_1 + \alpha_2)x + \boldsymbol{X}\boldsymbol{\beta} + u.$$

In the case where α_1 is statistically insignificant, i.e., we cannot reject the $\mathrm{H}_0 : \alpha_1 = 0$, and α_2 is significant, i.e., we can accept the $\mathrm{H}_1 : \alpha_2 \neq 0$, the regression equation is rewritten as follows:

$$Y = \alpha_0 + \alpha_2 x + \boldsymbol{X}\boldsymbol{\beta} + u,$$

for a sample taking $D = 1$. Similarly, in the case where α_1 is statistically significant, i.e., we can accept $\mathrm{H}_1 : \alpha_1 \neq 0$, and also α_2 is significant, i.e., we can accept $\mathrm{H}_1 : \alpha_2 \neq 0$, the regression equation can be rewritten as follows:

$$Y = \alpha_0 + (\alpha_1 + \alpha_2)x + \boldsymbol{X}\boldsymbol{\beta} + u,$$

for a sample taking $D = 1$. Comparing these two equations, regardless of α_1's significance, the interpretation of α_2 shall be an additional effect (not predetermined as being positive or negative) of $D = 1$. Now let us assume that D is the indicator of gender, where $D = 0$ means boys and $D = 1$ means girls, and then α_2 shall be interpreted as the additional effect attributable to being a girl rather than a boy.

TABLE 1

Philippine Education System (During Research)

Age	~5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Preschool															
Primary															
Secondary*															
Tertiary															

*Note: The Philippines education system is under reform (Okabe 2013), which is to expand secondary education from four to six years. However, the analysis in this study considers it as a four-year stage due to the research time.

TABLE 2

Descriptive Statistics (Sample: Delay Analysis, Primary Education only)

Variables	Ave.
Dependent Variables:	
Years delayed	1.08
Years completed	2.72
Independent Variables:	
Individual Attributes:	
Age	9.76
Age square	101.02
Had school snack = 1	0.32
Had school lunch = 1	0.18
Girls = 1 (*boys = 0*)	0.52
Height (cm)	127.47
Weight (kg)	25.65
Ilongo speaking dummy = 1	0.01
Ilokano speaking dummy=1	0.01
Walay speaking dummy = 1	0.01
Ivatan speaking dummy = 1	0.00
Labour started (years ago)	0.13
Labour started × *girls*	0.05
Household Attributes:	
No. of brothers	2.85
No. of sisters	2.45
No. of brothers × *girls*	1.25
No. of sisters × *girls*	1.52
Shock experienced = 1	0.82
Shock experienced × *girls*	0.43
Have saving account =1	0.24
Saving amount × *girls*	0.17
Experienced credit constraint = 1	0.19
Credit constraint × *girls*	0.10
(continue to right up)	

Variables	Ave.
Social network	1.97
Father's years of education	6.84
Mother's years of education	7.54
Father's education × *girls*	3.68
Mother's education × *girls*	4.02
Income Variables:	
Per capita nonagricultural income	200.62
Per capita agricultural income	8037.32
Per capita remittance received	459.33
Per capita nonagricultural income × *girls*	116.37
Per capita nonagricultural income × *girls*	6267.47
Per capita remittance × *girls*	300.16
Asset Variables:	
Owned land	91.09
Rented-in land	108.10
Owned land × *girls*	62.99
Rented-in land × *girls*	55.91
Have motorbike = 1	0.15
Have car = 1	0.03
Unelectrified house = 1	0.32
No water pipe in house = 1	0.52
Municipality Fixed Effect (Ref: Quezon)	
Valencia	0.07
Maramag	0.07
DonCarlos	0.18
Kitaotao	0.06
Dangcagan	0.10
Kibawe	0.12
Damulog	0.02
Kadingilan	0.05
Kalilangan	0.06

(Source) Author's calculation by IFPRI (2000; 2008).

