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School Quality, Labor Markets and Human Capital Investment

Long-term Impacts of an Early Stage Education Intervention in the Philippines

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Abstract

This paper examines the long-term impacts of improved school quality at the elementary school stage on subsequent schooling investments and labor market outcomes using unique data from a recent survey that tracked students in the Philippines. The empirical results, which are based on a comparison of students who graduated from schools located in adjacent treatment and control areas before and after a school intervention, show significant differences in subsequent schooling investments, migration, and labor market earnings between females and males. That is, females study more (relative to males) and tend to migrate and earn more if they receive high-quality educational investments at an early stage. The above results are consistent with females' greater incentives to study, driven by their higher returns to schooling, especially after high school completion, observed in the labor market.

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School Quality, Labor Markets and Human Capital Investments

Long-term Impacts of an Early Stage Education Intervention in the Philippines[1]

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1. Introduction

The formation of human capital requires a long time, starting from the prenatal stage and extending to an individual's entry into the labor market. The impact of an early-stage investment can be potentially large if investments at different stages are complementary and/or the outcome of an early stage is an important input for the following stage of production. Rapidly accumulating literature shows that investments in prenatal and early childhood stages have long-term impacts on schooling and labor market outcomes (Alderman et al. 2001; Alderman, Hoddinott, and Kinsey 2006; Maluccio et al. 2009; Yamauchi 2008; Cunha et al. 2006), though some catching up is certainly possible later on (Mani 2008). The sequential nature of human capital formation poses the question of the extent to which human capital investments have lasting effects on human life.

In this paper, we use a nationwide intervention in elementary schools implemented during the period 2000 to 2006 in the Philippines, named the Third Elementary Education Project (TEEP), to evaluate the long-term impact of improved school quality on individual outcomes in high school and college, migration decisions, and labor market earnings. TEEP was implemented in 23 poor provinces (education divisions)[4] identified in the Social Reform Agenda (Ramos 1995; Philippines, Congress 1998). It has several components: school building construction and renovation, textbook distribution, teacher training, school-based management, and some other modules to improve school facilities.[5] Yamauchi and Liu (2011) demonstrate that the program significantly increased national achievement test scores—by a magnitude of 15 points over the six-year exposure.[6]

By improving the quality of teachers and relaxing resource constraints at school (for example, by providing more classrooms and textbooks), TEEP was expected to increase the quality of human capital formed as well as the efficiency with which it was formed. These improvements were expected to augment the returns to schooling in the labor market and ultimately increase schooling investments. Such a program may also increase the general ability of students, which can directly increase current labor market wages and may decrease educational attainment due to increased

[4]Officially, the division is an administrative unit under the Department of Education. In many cases, the education division coincides with the province, but there are more than one division in some provinces. For example, the province of Leyte has Leyte division and the Tacloban City division (Leyte's capital city).
[5]See, for example, Case and Deaton (1999) and Hoxby (2000) for the effects of class size on educational outcomes.
[6]See Khattri, Ling, and Jha (2010) for the impact of school-based management on students' learning outcomes.

opportunity cost (labor market wage).[7]

Our unique contribution is two-fold. First, we analyze long-term impacts of the school intervention on subsequent human capital and labor market outcomes. In the developing country context, when assessing impacts of an education intervention, the literature only uses outcomes measured only in education cycles (for example, change in test score at elementary school education), but we go beyond the school education cycles to investigate post-school outcomes such as labor market earnings.[8] The analysis required a unique tracking survey of students who moved out of their original school areas. Second, we show that impacts of an education intervention can depend on the features of labor markets. On this issue, we describe more details below.

This paper pays particular attention to gender, given the fact that females have traditionally been more educated in the Philippines. We focus on the gender gap in returns to schooling as a source of differentiation in the impacts of school quality improvement.[9] Figure 1.1 displays a clear difference in the returns to schooling for females and males, based on our estimation using the October 2009 round of the Philippine Labor Force Survey. Females experience higher (marginal) returns to schooling (that is, the slope of wage profile), especially above high school completion. The return function is steeper for females than males, which creates a greater incentive for females to study. [10]

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[7] Moreover, the program can have general equilibrium effects. When school quality improves, more children will be enrolled and the dropout rate also decreases, which alters the distribution of student abilities in the school. If low-quality students start to enroll, the average performance of students in school can be worsened. Therefore, the total effect of the intervention can be either positive or negative.

[8] See, e.g., Hanushek (2006), Glewwe and Kremer (2006) and Speakman and Welch (2006).

[9] See Sakelariou (2004), Schady (2003), Lanzona (1998), and Yamauchi (2005) for existing estimates of returns to schooling in the Philippines. Sakelariou (2004) decomposes gender wage gaps. Both Schady (2003) and Yamauchi (2005) report convexity in the return structure. Yamauchi (2005) shows that higher returns to private school education are spurious in the sense that high-ability students are screened into private schools. Lanzona (1998) points out the importance of migration selectivity. Orbeta (2002) summarizes observations on labor force participation and education in the Philippines.

[10] First, Aslam (2009) reports a similar finding on gender gap in returns to schooling in Pakistan. Returns to schooling for females are significantly larger than that for males. On estimation issues of returns to schooling, see also Card (1999, 2001). Second, some studies examined the effects of returns on schooling investments by explicitly incorporating agent's learning and perceptions. Yamauchi (2007) used a change in returns to schooling due to a new technological opportunity to test social learning in schooling investment decisions. Anderson, King, and Wang (2003) examined inter-generational effects of mother's returns to schooling on child schooling investments. More recently, Jensen (2010) showed that students at randomly selected schools given information on the higher measured returns completed more years of schooling (given that the perceived returns were lower than the actual market returns).

The significant difference in returns to schooling for males and females observed in the Philippines (Figure 1.1) implies that male human capital and female human capital are not traded as perfect substitutes. Males' and females' skills are priced differently in the labor market. This can happen, for example, if males and females are specialized in occupations that require different types (and levels) of human capital. Because returns to schooling essentially determine the incentives to invest in schooling, the above observation implies that educational attainment would also differ between males and females.

The effects of improvements in school quality depend on the nature of dynamic human capital production functions. It is possible that males and females function differently, since, as indicated, male human capital and female human capital are not perfect substitutes and are possibly formed and valued in different ways. [11] This implies that although the improvement in school quality itself is gender-neutral, its effects can be gender-specific.

We use unique data from a student tracking survey conducted in the period from July 2010 to April 2011 in eight provinces and three major metropolitan areas. Four of the eight provinces had TEEP intervention, while the other four did not. The survey included 101 elementary schools, in each of which about 35 students were randomly sampled from the pre-intervention and intervention periods.[12] Students who had moved out of their school areas were tracked physically or by phone. The survey collected information on the schooling and work histories of 3,451 students. We use double differences estimation to identify the impact of the program by comparing grade 6 students enrolled in the 1999/2000 (pre-intervention), 2004/05 (intervention), and 2005/06 (intervention) school years in each school (school fixed effects), combined with school-level weights based on estimated propensity scores. Outcomes are measured based on repetitions in high school, college entry, years of schooling completed, migration, and earnings.

We have three major findings. First, the TEEP intervention widened the gender gap in schooling attainment. It increased females' years of schooling completed (reducing repetitions in high school, increasing the likelihood of college entrance) relative to males. Second, the program increased migration rates and labor market earnings among females. Third, females seemed to be

[11] For general discussions and literature reviews, see Altonji and Black (1999).

[12] In one northern Luzon province, the sampling design was modified, so the sample size differs from that of the other provinces.

less affected by financial constraints on parents' household expenditures. Therefore, our results demonstrate that the improvement of school quality significantly favored females, enhancing the pre-existing female advantage in education.[13]

The paper is organized as follows. Section 2 describes the background of the TEEP intervention. Section 3 lays out a basic model to clarify key predictions on the program impact. Sections 4 and 5 describe the empirical framework and data, respectively. Section 5 also includes descriptive statistics. Empirical findings are summarized in Section 6. We discuss the implications of the above findings in Section 7.

2. Background

The Third Elementary Education Project (TEEP) was implemented from 2000 to 2006 by the Philippine Department of Education in all public primary and elementary schools in the 23 provinces identified as the most socially depressed in the Social Reform Agenda, out of the 91 provinces in the Philippines.[14] The total project cost was US$221.16 million ($91.07 million from the Japan International Cooperation Agency, $82.84 million from the World Bank, and $47.25 million from the Philippine government). The unique feature of TEEP was the combination of investments in school facilities, education materials, and school governance reform. Not only were school facilities and textbook supplies improved, but the decision-making process was also decentralized to the school and community levels. TEEP introduced a package of investments, including (1) school building construction and renovation, (2) textbooks, (3) teacher training, (4) school-based management, and (5) other facility and equipment support.

The core of the program was school-based management, through which schools were given an incentive to proactively and more independently manage school governance. Schools partnered with communities and parents to make decisions on key issues, such as improvement plans and school finance options. Teachers were also trained systematically to improve teaching skills.

[13] Alderman and King (1998) summarized conceptual issues surrounding gender gap in schooling.

[14] In the Philippines, primary schools cover grades 1 to 4, while elementary schools cover grades 1 to 6. This is followed by 4 years of high school education. Thus, the basic education system has 10 years (age 7 to 16). Obtaining a college degree requires 4 years. Therefore, the Philippine education system is more compressed than the systems of many other countries (normally requiring 12 years for basic education). The second unique feature of the Philippine education system is the dominance of high-quality private schools over public schools (particularly at the high end, though private schools are highly heterogeneous too).

Information management was improved so that schools were responsible for systematically organizing information on enrollment, learning achievements, finance, and so forth, and reporting it to the division office. Schools were required to set improvement plans every year and compare them with actual achievement. This dynamic process was monitored by the division-level education department. School finance was also decentralized to some extent to relax the school budget constraints because Philippine public schools are not allowed to charge school fees. TEEP schools were free to raise their own funds from communities, parents, and others, although resources were admittedly limited in many poor communities. These reforms in public schools were expected to improve education quality, which would then in turn increase returns to schooling in the labor market (see for example, Yamauchi [2005] on returns to schooling).

The selection of TEEP provinces was purposive because the program was intended to cover the most depressed provinces identified in the Social Reform Agenda. TEEP allocation was rather different in the Philippines' three macro regions. In the northern macro region of Luzon, TEEP was concentrated in the Cordillera Administrative Region, a mountainous region in the center of northern Luzon. In the central macro region of Visayas, TEEP provinces were relatively evenly distributed. In the southern Mindanao macro region, TEEP divisions were clustered, though not to the same degree as in northern Luzon. The TEEP provinces are highlighted in the map in Figure 2.1.

Using school-level data, Yamauchi and Liu (2011) show that national achievement test scores increased by about 12–15 points if students were exposed to TEEP for six years. The researchers used cohort panel data from grade 4 in school year 2002/03 to grade 6 in 2004/05 to difference out cohort-school-specific unobservables, combined with propensity score matching. This study demonstrates a significant increase in student learning performance. This study also demonstrates a significant increase in student learning performance due to (1) new constructions of school buildings,[15] (2) instructional training of teachers and (3) distribution of textbooks especially at earlier grades.

3. Model

In this section we introduce a model to characterize the effects of school quality on schooling

[15] See, example, Case and Deaton (1999) and Hoxby (2000) for the effects of class size on educational outcomes.

investments, parental behavior, and migration decisions in the presence of a labor market imbalance in returns to schooling. The objective of this section is to clarify the basic intuitions that guide the interpretation of our empirical approach and findings. We model schooling investment (and migration) as the child's decisions, which parents can observe and intervene in, to either encourage or discourage. The labor market is segmented in the sense that returns to schooling for females and males are not equalized (this is explained in the introduction). Our key predictions are summarized in propositions.

The Environment

The labor market is segmented by gender under the assumption that male labor and female labor are imperfect substitutes, resulting in gender-differentiated returns to schooling. As described in the previous section, the Philippine labor market is characterized by higher returns to schooling among females. We consider a household to consist of parents, a female child, and a male child. We assume both children are at the post-elementary school (high school) stage and assume there are two time periods: current and future periods. The current period is defined as the schooling period after elementary school. Child human capital (quality adjusted), h_j, is formed in elementary school and in the current period. The child's future income, y_j, is determined by his or her human capital. We assume that returns to human capital, β_j, differ by gender ($j = m$: male, f: female):

$$y_j = \alpha + \beta_j h_j. \quad (1)$$

We assume out possible differences in α, though labor market discrimination may exist in α. In this paper, we do not introduce uncertainty in returns to schooling.

Human capital production is described as

$$h_j = q + (1 + x_j) f(s_j, q), \quad (2)$$

where q is the quality of the elementary school, s_j is schooling investment (time input) by child j, and x_j is the parents' investment to increase the quality (efficiency) of schooling (for example, tutoring, private school, college tuition, and so on) in the current period.[16] Assume that $f(s_j, q)$

[16] As discussed in Yamauchi (2005), private schools dominate the Philippine education system by offering high-quality educational opportunities. This situation results in higher prices for quality education, relative to public school education. In our model, we explicitly include the parents' private investments that augment the

is a strictly increasing and concave function in s_j and q. In Equation (2), q and $(1+x_j)f(s_j,q)$ are the components of human capital formed in elementary school and after elementary school, respectively. The human capital formed after elementary school depends on the schooling investment by the child and by the parents, as well as on elementary school quality (because human capital formation is accumulative). The parents' investment is complementary to the child's investment and to the quality of the elementary school. We also assume that the child's investment is weakly complementary to the quality of the elementary school, that is, $\partial^2 f(s_j,q)/\partial q \partial s_j \geq 0$. We assume $\alpha = 0$ hereafter for simplicity.

Consumption and parents' investments in the current period are constrained by the parents' income and labor incomes from the children.

$$c + px \leq Y(A), \tag{3}$$

where c is consumption, p is the unit price for private investment (not differentiated by gender), and $Y(A)$ is the parents' income (as a function of the asset). The parents' total investment, x, is a summation of the investments in the male child and the female child (that is, $x = x_m + x_f$). Note also that the unit price for the private investment is unique for males and females. Finally, the future income of the household, y, is a summation of the future incomes of the male child and the female child:

$$y = y_m + y_f = \sum_j \beta_j [q + (1+x_j) f(s_j,q)]. \tag{4}$$

Decision Problems of Parents and Children

The decision problem has two stages. In the first stage, children optimize their time allocations between current labor supply and schooling investments. For simplicity, we assume that child j maximizes the discounted sum of current and future incomes.

$$\max_{(t_j,s_j)} w_j t_j - p_m(\phi_j) + \delta y_j \quad s.t.$$
$$y_j = \beta_j(\phi_j)[q + \quad + (1+t_j \quad f)s_j(\quad q)]$$

where δ is the discount factor, t_j is child j's time spent on work, and w_j is the wage rate of the

child's schooling investments.

unskilled labor of child j.[17] The child time endowment in the current period, T, is divided into schooling (s_j) and labor (t_j) only (that is, $T \geq s_j + t_j$). ϕ_j is the migration probability, and $p_m(\phi_j)$ is the migration cost, which is increasing and convex in ϕ_j. Returns to human capital are $\beta_j(\phi_j) = (\beta_j - \beta_0)\phi_j + \beta_0$, where β_0 is returns to human capital at the local market. Therefore, an increase in ϕ_j raises returns to human capital.

Given the decisions of the children, the parents maximize the discounted sum of utilities in the second stage. We assume that the parents care about the total future incomes of their children. The parents' objective is

$$\max_{\{x_m, x_f\}} u(c) + \theta y,$$
$$s.t.$$
$$c + px \leq Y(A),$$
$$y = y_m + y_f = \sum_j \beta_j q + [+ x_j f s_j(q)]$$

where s_j is determined in the first stage, and θ represents altruistic preference to children's future income. Here we assume linearity in the future income, by which to focus on parents' reinforcement behavior (meaning that parents' inputs augment, rather than compensate for, differences in child schooling investments).[18]

We solve the above problem in the backward fashion. The first-order conditions of x_j in the second-stage problem are given as

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[17] Wage rate immediately after elementary school, w_j, can be a function of q, that is, $w_j(q)$. Similarly, the improvement of school quality at the elementary school stage can directly alter the adult wage, $y_j = \alpha + \beta_j h_j + \xi_j(q)$, where $\xi_j(q)$ is the general ability, which is a function of school quality q. For simplicity, this general equilibrium effect is not incorporated in the model.

[18] It is possible to use a concave function to incorporate compensatory behavior too. However, since our empirical findings strongly support the observation that parents differentiate their investments between females and males, we clarify the implications of the reinforcement behavior in this paper.

$$p\lambda^* = \theta\beta_j\phi_j f_s(s_j^*, q) + \mu_j, \tag{5a}$$

$$\mu_j \geq 0, x_j \geq 0, \mu_j x_j = 0, \tag{5b}$$

where $\lambda^* = u'(c)$. Under the current assumption that the agents cannot borrow from the credit market, λ^* represents the liquidity constraint. An increase in λ^* raises the marginal costs of both investments in schooling and private inputs. If the credit market is perfect (with interest rate r), θ/λ^* is constant in all households and the above effect does not exist.

From (5a) and (5b), we know that parents invest in only one of the siblings—the one who has a higher discounted return of x_j. That is, the right-hand side of (5a), meaning that the discounted returns to x_j are compared between the male child and the female child in the above setting. Unless an extreme condition of equality between the returns holds (measure zero), either females or males exhibit higher returns to x_j. Therefore, parents choose the sibling showing higher returns, determined by $\beta_j(\phi_j) f(s_j^*, q)$. Since the children know the parents' decision function (of the second stage), Equations (5a) and (5b) give

$$\frac{dx}{ds} = \frac{\theta\beta_j \phi_j f_s(s_j^*, q) + pw_j u''^*}{-p^2 u''^*}, \tag{6}$$

if $x_j > 0$. For $x_j = 0$, we assume that the response is zero (that is, we do not question whether x_j jumps from zero to the strictly positive range in response to a change in s_j). Similarly, we can derive the response function of x_j to ϕ_j. Parents will invest in children who tend to migrate.

Equation (6) shows that private investments from parents increase with respect to the child's schooling investment (time) when (a) the discount factor and/or (b) labor market returns to schooling (β_j) are large, (c) the unskilled labor wage (w_j) is low, (d) the level of the child's schooling investment (s) is relatively low, and (e) the cost of private investments from parents (p) is relatively low. Interestingly, since $\partial^2 f(s_j, q)/\partial q \partial s_j \geq 0$, an increase in q also makes x_j more responsive to s_j.

From the child's problem in the first stage, we obtain the first-order condition with respect to s_j as

$$w_j = \beta_j(\phi_j)\delta[(1+x_j)f_s(s_j,q) + x'(s_j)f(s_j,q)], \quad (7)$$

where the parents' response, $x'(s_j)$, is given in Equation (6), or $x'(s_j) = 0$. The second term on the right-hand side of Equation (7) captures the incentive effect by parents' investments. When $x'(s_j)$ is positive, this effect further increases schooling investments by the child, that is, this effect captures private investments from parents that augment the quality-adjusted returns. Intuitively, parents encourage their children to study after observing their willingness to study when market returns are large and the cost of private investments is small. Without the parents' investments, the child's schooling investments are lower than the level determined in Equation (7). Since the parents prefer the sibling who shows higher returns, the other sibling has the first-order condition

$$w_j = \beta_j(\phi_j)\delta f_s(s_j,q).$$

In addition, we derive the migration decision from the first-order condition of ϕ_j:

$$p'_m(\phi_j) = \delta(\beta_j - \beta_0)h_j. \quad (8)$$

Human capital stock and return differentials between local and urban labor markets determine the incentive to migrate. The lower the migration cost, the more incentive there is to invest in schooling too.

We derive Propositions 1 and 2 based on Equations (5) and (7).

Proposition 1

1) The return differential in the labor market creates a divergence in efforts among children.
2) Parents invest only in the child for whom the labor market returns are higher.
3) Migration increases with return differentials and human capital stock.

Proof:

1) Other things being equal, Equation (7) says that the right-hand side increases with β_j. Hence, the second-order condition implies that s_j increases.
2) The proof of Proposition 1.1 suggests optimal s_j is larger for larger β_j. From Equations (5a) and (5b), we have a corner solution, $(x_j = 0)$, for the child with smaller β_j.
3) Directly from Equation (8).