TABLE 3

Result of Delay Analysis (Tobit Model)

	Dependent Variable = Years Delayed				Dependent Variable = Years Completed			
	Without Gender Interaction		With Gender Interaction		Without Gender Interaction		With Gender Interaction	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Individual Attributes:								
Age	0.1066	0.1245	0.0879	0.1397	1.8503	1.8455	1.8041	1.8211
	[0.42]	[0.48]	[0.34]	[0.55]	[6.65]***	[6.62]***	[7.03]***	[6.90]***
Age square	0.0195	0.0177	0.0208	0.017	-0.0603	-0.0596	-0.0589	-0.0589
	[1.51]	[1.36]	[1.61]	[1.35]	[-4.42]***	[-4.31]***	[-4.65]***	[-4.52]***
Had school snack = 1	-0.4408	-0.4144	-0.3487	-0.3453	0.3465	0.3427	0.2657	0.2721
	[-2.84]***	[-2.65]***	[-2.28]**	[-2.24]**	[2.71]***	[2.69]***	[2.05]**	[2.09]**
Had school lunch = 1	-0.4798	-0.4865	-0.4224	-0.4395	0.3398	0.3015	0.301	0.26
	[-2.41]**	[-2.34]**	[-2.04]**	[-2.03]**	[2.27]**	[1.93]*	[1.93]*	[1.57]
Gender dummy (*girls* = 1)	-0.4139	-0.4127	-1.2147	-0.8144	0.3582	0.3534	1.1017	0.9505
	[-2.88]***	[-2.87]***	[-1.85]*	[-1.22]	[2.87]***	[2.92]***	[1.96]*	[1.67]*
Height	-0.0207	-0.0205	-0.0205	-0.0195	0.0207	0.0212	0.0215	0.0195
	[-1.57]	[-1.53]	[-1.45]	[-1.38]	[1.93]*	[1.93]*	[1.98]**	[1.73]*
Labour stated × *girls*			0.4964	0.4828			-0.3953	-0.425
			[2.15]**	[2.37]**			[-1.96]*	[-2.31]**
Household Attributes:								
Shock experienced (=1)	0.3542	0.3338	0.2425	0.1443	-0.2848	-0.2875	-0.2127	-0.15
	[1.98]**	[1.80]*	[1.05]	[0.62]	[-2.04]**	[-2.04]**	[-1.15]	[-0.84]
Social network	-0.1038	-0.118	-0.1121	-0.1314	0.0471	0.0502	0.0576	0.0628
	[-2.12]**	[-2.40]**	[-2.29]**	[-2.62]***	[1.45]	[1.52]	[1.80]*	[1.89]*
Father's education	-0.0332	-0.0422	-0.1206	-0.1223	0.0186	0.0225	0.0943	0.0999
	[-1.33]	[-1.70]*	[-3.08]***	[-3.07]***	[0.99]	[1.18]	[2.73]***	[2.83]***
Father's education × *girls*			0.1621	0.1543			-0.1316	-0.134
			[3.29]***	[3.03]***			[-3.14]***	[-3.17]***
Mother's education	-0.0532	-0.0678	-0.0249	-0.026	0.0579	0.0647	0.0255	0.0258
	[-1.72]*	[-2.18]**	[-0.57]	[-0.59]	[2.41]**	[2.61]***	[0.63]	[0.63]
Mother's education × *girls*			-0.0403	-0.0718			0.0392	0.0518
			[-0.71]	[-1.26]			[0.83]	[1.06]
Income Variables: (Flow)								
Per capita nonagricultural income	0		0		0		PLUS(注 3)	
	[-1.56]		[-1.54]		[0.75]		[1.66]*	
Asset Variables: (Stock)								
Rented-in land × *girls*				-0.0024				0.0015
				[-2.27]**				[1.76]*
Have motorbike = 1		-0.3577		-0.3109		0.3219		0.3147
		[-1.71]*		[-1.43]		[1.89]*		[1.76]*
Region Characteristics								
Municipality Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	2.2523	2.4478	2.7021	2.369	-13.4168	-13.5228	-13.6326	-13.4928
	[1.60]	[1.70]*	[1.91]*	[1.66]*	[-9.83]***	[-9.75]***	[-9.46]***	[-9.42]***
Sigma constant	1.0276	1.0207	0.991	0.9839	0.8956	0.883	0.8677	0.8583
	[17.30]***	[16.83]***	[16.16]***	[15.36]***	[17.60]***	[17.28]***	[17.01]***	[16.45]***
Pseudo R^2	0.254	0.257	0.271	0.277	0.409	0.415	0.422	0.428
Log likelihood	-376.554	-374.984	-367.682	-364.721	-390.741	-386.254	-382.075	-377.906
n	326	326	326	326	326	326	326	326