Imposing the labor market condition that females have higher returns to schooling than males, $\beta_f > \beta_m$, we derive the following corollary from the proposition.

Corollary 1

1) The female child puts more effort than the male child into schooling.
2) The parents invest more in the female child.
3) Females tend to migrate more.

Proof: Directly from Proposition 1.

Next we derive the implications of school quality improvement.

Proposition 2

1) Improved school quality increases child schooling investments if f_{sq} is sufficiently large (that is, the complementarity of schooling and school quality is sufficiently large).
2) Improved school quality increases the parents' investment in schooling if $x_j > 0$.
3) Improved school quality makes parents' investments more responsive to a change in the child's schooling investment if $x_j > 0$.
4) Improved school quality increases migration.

Proof:

1) From Equation (7), we have

$$\frac{ds}{dq} = -\frac{(1+x) f_{sq} + x' f_q}{x' f_s + (1+x) f_{ss} + x'' f + x' f_s}. \tag{9}$$

when $x'(s) \neq 0$ (or for the child with higher β_j). Note that the second-order condition of s implies that the denominator of the right-hand side of Equation (9) is negative. Therefore,

$ds/dq > 0$ if $(1+x) f_{sq} + x' f_q > 0$. When $x'(s) = 0$, Equation (7) becomes $w_j = \beta_j \delta (1 + x_j) f_s(s_j, q)$. We thus have

$$\frac{ds}{dq} = -\frac{f_{sq}}{f_{ss}} > 0$$

2) If $x_j > 0$, from Equations (5a) and (5b), we have

$$\frac{dx}{dq} = \frac{f_q(s,q))}{-p^2 u''(c)} > 0$$

3) That $f_s(s,q) > 0$ is increasing in q implies that the right-hand side of Equation (6) is increasing in q.

4) Since q augments h_j, Equation (8) implies the result.

4. Empirical Strategy

In this section, we discuss the sources of bias and our identification strategy.

Double Differences

We aim to evaluate the long-term effects of TEEP. The outcomes we examine fall into three categories: students' schooling attainment, migration, and returns in the labor market. Our identifying strategy is double differences (DD). To perform the evaluation, we sample students who were enrolled in grade 6 before the TEEP intervention (pre-TEEP cohort) and those who were enrolled in grade 6 after the TEEP intervention (TEEP cohort), in both TEEP and non-TEEP provinces.

The empirical model is specified as

$$y_{si} = \alpha_s + \beta_1 * t_{si} * d_{si} + \beta_2 * f_{si} * t_{si} * d_{si} + x_{si}\gamma + u_{si}, \qquad (10)$$

where s indexes schools and i indexes students; y_{si} is an outcome variable; α_s is school fixed effects; t and d are indicators of the TEEP cohort and TEEP province, respectively (that is, $t = 0$ if the student enrolled in grade 6 before the TEEP intervention and $t = 1$ if he or she

enrolled in grade 6 after the TEEP intervention; $d = 0$ if the student was enrolled in a non-TEEP school and $d = 1$ if he or she was enrolled in a TEEP school); f_{si} refers to female; x_{si} is a vector of other control variables; and u is a random error term. The parameters of particular interest are β_1 and β_2. β_1 is the TEEP effect on males and β_2 is the difference in the TEEP effect between females and males. In Equation (10), the DD estimation (with school fixed effects) controls for cohort and school fixed effects.

Sources of Bias and Strategies

We next discuss sources of time-variant selection bias (which cannot be eliminated by DD) and our corresponding strategies. We consider three sources of such bias. First, the placement of TEEP is not random, because TEEP tends to target poorer provinces. So the initial conditions of the TEEP area can be different from those in the non-TEEP area. If the initial conditions affect subsequent changes in the outcome variables, the estimates will be biased.

To account for this, we carefully sampled our treatment and control groups to make them as comparable as possible. The remaining differences in initial conditions are dealt with by propensity score (PS) matching at the school level (the sampling method is described in detail in the data section). The PS matching is implemented as follows. We first run a logit regression of TEEP placement on a set of initial conditions. Based on the estimated PS from the logit regression, we assign weights of $1/\hat{PS}$ to the students enrolled in TEEP schools and $1/(1-\hat{PS})$ to the students enrolled in non-TEEP schools. We then use weighted least squares to estimate Equation (10). According to Wooldridge (2007), this method would obtain "double robustness" of the estimation.[19] Besides reweighting based on PS, we also trim off the observations with extreme propensity scores. We follow the formula in Corollary 5.1 of Crump et al. (2009) to compute the optimal common support area.[20]

The second source of bias is the time-variant shocks that affected high school quality. Because we look at long-term effects of TEEP, any shocks differentially affecting high school quality in TEEP and non-TEEP areas could potentially bias our estimation. Therefore, we control

[19]Double robustness means that if the main regression is misspecified but the selection function is correctly specified, the estimates based on the reweighted regression are still consistent.

[20] This process trimmed off seven schools with PSs smaller than 0.108 or larger than 0.892 in our regressions.

for cohort-specific measures of high school quality in the analysis.

The sources of bias discussed above are common to all outcome variables. In estimating the wage equation, we also need to consider the sample selection bias, that is, salaries can be observed only for individuals who participated in the labor force. For example, females who cannot be paid well in the labor market (or who can study more effectively) tend to delay entering the labor force.[21] Furthermore, our sample students are relatively young (especially for the TEEP cohort). Therefore, students attaining higher education may not have participated in the labor force, though it is common that students work and study at the same time in the Philippines. To check robustness of our findings, we also take a two-stage procedure using the inverse Mills ratio (Heckman, 1979) in the appendix.

5. Data

In this section we describe the data we use in our analysis.

Sampling Framework

The data come from the survey conducted in eight education divisions (four intervention and four nonintervention divisions) in the Philippines from July 2010 through April 2011. The eight divisions were chosen to represent three major metropolitan areas: Manila (National Capital Region), Cebu, and Baguio. We sampled in such a way as to pair an intervention division with an adjacent nonintervention division in the same area so that the pair shares similar socioeconomic conditions. Our sample was grouped into four areas: (a) Ifugao and Neuva Vizcaya, (b) Antique and Iloilo, (c) Negros Oriental and Cebu, and (d) Leyte and Western Samar. Figure 5.1 maps our sampled provinces.

In each division, relatively poor municipalities (school districts) were chosen first. Municipalities of census-2000 income classes ranked 3 to 5 (the highest income is rank 1 and the poorest is rank 6) were chosen from the adjacent area (near the division border) of an intervention and a nonintervention division (see Philippines, Department of Finance 2001). In Ifugao division,

[21] As described in Section 5, we use wages received at the latest job held. This mitigates the above selection problem since we have wage observations for those who are currently studying (or are unemployed) but recently had work experience.

however, all our school districts were taken from income classes ranked 4 and 5, which created imbalance with Neuva Vizcaya division, where some of the school districts were ranked 3.

Second, schools were randomly sampled from the list of elementary schools in school year 2002/03 satisfying three criteria: (a) having a total enrollment larger than 120, (b) being mono-grade (having at least one class for each grade), and (c) being complete (offering grades 1 to 6). That is, schools had on average at least 20 students in each grade. In an intervention division, 15 schools were randomly sampled from the basic list satisfying the above criteria. Similarly, 10 schools were randomly sampled in a nonintervention division. In Antique (an intervention division), however, we decided to add 2 more schools since we found that 2 schools had been severely damaged in flash floods caused by a typhoon in 2006 (they were relocated and rebuilt on safer higher ground). Therefore, we have 17 schools in Antique. In Neuva Vizcaya, it was difficult to obtain student lists from one school at the early stage, so this school was omitted from our sample, but we increased the number of students from 2 large schools (to keep the number of sample students the same).

Third, we collected lists of students enrolled in grade 6 in school years 1999/2000, 2004/05, and 2005/06. School year 1999/2000 is a pre-intervention cohort, while both 2004/05 and 2005/06 are cohorts that were exposed to a school intervention if the students lived in TEEP divisions. The process required a few months in each division. We randomly sampled 15 students from school year 1999/2000 grade 6 (pre-TEEP cohort), while 20 students altogether were sampled from school years 2004/05 and 2005/06 grade 6 (TEEP cohort). The sampling disregarded gender and age. Delays in entering school and repetitions created variations in age even in the same cohort. Note that because the listed students are those who were enrolled at that time, some of our sample students might not have graduated from their elementary schools.

Table 5.1 shows the composition of our sample households and students. We have a total of 3,451 students in our sample. TEEP divisions and cohorts (school years 2004/05 and 2005/06) are oversampled. Among the TEEP divisions, Ifugao shows smaller numbers in each grade-6 sample year due to the decision to drop some unreliable and unverified information in the second qualification visit in the division.

Household Survey and Student Tracking Survey

The data collection had two components: a household survey and a student tracking survey. In the household survey, we gathered information on household rosters in 2010 and 2000, schooling and work histories of biological siblings (of our sample students), household income (2010) and asset holding (2010 and 2000), parents' participation in school governance for each sibling, and public service and infrastructure access (2010 and 2000). On assets owned in 2000, only quantities were captured in each category (we asked both values and quantities of assets in 2010). To impute the value of asset holdings in 2000, we used the current prices calculated from the values and quantities of assets in 2010. The survey was supplemented by barangay (community) leader, the parent–teacher community association, and school surveys.

In the student tracking survey, we tracked our sample students to collect detailed information on their schooling and work histories as well as marriage, anthropometry, and illness. Either face-to-face or phone interviews were conducted. There were two stages in tracking activities. First, the teams tracked students residing within their original divisions. This took place immediately after the household survey. Second, in the case of out-of-division tracking, the teams attempted to schedule face-to-face interviews with students residing in National Capital Region, Baguio, and Cebu. For students residing in other provinces, we used primarily phone interviews. However, the teams tried to visit students residing near or within the province of Laguna and in between northern Luzon and Manila to conduct face-to-face interviews. We did not track overseas migrants, and we omitted several students who could not be interviewed even by phone.[22]

Although our sample has different age groups (cohorts) due to its sampling design, the majority of our students completed four years of high school. This is as expected, since even TEEP students (grade 6 in school years 2004/05 and 2005/06) are expected to reach age 17 in the survey period (note that children graduate from high school at age 15 or 16 if they have no delays or repetitions in schooling).

The tracking survey captured information on schooling and work histories in detail. Since our sample students were grade-6 enrollers in particular school years, we omit questions on their schooling histories up to that stage. Detailed information starts from high school entry and onward. Similar to the sibling section of the household survey, we collected information on school (name and school ID), school type (public or private), age started, graduated or not, age graduated, age

[22]There were 36 cases untracked out of the total of 3,487 students being tracked. Therefore, the tracking rate is about 98.97 percent.

stopped if not graduated, reasons for stopping, and whether still in school. At the college level, we also captured course majored and degree attained.

On their transition from school to work, students were asked when they left their parents' households for the first time and whether they had returned permanently or temporarily, the reasons, and whether they currently lived with their parents. In work history, details were identified for each job. Many of our sample students had experienced several jobs, which often started when they were still in school. The survey collected information on job description, occupation type, employment type, industry, when started and ended, types of reference, payment types, and monthly earnings.[23]

In this survey, we categorized students as one of three types based on their migration and household membership status: (a) in town, (b) migrant, or (c) transition. In-town students stay in the same school area. They may or may not live with their parents or guardians. Migrant students live away from their town and also are not members of their parents' or guardians' households. Finally, transition students live physically away from their towns but still belong to their original households. For example, students who are temporarily staying in Manila to look for a job, or who very recently started living in a boarding house to attend college at a distance. At the time of our survey, it was still uncertain whether the members of this group would come back to their households or permanently migrate.

In our sample, 69.34 percent of the students lived in their original school areas, 22.11 percent were migrants, and 8.55 percent were transitory students. If we add migrant and transitory students, more than 31 percent of our sample students were physically living away from their parents' or guardians' households. In the analysis, transition students are not considered as migrants.

Table 5.2 reports the mean and standard deviation of the dependent variables, separated by gender and cohort. The table suggests that, on average, females outperformed males in all three of the indicators of school performance for both TEEP and non-TEEP cohorts. For the non-TEEP cohort, females on average had about 10.9 years of schooling completed, the number of high school repetitions was about 0.026, and 51 percent had entered college. For males, the number of school

[23]We used monthly earnings from the latest job. That is, we had wage observations from those who were currently not working but had recent work experience. The survey captured the average wage for each job they were engaged in if the length of service was more than one month. For family labor in agriculture, hunting, and forestry, we asked the students to estimate the average annual income (dividing total annual family income from harvests by the number of members who worked) and convert the total into a monthly figure. For the first job, 18 students could not estimate monthly earnings, so we have 178 cases of reported monthly earnings out of 196 cases in this category of employment type and industry.

years completed, number of high school repetitions, and percent entering college were 10.3, 0.127, and 42.4 percent, respectively. We observe the same pattern for the TEEP and younger cohorts. Although females outperformed males in schooling and migration, the monthly salary of females was only 84 percent of males' salaries for the non-TEEP cohort and 96 percent of males' salaries for the TEEP cohort.

Table 5.3 compares the means of key variables between the two modes of interview: face-to-face and phone. Except for years of schooling completed and number of repetitions in high school, all the variables show statistically significant differences. The migration rate was particularly higher among phone interviewees due to the above-mentioned method of our survey. Note that most of the face-to-face interviews were conducted within division. In our analyses, we include indicators of interview mode to control for potential differences in unobserved characteristics correlated with the mode.

Cohort-Specific Variables

As discussed earlier, we control for factors (progress in social development and high school quality) that could have induced differentiated trends between TEEP and non-TEEP divisions. Figure 5.2 plots the percentage of households below the poverty threshold in each of the sample provinces from 1997 to 2009. The trends in poverty incidence during the 12 years are similar between the paired provinces for two pairs (Ifugao and Neuva Vizcaya, and Antique and Iloilo), slightly different for one pair (Leyte and West Samar), and very different for the last pair (Negros Oriental and Cebu).

In Table 5.4, we compare measures of access to public services and infrastructure between TEEP and non-TEEP areas. The household survey asked each mother or guardian whether the household had access to 14 types of public services or infrastructure in its barangay in 2000 and 2010. The table shows that except for public elementary school, health center, and paved road, we do not confirm significant differences in 2000 and/or 2010. Interestingly, trends in the period of 2000 to 2010 are marginally significantly different with regard to paved road, access to market, and post office.

We use the hypothetical number of students per classroom to proxy for high school quality. The previous year's number of students enrolled in the first year was multiplied by 4 to obtain the

hypothetical full size of total enrollment. This would be the full size of enrollment if there were no dropouts or repetitions in subsequent years. Table 5.5 compares the hypothetical number of students per academic classroom in high schools in school years 2002/03 and 2007/08 by our sample divisions. It is important to note that large numbers of new classrooms were added in Neuva Vizcaya (non-TEEP) and Antique and Leyte (both TEEP). Interestingly, we observe that this measure of school quality has converged between adjacent TEEP and non-TEEP divisions.

6. Results

In this section, we discuss the empirical results.

Results on Schooling Attainment

To provide appropriate weights for the analysis, we estimate a logit selection function of TEEP schools in which we control for initial school quality and the poverty level of the community of the school location. School quality is proxied by pupil–teacher ratio, total student enrollment in grade 6, and total classes provided by the school. These variables are based on the 2002/03 Basic Education Information System (BEIS) data. Community-level poverty is proxied by the mean of the logarithm of the value of the consumer durables of the sampled households with students at the school. We also include school location dummies and their interactions with pupil–teacher ratio and community poverty. The results are reported in Table A.1. Although only three variables are statistically significant, the overall explanatory power is favorable (the pseudo R-squared is 0.144).

Tables 6.1, 6.2, and 6.3 report the regression results of the three schooling outcomes: years of schooling, number of repetitions in high school, and college entry, respectively.[24] In each table, we report the result for the untrimmed and unweighted sample (full sample) and the trimmed and weighted sample. In both samples, we estimate two specifications: with and without cohort-specific

[24] In all the estimations below, we restrict the sample to those whose ages were within plus or minus 2 from the standard age, that is, age 12 at the respective grade-6 year. This process reduced the sample to 3,028. This is an important step in order to make each cohort as homogeneous as possible. Since all the equations include the log of the total value of consumer durables, the estimations also do not include those households that have missing values on consumer durables in 2000. The total effective sample size of students becomes 2,962. We estimate a linear probability model for college entry though it is a binary variable. This is because the trimming and weighting method is typically used in linear regressions. The percentage of predicted values that lie outside the range from 0 to 1 varies from 5.1 percent to 6.6 percent, depending on the model (see Table 6.3). This suggests that the linear probability model should be a reasonable approximation.

controls (poverty incidence, infrastructure index, number of students per classroom in high school). We also include the mode of interview in Models 2 and 4 to control for the choice of interview methods that are potentially correlated with unobserved characteristics.

Poverty incidence and number of students per classroom are at the province level. The infrastructure index is generated by the average of the dummy variables indicating access to each of the 14 types of public services or infrastructure (see Table 5.4) at the household level. To make them correspond to the high school period for either cohort, we assign the average of poverty incidence rates in 2000 and 2003 to the pre-TEEP cohort and the average rate of 2006 and 2009 to the TEEP cohort. Similarly, we use the infrastructure index of 2000 for the pre-TEEP cohort and the average of 2000 and 2010 (representing the situation around 2005) for the TEEP cohorts, and we use the hypothetical number of students per academic classroom in school years 2002/03 and 2007/08 for pre-TEEP and TEEP cohorts, respectively.

We use the logarithm of the total value of consumer durables, Log(consumer durables), to proxy for liquidity constraints.[25] We interact Female and Log(consumer durables) with a variety of variables to fully capture gender-specific TEEP effects and the effects of liquidity constraints.

The estimation results are mostly consistent across the four models or regressions. Our interpretation is based on the results of Model 4 for each outcome. The findings are summarized as follows. First, Female is significant in the functions of years of schooling completed and high school repetitions, pointing to a female advantage in school performance. This is consistent with our observation in Table 5.2. The interaction term of Female and TEEP cohort is insignificant at any conventional levels, suggesting that the female advantage is not changed between cohorts. The variable Female $\times$ TEEP cohort $\times$ TEEP province is statistically significant (at the 5 percent level for years of schooling completed and high school repetitions, and at the 10 percent level for college entry), and its coefficients have the predicted signs for all three indicators. This result points to an increased female advantage due to TEEP intervention. The gender-specific TEEP effect is nontrivial

[25] In the estimated consumer durables, we include house and residential land but do not include agricultural and commercial lands and various productive assets such as irrigation, farm equipment, livestock, and so on. Although we can compute the value of total physical assets, we believe the total value of consumer durables is a better indicator of liquidity constraints because our sample includes both rural and urban households. Compared with rural households, urban households have less (or no) agricultural land and relatively more human capital. The total value of physical assets is likely to underestimate the total assets of urban households because human capital assets are not included.

in magnitude: the change in the female–male gap due to TEEP is estimated to be 0.34 school years, -0.14 repetitions in high school, and 9 percent college entry rate, all other factors being equal.

Second, the variable Log(consumer durables) being positive and significant at the 1 percent level for years of schooling and college entry is in line with our expectation that liquidity constraints play an important role in schooling attainment. The interaction of Log(consumer durables) and TEEP cohort is significant at the 1 percent level in the years of schooling equation, suggesting that liquidity constraints are likely to be more binding at later stages of education. The interaction term of Female and Log(consumer durables) is significant, and its coefficient has the opposite sign to the coefficient of Log(consumer durables) when the dependent variable is years of schooling and number of repetitions in high school. This result suggests that females are less affected by liquidity constraints, which increases years of schooling completed and reduces high school repetitions.

Third, the interaction term of TEEP cohort and TEEP province is insignificant for years of schooling and repetitions in high school, and marginally significant (but has a negative sign) for college entry, which suggests that TEEP has hardly any impact on males.

Forth, an increase in poverty incidence is significantly positively correlated with increased years of schooling and repetitions in high school. Access to public services and infrastructure is positively related to years of schooling. Increased poverty seems to decrease the opportunity costs of schooling, which increases schooling attainment. The positive effect on repetitions in high school may be due to the same reason, that is, poorly performing students are more likely to stay at school when the opportunity cost of schooling is lower. Improved access to public services and infrastructure should be positively correlated with income level, which seems to support child schooling.