Notes: (1) Robust standard errors are included in square brackets. (2) *, **, and *** represent statistical significance at 10%, 5%, and 1% levels, respectively. (3) Only the sign (i.e., plus or minus) of the coefficient of income variables is shown in the table because the absolute value of the regression coefficient is very small due to a marginal effect in accordance with an increase of PHP 1.00. (4) Due to space limitations, the results of the variables included in the regression analysis (but not statistically significant) are excluded in this table. See footnote #13.

Source: Author's calculation by IFPRI (2000; 2008).

TABLE 4

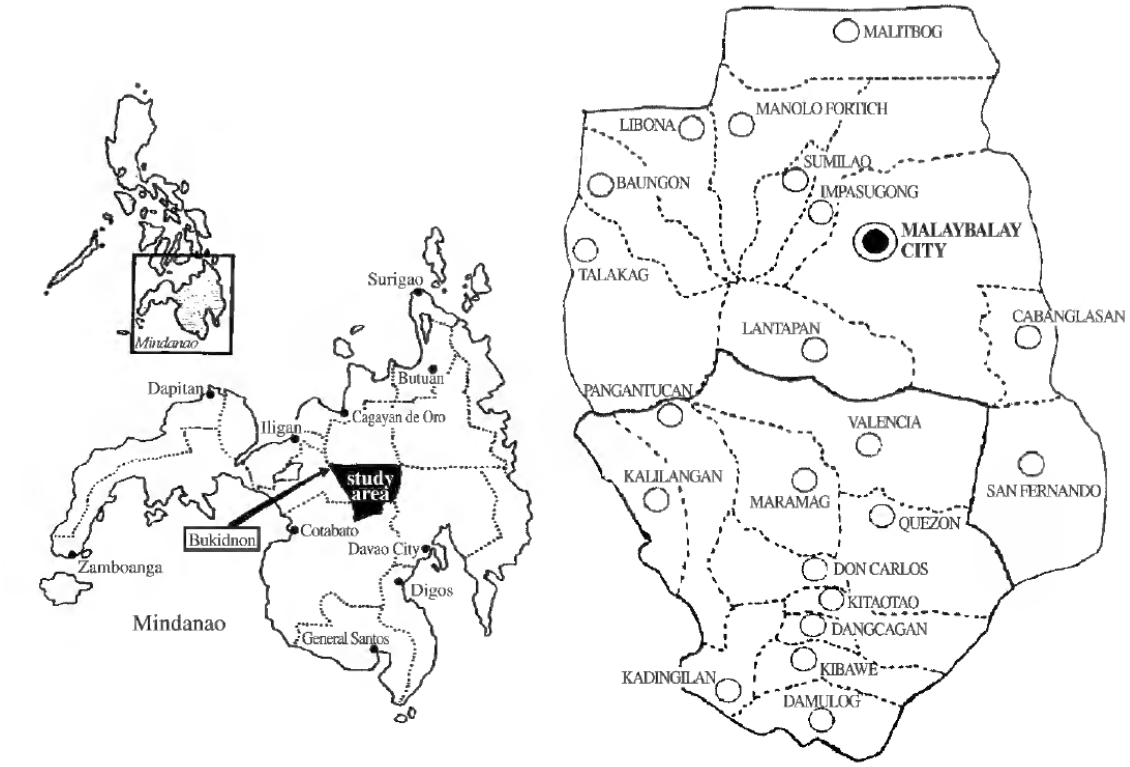
Result of Delay Analysis (Poisson Model)