The effects of other variables are as follows: having an educated and older mother and fewer siblings all contribute to better education performance, age has a positive and decreasing effect on school performance, and cohort-specific controls have some explanatory power in schooling attainment.

Results on Migration

The results on migration are reported in Table 6.4.[26] We use the same model specification as that for the schooling outcomes except that the mode of interview is not included because it is endogenous here (see Table 5.3).

We interpret the results based mainly on Model 4. The major findings are as follows. First, the variable Female is significant at the 1 percent level and has an estimated coefficient of 0.38, indicating that being female increases the chances of migration by 38 percentage points, all other factors being equal. The interaction of Female and TEEP cohort being insignificant suggests that females' inclination to migrate does not change between cohorts. The interaction of Female and Log(consumer durables) is negative and significant at the 5 percent level, suggesting that poorer females are more likely to migrate. This is reasonable given that the opportunity cost of migration is lower for poorer individuals.

Second, the interaction of TEEP cohort and TEEP province is insignificant (only marginally significant in Model 3), suggesting that TEEP's effect on male migration is small. The interaction of Female, TEEP cohort, and TEEP province is insignificant in Models 3 and 4, though marginally significant in Models 1 and 2. The partial effect of TEEP on females is significant in the models without cohort-specific controls (Models 1 and 3) but insignificant in the models with cohort-specific controls (Models 2 and 4). Therefore, TEEP's effect on females' mobility is ambiguous. Interestingly, the interaction of TEEP cohort, TEEP province, and Log(consumer durables) is negative and significant, suggesting that TEEP seemed to increase the migration propensity of students from relatively poor households, possibly to search for better schooling and work opportunities.

Results on Earnings in the Labor Market

We estimate a Mincerian equation that includes the inverse Mills ratio from the first stage as a regressor. The results are reported in Table 6.5. Not surprisingly, years of schooling completed is significant at the 1 percent level, and one more year of schooling contributes to about an 8 percent increase in wages for males, on average. This estimate is consistent with the literature. The

[26] This is estimated by a linear probability model for the same reason as for college entry. The percentage of predicted values that lie outside the range from 0 to 1 varies from 6.3 percent to 9.2 percent, depending on the models (see Table 6.4).

interaction terms Years of schooling × TEEP cohort and Years of schooling × TEEP cohort × TEEP province are both insignificant, indicating that the return to schooling does not change much between cohorts or by TEEP.

The variable TEEP cohort × TEEP province is insignificant again, suggesting that TEEP did not have a direct effect on males' wages. However, it is interesting to find that the interaction term of Female, TEEP cohort, and TEEP province is positively significant (jointly significantly above zero in F tests). This suggests that TEEP reduced the salary gap between females and males if females had lower salaries than males (see also Figure 1.1). In other words, TEEP reduced female disadvantage in the labor market. We note that this gender effect of TEEP occurred after controlling for years of schooling. Therefore, the overall TEEP effects on females' earnings relative to males' earnings can be much larger once we take into account that TEEP significantly enhanced female advantage on schooling attainment.

The estimates for other variables are reasonable: age has a positive and decreasing effect on wages, and better physical endowment is also related to a higher salary. A phone interview is positively correlated with wages, which is reasonable since phone interviews were used for migrants residing in provinces away from their origins and the three metropolitan areas.

Summary

Our empirical results showed that the improvement of school quality at the elementary school stage enhanced female advantage in schooling (more years of schooling completed, less repetitions at high school, and more likely to enter college), but directly increased female wages. The result on migration was slightly ambiguous; significant effects on females were confirmed in un-weighted regressions. Our analysis also showed that in our specific empirical contexts, the improvement of elementary school quality did not change high school entry and completion (though the number of repetitions was reduced).

Given the observed wage penalty against females in the Philippines, the above change brought an increase of female wages through two channels: (1) increasing female schooling and (2) directly raising their wages. The former was not directly shown in our results on labor market earnings (Section 6.3). Possible changes in migration behavior, though not explicitly shown in the

wage regressions, also explain wage changes (as well as, in part, an increase in schooling).

The program also tends to keep female students in school, thus increasing their educational attainment. Though we found that improved school quality significantly increased female wages, female labor supply was reduced too. This result shows that an increase in opportunity cost did not offset a reinforced incentive to advance schooling among females.

7. Conclusion

This paper examined the long-term impacts of improved school quality at the elementary school stage on subsequent schooling investments and labor market outcomes using unique data from a recent survey that tracked students from the areas that experienced (and did not experience) a large-scale school intervention in the Philippines. We find that improved school quality enhanced female advantage (or decreased female disadvantage) in subsequent schooling investments, migration, and labor market earnings. That is, females study more (relative to males) and tend to migrate and earn more if they receive high-quality educational investments at an early stage.

The above specific results are consistent with the observation that returns to schooling are significantly higher among females than males, especially after high school completion. A labor market imbalance, represented by a significant gender gap in the returns to schooling, seems to create a unique situation in which the impact of improved school quality is biased in favor of females. This result is also supported by the behavior of parents, who were found to prioritize investments in the schooling of their daughters in the face of financial constraints. Our example demonstrates the importance of linking education and labor markets when predicting the impact of any intervention in schooling.

Appendix

The first-step probit regression results are reported in Table A2. The results suggest that the probability of the wage being observed is positively correlated with age (in a decreasing manner), being female in the TEEP cohort, and height (which captures physical endowment). It is intuitive that older and/or taller individuals were more likely to participate in the labor force in this relatively young sample. The positive coefficient of Female × TEEP cohort is consistent with the observation

that females are more likely to work while in school in the younger cohort (note that schooling is controlled).

The results also suggest that the probability of the wage being observed is lower if the individual is more schooled, female with TEEP, has an educated mother, and is part of a wealthier family. School and work are competing for our sample, so it is reasonable that more highly educated students were less likely to participate in the labor force. This inclination is stronger in the TEEP cohort. TEEP reduced females' likelihood of labor force participation, which is consistent with the observation that female TEEP beneficiaries spent more time studying. Also, students from relatively wealthier households are less likely to work while schooling. Table A3 shows that the inclusion of inverse Mill's ratio does not alter our main findings.

References

Altonji, J.G., and R.M. Black, 1999, Gender and Race in the Labor Market, In *Handbook of Labor Economics*, vol. 3, ed. O. Ashenfelter and D. Card, Amsterdam: North-Holland.

Anderson, K.H., E.M. King, and Y. Wang, 2003 , Market Returns, Transfers and Demand for Schooling in Malaysia, 1976-89, *Journal of Development Studies*, 39: 1–28.

Alderman, H., J. R. Behrman, V. Lavy, and R. Menon. 2001, Child Health and School Enrollment: A Longitudinal Analysis, *Journal of Human Resources* 36: 185-205.

Alderman, H., J. Hoddinott, and B. Kinsey. 2006, Long Term Consequences of Early Childhood Malnutrition, *Oxford Economic Papers* 58: 450-474.

Alderman, H. and E. King, 1998, Gender differences in parental investment in education, *Structural Change and Economic Dynamics*, 9: 453–468.

Aslam, M., 2009, Education Gender Gaps in Pakistan: Is the Labor Market to Blame?, *Economic Development and Cultural Change*, 57: 747-784.

Card, D., 1999, The Causal Effect of Education on Earnings, In *Handbook of Labor Economics*, vol. 3A, ed. O. Ashenfelter and D. Card, Amsterdam: North-Holland.

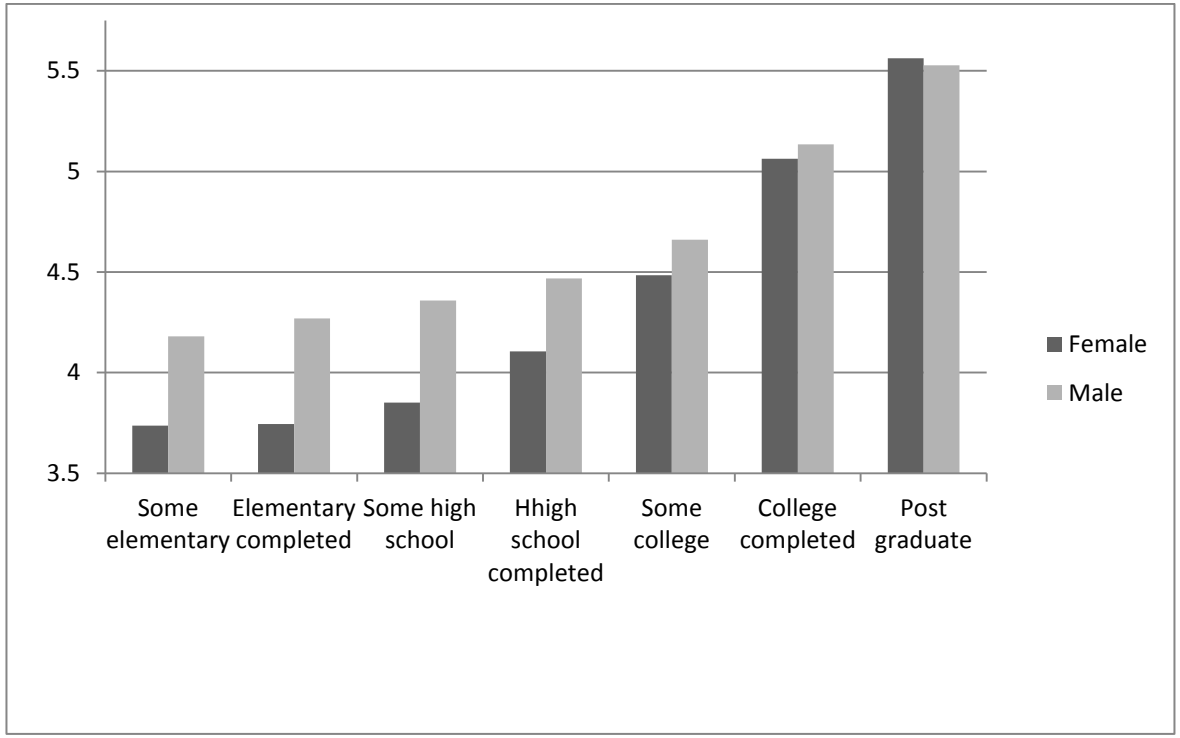
---------, 2001, Estimating the Returns to Schooling: Progress in Some Persistent Econometric Problems, *Econometrica*, 69: 1127–60.

Case, Anne and Angus Deaton, 1999, School Inputs and Educational Outcomes in South Africa, *Quarterly Journal of Economics*, 114: 1047-1084.

Crump, Richard K., V. Joseph Hotz, Guido W. Imbens, and Oscar A. Mitnik, 2009, Dealing with Limited Overlap in Estimation of Average Treatment Effects, *Biometrika*, 96: 187-199.
Cunha, F., J. J. Heckman, L. Lochner, and D. V. Masterov. 2006, Interpreting the Evidence on Life Cycle Skill Formation, In *Handbook of the Economics of Education*, Volume 1, edited by E. A. Hanushek and F. Welch, 697-812, Elsevier, North-Holland, Amsterdam, Holland.
Glewwe, P. and M. Kremer, 2006, Schools, teachers, and education outcomes in developing countries, Ch.16, *Handbook of the Economics of Education*, Vol.2, edited by E.A. Hanushek and F. Welch, Amsterdam: Elsevier B.V.
Jensen, R., 2010, The (perceived) returns to education and the demand for schooling, *Quarterly Journal of Economics*, 125 : 515-548.
Hanushek, E.A., 2006, School Resources, Ch.14, *Handbook of the Economics of Education*, Vol.2, edited by E.A. Hanushek and F. Welch, Amsterdam: Elsevier B.V.
Heckman, J., 1979, Sample Selection Bias as a Specification Error, *Econometrica* 47: 153–61.
Hirano, K. H., G. W. Imbens, and G. Ridder. 2003, Efficient Estimation of Average Treatment Effects Using the Estimated Propensity Score, *Econometrica* 71: 1161-1189.
Hoxby, C., 2000, The Effects of Class Size on Student Achievement: New Evidence from Natural Population Variation, *Quarterly Journal of Economics*, 116: 1239-1286.
Khattri, N., C. Ling, and S. Jha. 2010, The Effects of School-Based Management in the Philippines: An Initial Assessment Using Administrative Data, Policy Research Working Paper No. 5248, World Bank, Washington D.C.
Lanzona, Leonardo A., 1998, Migration, Self-selection and Earnings in Philippine Rural Communities, *Journal of Development Economics* 56: 27-50.
Maluccio, J. A., J. Hoddinott, J. R. Behrman, R. Martorell, A. R. Quisumbing, and A. D. Stein, 2009, The Impact of Improving Nutrition during Early Childhood on Education among Guatemalan Adults, *Economic Journal* 119: 734-763.
Mani, Subha, 2008. Is there Complete, Partial, or No Recovery from Childhood Malnutrition? Empirical Evidence from Indonesia, Fordham Economics Discussion Paper Series dp2008-19, Fordham University.
Orbeta, Aniceto C., 2002, Education, Labor Market and Development: A Review of the Trends and Issues in the Philippines for the Past 25 Years, Manila: Philippine Institute for Development Studies.

Ramos, F. V. 1995. The Social Reform Agenda: Winning the Future. Quezon City, Philippines:
Republic of the Philippines, Republic of the Philippines, Congress. 1998. Republic Act 8425 (Social Reform and Poverty Alleviation Act).
Republic of the Philippines, Department of Finance, 2001, Department Order No. 32-01 (effective November 20, 2001).
Sakellariou, C. 2004. The Use of Quantile Regressions in Estimating Gender Wage Differentials: A Case Study of the Phillippines, *Applied Economics*, 36: 1001-1007.
Schady, Norbert, 2003, Convexity and Sheepskin Effects in the Human Capital Earnings Function: Recent Evidence for Filipino Men, *Oxford Bulletin of Economics and Statistics*, 65(2), 171-196.
Speakman, R. and F. Welch, 2006, Using wages to infer school quality, Ch.13, *Handbook of the Economics of Education*, Vol.2, edited by E.A. Hanushek and F. Welch, Amsterdam: Elsevier B.V.
Wooldridge JM. 2007. Inverse Probability Weighted Estimation for General Missing Data Problems. *Journal of Econometrics* 141: 1281-1301.
Yamauchi, Futoshi, 2005, Why do Schooling Returns Differ? Screening, Private Schools and Labor Markets in the Philippines and Thailand, *Economic Development and Cultural Change* 53: 959-981.
----------, 2007, Social learning, neighborhood effects, and investment in human capital: Evidence from Green-Revolution India, *Journal of Development Economics*, 83: 37–62.
----------, 2008. 'Early Childhood Nutrition, Schooling, and Sibling Inequality in a Dynamic Context: Evidence from South Africa, *Economic Development and Cultural Change* 56: 657-682.
Yamauchi, Futoshi and Yanyan Liu, 2011, Impacts of an Early Education Intervention on Students' Learning Achievement: Evidence from the Philippines, IFPRI Discussion Paper No. 1121, Washington D.C.: International Food Policy Research Institute.

Figure 1.1—Returns to schooling in the Philippines



Source: Labor Force Survey, October 2009 round. Using the pooled sample, the log daily wage regression was estimated with the female indicator; educational attainment indicators (shown in the graph, "no education" being omitted) interacted with the female indicator; and age, age squared, and region dummies. The graph shows estimated constant term + female effect (zero if male) + education effects (differentiated by gender). The estimation sample consists of men and women aged 20 to 49.

Figure 2.1—TEEP provinces

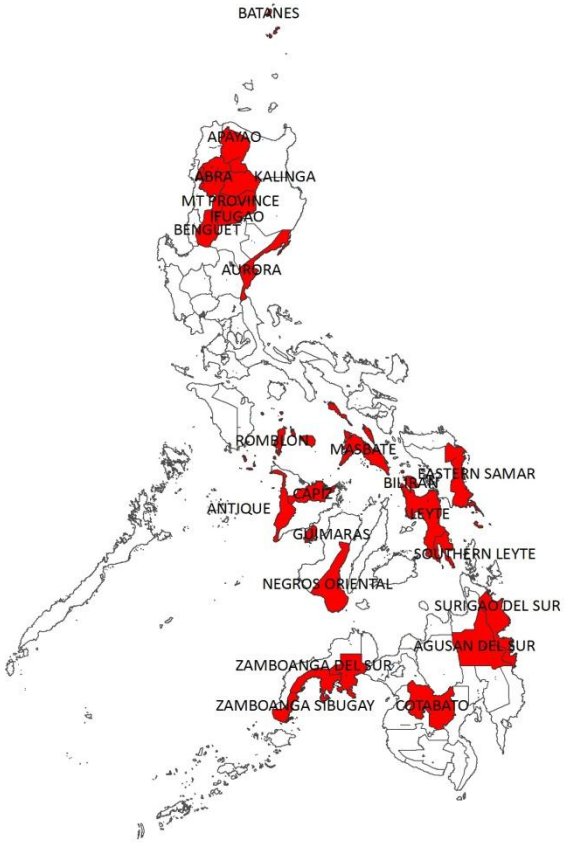


Figure 5.1—Sample provinces

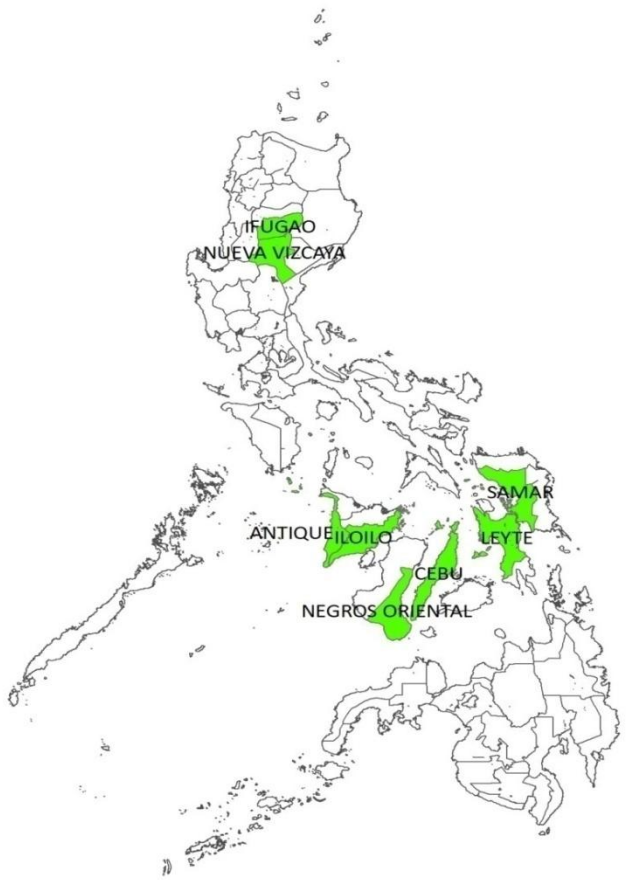
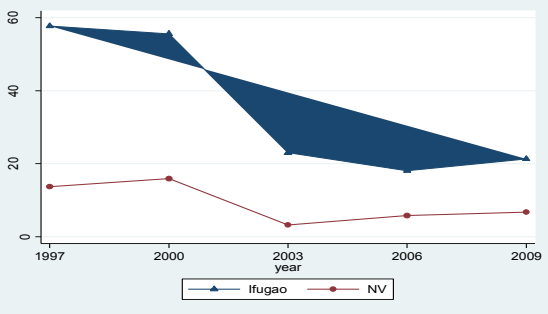
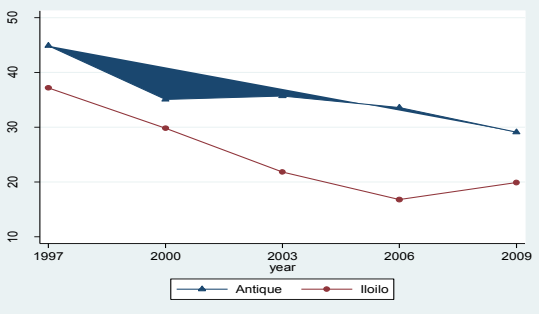


Figure 5.2—Percentage of households below poverty threshold at province level, by pair and treatment status

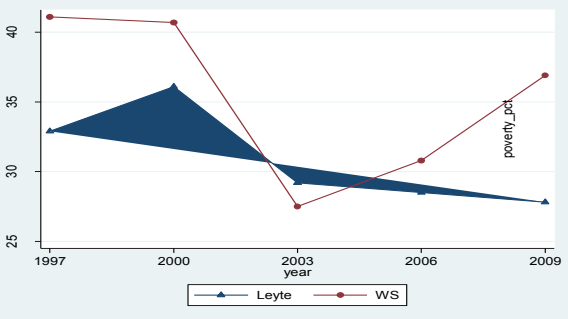
Ifugao versus Neuva Vizcaya



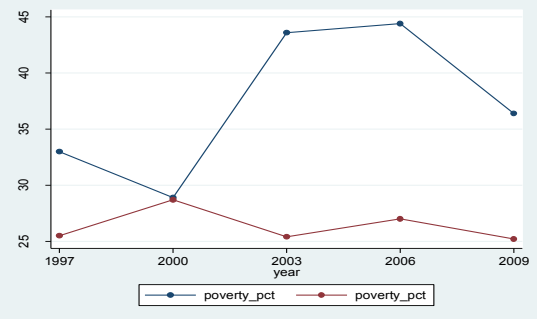
Antique versus Iloilo



Leyte versus West Samar



Negros Oriental versus Cebu



Source: Philippine National Statistical Coordination Board, www.nscb.gov.ph/poverty/2009/tables.asp.