	Dependent Variable = Years Delayed				Dependent Variable = Years Completed			
	With Gender Interaction		Without Gender Interaction		With Gender Interaction		Without Gender Interaction	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Individual Attributes:								
Age	0.4723	0.5564	0.5329	0.5499	1.3067	1.3339	1.3127	1.3233
	[2.75]***	[3.36]***	[3.18]***	[3.29]***	[11.21]***	[11.47]***	[10.46]***	[10.85]***
Age square	-0.007	-0.0116	-0.0103	-0.0112	-0.0495	-0.0504	-0.0494	-0.0497
	[-0.86]	[-1.49]	[-1.35]	[-1.46]	[-9.54]***	[-9.75]***	[-8.81]***	[-9.11]***
Had school snack = 1	-0.257	-0.2289	-0.2633	-0.2614	0.0844	0.0729	0.1004	0.0926
	[-2.42]**	[-2.05]**	[-2.49]**	[-2.38]**	[1.94]*	[1.70]*	[2.29]**	[2.18]**
Had school lunch = 1	-0.3189	-0.3332	-0.331	-0.3387	0.1243	0.1141	0.1368	0.1295
	[-2.36]**	[-2.37]**	[-2.59]***	[-2.51]**	[2.27]**	[1.99]**	[2.57]**	[2.35]**
Gender dummy (*girls* = 1)	-0.7231	-0.5187	-0.332	-0.3251	0.2964	0.2226	0.1313	0.1215
	[-1.73]*	[-1.16]	[-3.52]***	[-3.43]***	[1.68]*	[1.22]	[3.02]***	[2.90]***
Weight (kg)	-0.019	-0.0159	-0.0133	-0.0139	0.0111	0.0129	0.0117	0.0128
	[-1.08]	[-1.04]	[-0.89]	[-0.99]	[2.24]**	[2.54]**	[2.47]**	[2.65]***
Paid labor started × *girls*	0.2856	0.2608			-0.1186	-0.1361		
	[2.28]**	[2.70]***			[-1.79]*	[-2.05]**		
Household Attributes:								
No. of sisters	0.0552	0.0475	0.0542	0.0414	-0.0164	-0.0134	-0.018	-0.0177
	[1.37]	[1.39]	[1.84]*	[1.50]	[-0.77]	[-0.70]	[-1.46]	[-1.45]
Experienced negative shock (=1)	0.2525	0.2251	0.3528	0.3154	-0.1093	-0.0936	-0.1168	-0.1129
	[1.63]	[1.45]	[2.76]***	[2.40]**	[-1.63]	[-1.45]	[-2.54]**	[-2.43]**
Social network	-0.0942	-0.1202	-0.0871	-0.1039	0.0308	0.0314	0.0273	0.0278
	[-2.36]**	[-2.80]***	[-2.25]**	[-2.55]**	[2.56]**	[2.51]**	[2.26]**	[2.23]**
Father's education	-0.0603	-0.0703	-0.0245	-0.0314	0.0297	0.0305	0.0082	0.0087
	[-2.76]***	[-3.13]***	[-1.44]	[-1.86]*	[2.66]***	[2.66]***	[1.29]	[1.41]
Father's education × *girls*	0.0915	0.0962			-0.0388	-0.0387		
	[2.93]***	[3.02]***			[-2.78]***	[-2.74]***		
Mother's education	-0.0242	-0.0166	-0.0407	-0.0486	0.0095	0.0069	0.0147	0.0148
	[-0.90]	[-0.62]	[-1.96]**	[-2.32]**	[0.82]	[0.58]	[1.97]**	[2.01]**
Mother's education × *girls*	-0.0353	-0.0671			0.0059	0.0101		
	[-0.91]	[-1.74]*			[0.39]	[0.67]		
Income Variables: (Flow)								
Per capita agricultural income	0		MINUS[3]		0		0	
	[-1.24]		[-1.92]*		[0.91]		[0.04]	
Asset Variables: (Stock)								
Rented-in land × *girls*		-0.0016				0.0005		
		[-2.28]**				[1.67]*		
Have motorbike = 1		-0.2792		-0.3055		0.0163		0.0297
		[-1.71]*		[-1.87]*		[0.26]		[0.52]
Have car = 1		-0.32		-0.158		0.1889		0.1457
		[-1.01]		[-0.46]		[2.00]**		[1.59]
Region Characteristics								
Municipality Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	-1.3283	-1.5548	-1.5187	-1.3329	-7.7721	-7.6334	-7.5584	-7.4906
	[-1.52]	[-1.80]*	[-1.82]*	[-1.56]	[-12.59]***	[-12.52]***	[-11.58]***	[-11.84]***
Goodness-for-fit χ^2	195.4631	193.0166	203.716	203.0438	127.3962	125.1462	131.9706	129.8357
Prob > χ^2 (281) (H_0: $\Delta A \sim Po$)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)
Pseudo R^2	0.2487	0.2514	0.2397	0.2404	0.3019	0.3036	0.2985	0.3001
Log likelihood	-342.5468	-341.3236	-346.6733	-346.3372	-467.6528	-466.5278	-469.9399	-468.8725
n	326	326	326	326	327	327	327	327

Notes: (1) Robust standard errors are included in square brackets. (2) *, **, and *** represent statistical significance at 10%, 5%, and 1% levels, respectively. (3) Only the sign (i.e., plus or minus) of the coefficient of income variables is shown in the table because the absolute value of the regression coefficient is very small due to a marginal effect in accordance with an increase of PHP 1.00. (4) Due to space limitations, the results of the variables included in the regression analysis (but not statistically significant) are excluded in this table. See footnote #13.

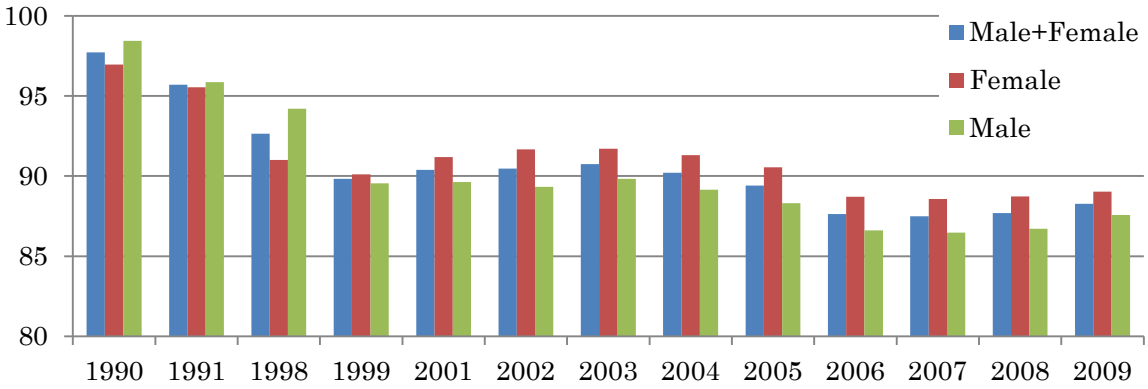
Source: Author's calculation by IFPRI (2000; 2008).

Fig. 1. Map of Studied Area, Bukidnon, the Philippines



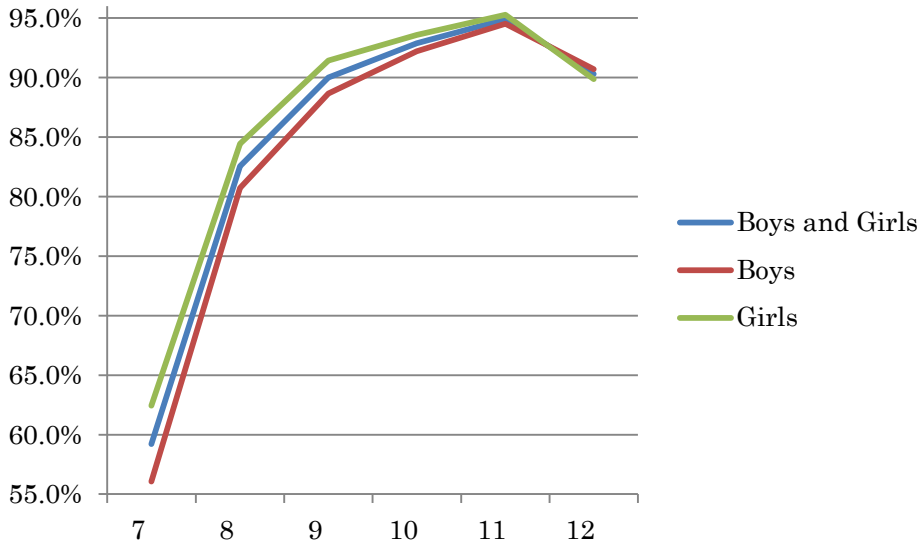
Source: Takayama *et al*. (2010: 51).

Fig. 2. Enrolment Ratio of the Philippine Primary Education



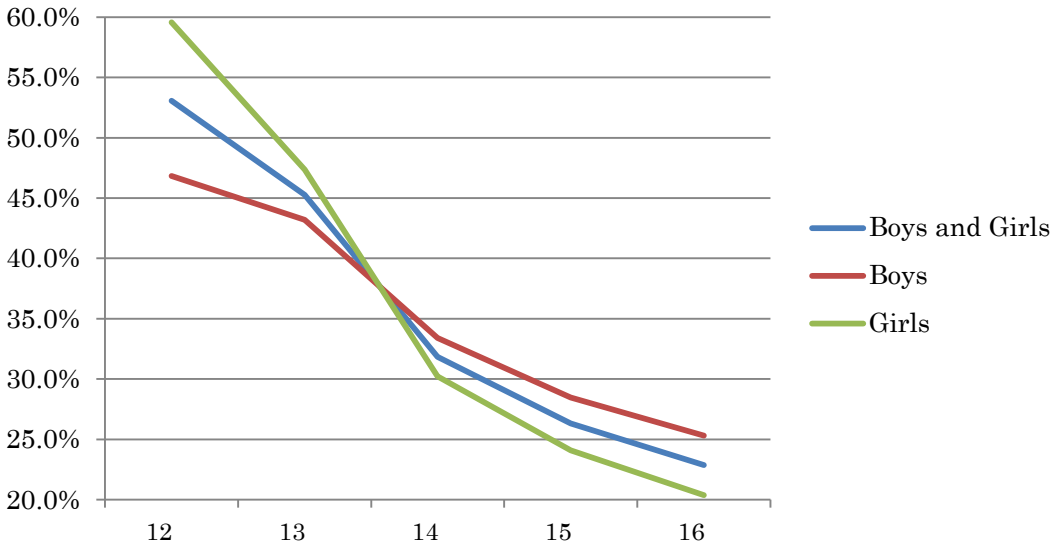
Source: World Development Indicator (various years)

Fig. 3. Proportion of Primary Education Enrollment Population, Bukidnon, 2000



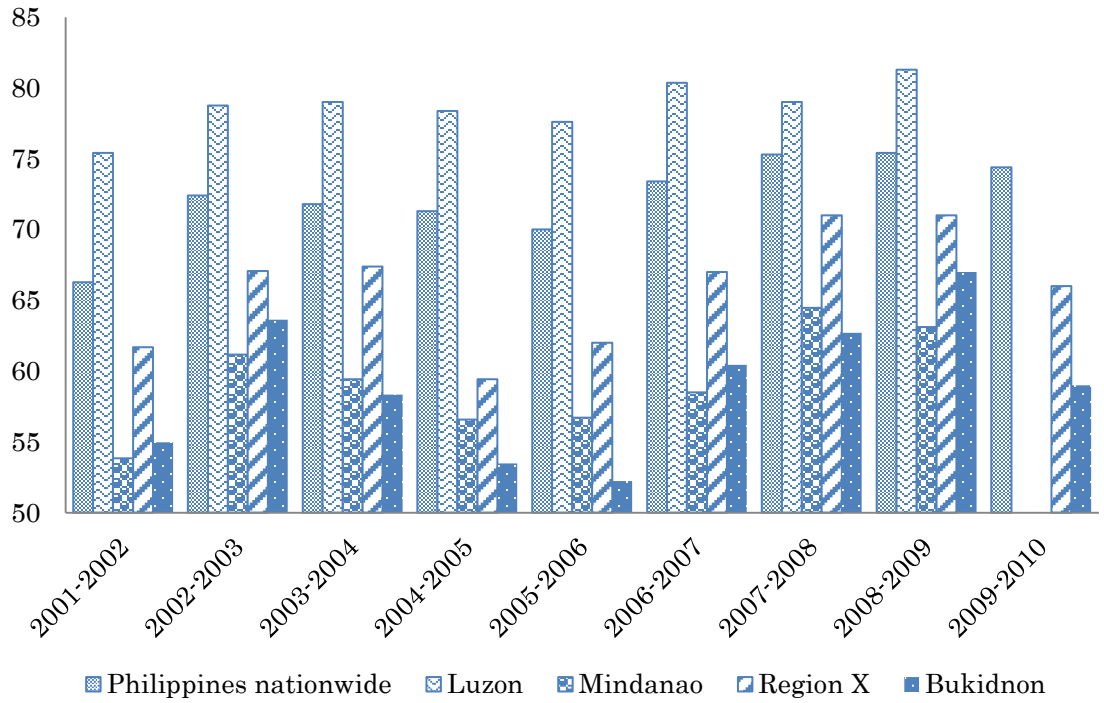
Source: : NSO (2003).

Fig. 4. Proportion of Population Completed Grade 5–6 in Primary Education, Bukidnon, 2000



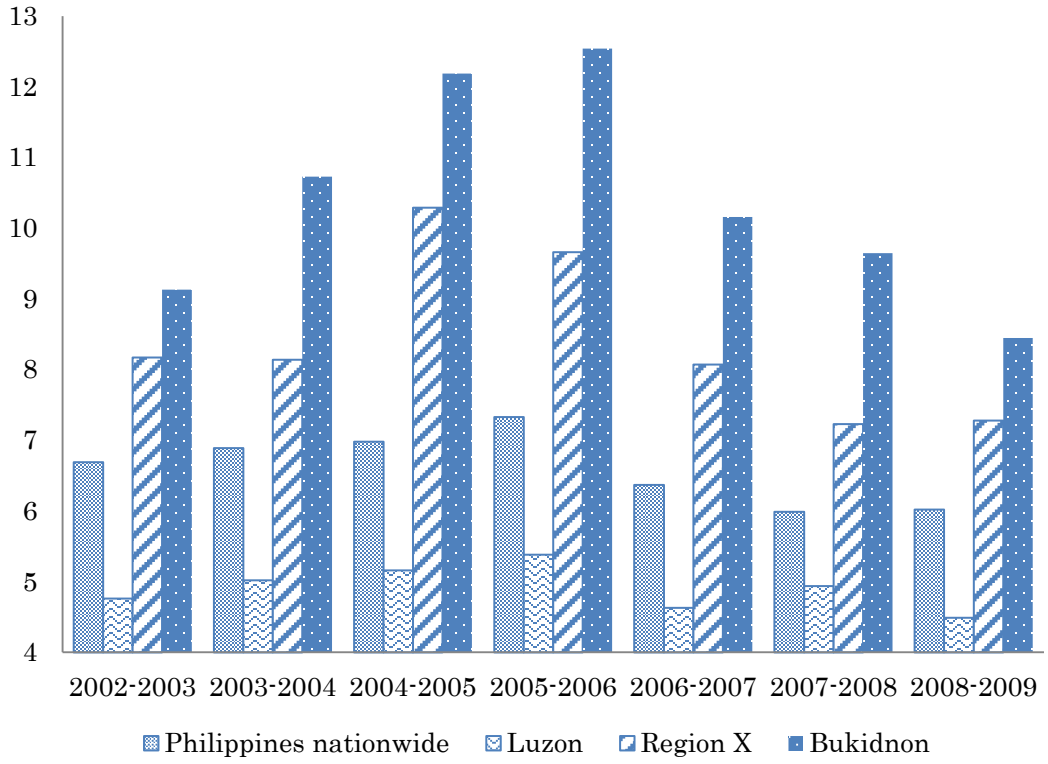
Source: NSO (2003).

Fig. 5. Cohort Survival Rate by Region, Primary Education, The Philippines



Source: Mindanao Development Authority.

Fig. 6. Dropout Rate by Region, Primary Education, The Philippines

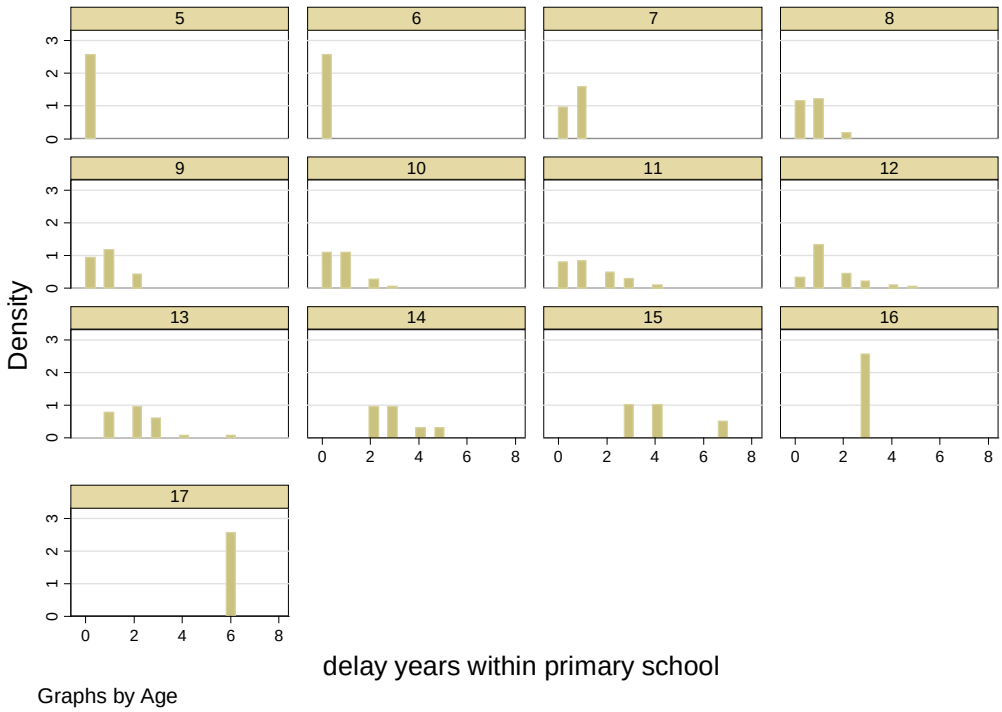


Source: Mindanao Development Authority.

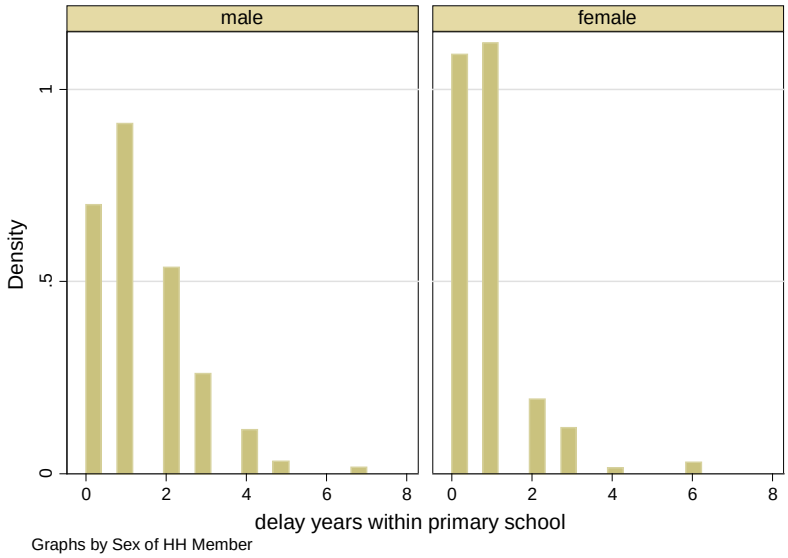
Fig. 7. Distribution of Delayed Years in Primary Education

(Horizontal Axis: Delayed Year and Vertical Axis: Proportion)

1) By age



2) By gender



Source: Author's calculation by IFPRI (2008).