Table 5.1—Sample student distribution

Grade 6 SY	Antique	Iloilo	Ifugao	Neuva Viscaya	Leyte	West Samar	Negros Oriental	Cebu
1999/2000	244	143	188	139	217	148	230	144
2004/05	159	97	137	92	160	98	163	107
2005/06	177	111	145	101	139	99	148	95
Total	580	351	470	332	516	345	541	346

Source: TEEP Tracking Survey. Note: Antique, Ifugao, Leyte, and Negros Oriental are TEEP divisions.

Table 5.2—Summary statistics of the dependent variables, separated by gender and cohort

	Non-TEEP Cohort				TEEP Cohort			
	Female		Male		Female		Male	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Years of schooling	10.866	2.279	10.310	2.450	9.604	1.370	8.935	1.654
High school repetitions	0.026	0.170	0.217	0.567	0.060	0.255	0.279	0.678
College entry	0.512	0.500	0.424	0.495	0.409	0.492	0.278	0.448
Migration	0.397	0.490	0.285	0.452	0.200	0.400	0.086	0.280
Log(salary)	8.147	0.750	8.322	0.768	7.598	0.478	7.640	0.801

Source: TEEP Tracking Survey.

Table 5.3—Sample means of variables for face-to-face interviews and phone interviews

Variable	Face-to-face	Phone	Sig.
Years of schooling	9.79	9.72	
Repetitions in high school	0.15	0.13	
College entry	0.40	0.29	***
Migration	0.16	0.73	***
TEEP province	0.60	0.67	***
Female	0.50	0.60	***
Log(consumer durables)	11.08	10.76	***
Mother's years of schooling	7.48	6.45	***
Mother's age	49.16	49.98	*
Number of siblings	5.52	6.22	***
Age	19.58	20.18	***
Number of observations	2,724	330	

Source: TEEP Tracking Survey.

Table 5.4—Availability of different types of infrastructure in student's residence village (averaged in school areas)

	2000			2010			(2010–2000)		
Variable	TEEP	Non-TEEP		TEEP	Non-TEEP		TEEP	Non-TEEP	
Electricity	0.865	0.838		0.988	0.972		0.123	0.134	
Piped water	0.422	0.349		0.642	0.595		0.220	0.245	
Paved road	0.388	0.451		0.518	0.709	***	0.129	0.258	*
Modern irrigation	0.197	0.124		0.294	0.238		0.097	0.114	
Cell phone service	0.611	0.624		0.951	0.950		0.340	0.326	
Internet café	0.020	0.031		0.075	0.068		0.055	0.037	
Market	0.077	0.081		0.079	0.111		0.002	0.030	*
Public elementary school	0.917	0.795	***	0.891	0.804	**	-0.026	0.009	
Private elementary school	0.018	0.038		0.154	0.154		0.136	0.117	
Public high school	0.228	0.192		0.312	0.308		0.084	0.116	
Private high school	0.040	0.032		0.123	0.121		0.083	0.089	
Health center	0.784	0.596	***	0.766	0.619	**	-0.018	0.023	
Public library	0.024	0.020		0.046	0.031		0.022	0.011	
Post office	0.036	0.017		0.026	0.038		-0.010	0.020	**
Number of observations	62	39		62	39		62	39	

Source: TEEP Tracking Survey. Note: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table 5.5—Estimated students per classroom

Province	SY 2002/03	SY 2007/08	% Change
Ifugao	99.31	58.57	-41.03%
Neuva Viscaya	93.37	53.59	-42.61%
Antique	156.31	59.12	-62.18%
Iloilo	49.92	58.7	17.58%
Negros Oriental	152.49	75.04	-50.79%
Cebu	68.97	72.78	5.53%
Leyte	54.26	71.3	31.40%
Western Samar	36.11	79.91	121.34%

Source: Basic Education Information System, SY 2002/03, SY 2007/08.

Table 6.1—Regression results of years of schooling, for full sample and trimmed and weighted sample

	Full Sample				Trimmed and Weighted Sample			
	Model 1		Model 2		Model 3		Model 4	
TEEP cohort*TEEP province	-0.410	(-0.76)	-0.862	(-1.57)	-0.427	(-0.73)	-0.734	(-1.25)
Female	1.419**	(2.44)	1.457**	(2.53)	1.892**	(3.27)	1.920**	(3.32)
Female*TEEP cohort	-0.183	(-1.15)	-0.184	(-1.15)	-0.200	(-1.23)	-0.195	(-1.18)
Female*TEEP cohort*TEEP province	0.281**	(2.01)	0.289**	(2.07)	0.337**	(2.00)	0.343**	(2.05)
Log(consumer durables)	0.426***	(7.60)	0.391***	(6.64)	0.463***	(7.96)	0.442***	(7.33)
TEEP cohort	0.910	(1.28)	0.593	(0.84)	0.969	(1.47)	0.806	(1.27)
TEEP cohort*Log(consumer durables)	-0.362***	(-6.13)	-0.325***	(-5.42)	-0.375***	(-7.29)	-0.353***	(-7.02)
Female*Log(consumer durables)	-0.0691	(-1.38)	-0.0726	(-1.47)	-0.110**	(-2.31)	-0.113**	(-2.37)
TEEP cohort*TEEP province*Log(consumer durables)	0.00460	(0.10)	0.0470	(1.01)	-0.00406	(-0.08)	0.0236	(0.48)
Age	1.402***	(4.11)	1.467***	(4.20)	1.433***	(3.72)	1.503***	(3.79)
Age squared	-0.0442***	(-4.82)	-0.0458***	(-4.89)	-0.0455***	(-4.39)	-0.0472***	(-4.43)
Mother's years of schooling	0.127***	(11.28)	0.126***	(11.23)	0.134***	(10.58)	0.132***	(10.53)
Mother's age	0.0200***	(5.15)	0.0197***	(5.14)	0.0198***	(4.98)	0.0197***	(5.04)
Number of siblings	-0.0275**	(-2.05)	-0.0277**	(-2.07)	-0.0277**	(-2.15)	-0.0284**	(-2.22)
Poverty incidence rate			0.0410***	(3.79)			0.0346**	(3.16)
Infrastructure index			0.452	(1.59)			0.634**	(2.22)
Number of students per classroom in high school			-0.00171	(-0.89)			-0.00143	(-0.73)
If phone interview			-0.0269	(-0.26)			-0.110	(-0.82)
Other variables and school fixed effects	yes		yes		yes		yes	
Number of observations	2,962		2,962		2,761		2,761	

Source: TEEP Tracking Survey. Notes: Other variables include house value in 2000, residential land value in 2000, commercial land value in 2000, and agricultural land value in 2000.

t values are in parentheses.

* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table 6.2—Regression results of number of repetitions in high school, for full sample and trimmed and weighted sample

	Full Sample				Trimmed and Weighted Sample			
	Model 1		Model 2		Model 3		Model 4	
TEEP cohort*TEEP province	0.118	(0.61)	0.0804	(0.40)	0.290	(1.13)	0.241	(0.95)
Female	-0.455***	(-3.47)	-0.453***	(-3.49)	-0.383***	(-2.85)	-0.380***	(-2.86)
Female*TEEP cohort	0.0572	(1.25)	0.0582	(1.27)	0.0359	(0.75)	0.0376	(0.78)
Female*TEEP cohort*TEEP province	-0.122**	(-2.27)	-0.121**	(-2.23)	-0.143**	(-2.32)	-0.143**	(-2.30)
Log(consumer durables)	-0.0159	(-1.42)	-0.0204*	(-1.77)	-0.00563	(-0.42)	-0.00873	(-0.63)
TEEP cohort	0.205	(1.14)	0.157	(0.85)	0.275	(1.28)	0.253	(1.14)
TEEP cohort*Log(consumer durables)	0.00305	(0.20)	0.00812	(0.51)	0.00534	(0.29)	0.00886	(0.47)
Female*Log(consumer durables)	0.0235**	(2.08)	0.0232**	(2.07)	0.0204*	(1.66)	0.0200*	(1.65)
TEEP cohort*TEEP province*Log(consumer durables)	-0.00452	(-0.26)	0.0000134	(0.00)	-0.0174	(-0.79)	-0.0127	(-0.58)
Age	0.0391	(0.44)	0.0524	(0.59)	-0.0218	(-0.20)	-0.00405	(-0.03)
Age squared	0.0000289	(0.01)	-0.000315	(-0.14)	0.00193	(0.67)	0.00147	(0.49)
Mother's years of schooling	-0.00139	(-0.40)	-0.00155	(-0.44)	0.00140	(0.26)	0.00134	(0.25)
Mother's age	-0.000491	(-0.35)	-0.000538	(-0.38)	0.000217	(0.13)	0.000190	(0.11)
Number of siblings	0.00290	(0.65)	0.00278	(0.63)	0.00570	(0.82)	0.00559	(0.81)
Poverty incidence rate			0.00527*	(1.97)			0.00634**	(2.15)
Infrastructure index			0.0573	(0.45)			-0.0133	(-0.08)
Number of students per classroom in high school			-0.0000552	(-0.11)			-0.000189	(-0.39)
If phone interview			0.00434	(0.15)			0.00127	(0.04)
Other variables and school fixed effects	yes		yes		yes		yes	
Number of observations	2,776		2,776		2,585		2,585	

Source: TEEP Tracking Survey. Notes: Other variables include house value in 2000, residential land value in 2000, commercial land value in 2000, and agricultural land value in 2000.

t values are in parentheses.

* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table 6.3—Regression results of college entry (linear probability model), for full sample and trimmed and weighted sample

	Full Sample				Trimmed and Weighted Sample			
	Model 1		Model 2		Model 3		Model 4	
TEEP cohort*TEEP province	-0.230	(-1.18)	-0.306	(-1.55)	-0.355*	(-1.67)	-0.395*	(-1.89)
Female	0.0442	(0.34)	0.0540	(0.42)	0.0979	(0.72)	0.100	(0.73)
Female*TEEP cohort	-0.0350	(-0.77)	-0.0372	(-0.81)	-0.0357	(-0.71)	-0.0357	(-0.71)
Female*TEEP cohort*TEEP province	0.0983**	(2.28)	0.0992**	(2.31)	0.0893*	(1.82)	0.0892*	(1.82)
Log(consumer durables)	0.0561***	(4.58)	0.0544***	(4.17)	0.0651***	(5.32)	0.0640***	(4.97)
TEEP cohort	-0.250	(-1.27)	-0.241	(-1.19)	-0.222	(-1.16)	-0.217	(-1.11)
TEEP cohort*Log(consumer durables)	-0.0216	(-1.28)	-0.0210	(-1.19)	-0.0259	(-1.55)	-0.0253	(-1.46)
Female*Log(consumer durables)	0.00590	(0.52)	0.00536	(0.47)	0.00128	(0.11)	0.00117	(0.10)
TEEP cohort*TEEP province*Log(consumer durables)	0.0157	(0.89)	0.0203	(1.15)	0.0257	(1.32)	0.0281	(1.47)
Age	0.303***	(3.77)	0.297***	(3.54)	0.275***	(2.77)	0.277***	(2.77)
Age squared	-0.00933***	(-4.48)	-0.00915***	(-4.22)	-0.00876***	(-3.41)	-0.00880***	(-3.40)
Mother's years of schooling	0.0340***	(10.79)	0.0339***	(10.89)	0.0324***	(9.18)	0.0324***	(9.23)
Mother's age	0.00371***	(3.37)	0.00370***	(3.35)	0.00369***	(2.97)	0.00368***	(2.91)
Number of siblings	-0.0129***	(-4.05)	-0.0128***	(-3.94)	-0.0124***	(-3.50)	-0.0123***	(-3.36)
Poverty incidence rate			0.00275	(0.89)			0.00259	(0.82)
Infrastructure index			-0.00935	(-0.11)			-0.00107	(-0.01)
Number of students per classroom in high school			-0.000559	(-1.32)			-0.000296	(-0.55)
If phone interview			-0.0499*	(-1.88)			-0.0353	(-1.05)
Other variables and school fixed effects	yes		yes		yes		yes	
Percentage of predicted values out of [0,1]	5.10%		5.00%		6.60%		6.20%	
Number of observations	2,962		2,962		2,761		2,761	

Source: TEEP Tracking Survey. Notes: Other variables include house value in 2000, residential land value in 2000, commercial land value in 2000, and agricultural land value in 2000. t values are in parentheses.
* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table 6.4—Regression results of migration (linear probability model), for full sample and trimmed and weighted sample

	Full Sample				Trimmed and Weighted Sample			
	Model 1		Model 2		Model 3		Model 4	
TEEP cohort*TEEP province	0.222	(1.60)	0.149	(1.07)	0.244*	(1.65)	0.137	(0.94)
Female	0.394***	(3.71)	0.400***	(3.75)	0.365***	(3.11)	0.375***	(3.30)
Female*TEEP cohort	-0.0369	(-0.95)	-0.0373	(-0.97)	-0.0111	(-0.26)	-0.0131	(-0.32)
Female*TEEP cohort*TEEP province	0.0607*	(1.91)	0.0608*	(1.91)	0.0524	(1.51)	0.0514	(1.51)
Log(consumer durables)	0.00720	(0.62)	0.00282	(0.23)	-0.00173	(-0.11)	-0.00144	(-0.09)
TEEP cohort	0.0149	(0.09)	-0.0168	(-0.10)	-0.0383	(-0.20)	0.00651	(0.03)
TEEP cohort*Log(consumer durables)	0.00321	(0.25)	0.00766	(0.55)	0.00780	(0.48)	0.00625	(0.36)
Female*Log(consumer durables)	-0.0250***	(-2.85)	-0.0254***	(-2.89)	-0.0239**	(-2.43)	-0.0246**	(-2.56)
TEEP cohort*TEEP province*Log(consumer durables)	-0.0277**	(-2.24)	-0.0210*	(-1.72)	-0.0276**	(-2.09)	-0.0223*	(-1.70)
Age	-0.111	(-1.52)	-0.101	(-1.34)	-0.128*	(-1.71)	-0.131*	(-1.85)
Age squared	0.00360*	(1.81)	0.00334	(1.63)	0.00417**	(2.03)	0.00429**	(2.20)
Mother's years of schooling	-0.00562**	(-2.11)	-0.00554**	(-2.09)	-0.00461	(-1.66)	-0.00456	(-1.63)
Mother's age	0.000941	(1.01)	0.000892	(0.96)	0.00129	(1.11)	0.00128	(1.11)
Number of siblings	0.0114***	(3.97)	0.0114***	(3.94)	0.00970***	(2.72)	0.00956***	(2.65)
Poverty incidence rate			0.00579**	(2.23)			0.00395	(1.34)
Infrastructure index			-0.0486	(-0.61)			-0.0523	(-0.68)
Number of students per classroom in high school			-0.000256	(-0.57)			-0.000963	(-1.62)
Other variables and school fixed effects	yes		yes		yes		yes	
Percentage of predicted values out of [0,1]	6.3%		8.0%		7.6%		9.2%	
Number of observations	2,962		2,962		2,761		2,761	

Source: TEEP Tracking Survey. Notes: Other variables include house value in 2000, residential land value in 2000, commercial land value in 2000, and agricultural land value in 2000.
t values are in parentheses.
* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table 6.5—Regression results of logarithm of monthly earnings from the latest job, for full sample and trimmed and weighted sample

	Full Sample		Trimmed and Weighted Sample	
	Model 1		Model 2	
Years of schooling	0.0864***	(6.02)	0.0894***	(5.39)
Age	0.519***	(3.19)	0.557***	(3.66)
Age squared	-0.0125***	(-2.97)	-0.0139***	(-3.55)
TEEP cohort*TEEP province	0.0424	(0.15)	0.156	(0.59)
Years of schooling*TEEP cohort*TEEP province	-0.0204	(-0.62)	-0.0310	(-1.00)
TEEP cohort	-0.00543	(-0.02)	-0.230	(-0.85)
Years of schooling*TEEP cohort	-0.0463	(-1.52)	-0.0313	(-1.09)
Female*TEEP cohort*TEEP province	0.234**	(2.13)	0.272**	(2.26)
Female	-0.495***	(-3.20)	-0.333*	(-1.83)
Female*Years of schooling	0.0280*	(1.90)	0.0165	(0.99)
Female*TEEP cohort	0.122	(1.24)	0.0646	(0.58)
Mother's years of schooling	0.00956	(1.39)	0.0165**	(2.02)
Mother's age	-0.000262	(-0.12)	-0.00169	(-0.80)
Log(consumer durables)	0.0455***	(3.60)	0.0474***	(3.74)
Height	0.00569*	(1.92)	0.00613*	(1.78)
Number of students per classroom in high school	-0.000602	(-0.68)	0.000581	(0.52)
If phone interview	0.233***	(4.62)	0.242***	(3.18)
School fixed effects	yes		yes	
Number of observations	1,716		1,592	

Source: TEEP Tracking Survey. Notes: t values are in parentheses.

* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table A.1 — Logit regression of the selection of TEEP schools

	Coeff.	t	
Pupil–teacher ratio	0.034	0.36	
Total enrollment	-0.002	-0.28	
Total number of classes	-0.004	-0.01	
Area 1	18.047	1.09	
Area 2	47.615	2.39	**
Area 3	23.958	1.45	
Log(asset)*Area 1	0.670	0.77	
Log(asset)*Area 2	-1.493	-1.19	
Log(asset)*Area 3	-0.160	-0.20	
Log(asset)*Area 4	2.354	1.94	*
Pupil–teacher ratio*Area 1	-0.012	-0.08	
Pupil–teacher ratio*Area 2	-0.220	-1.68	*
Pupil–teacher ratio*Area 3	0.080	0.75	
Constant	-25.433	-1.85	*
Number of observations	101		
Pseudo R-squared	0.144		

Notes: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table A2—Probit regression results of selection equation of wage (dependent variable: wage being observed)

	Full Sample			Trimmed Sample		
	Coeff.	t		Coeff.	t	
Years of schooling	-0.065	-2.63	***	-0.056	-2.2	**
Age	0.969	4.03	***	0.963	3.87	***
Age squared	-0.023	-3.52	***	-0.023	-3.38	***
TEEP cohort*TEEP province	0.359	0.86		0.108	0.25	
Years of schooling*TEEP cohort*TEEP province	-0.033	-0.71		-0.009	-0.19	
TEEP cohort	0.291	0.64		0.566	1.2	
Years of schooling*TEEP cohort	-0.169	-4.07	***	-0.197	-4.61	***
Female*TEEP cohort*TEEP province	-0.245	-1.81	*	-0.251	-1.79	*
Female	-0.292	-0.86		-0.237	-0.68	
Female*Years of schooling	0.021	0.7		0.018	0.59	
Female*TEEP cohort	0.578	3.91	***	0.566	3.72	***
Mother's years of schooling	-0.044	-4.9	***	-0.039	-4.22	***
Mother's age	-0.006	-1.69	*	-0.005	-1.55	
Log(consumer durables)	-0.161	-7.84	***	-0.175	-8.23	***
Height	0.005	1.77	*	0.005	1.73	*
Number of students per classroom in high school	0.002	1.48		0.001	1.24	
Constant	-7.100	-3.19	***	-6.988	-3.02	***
Number of observations	2,962			2,761		
Pseudo R-squared	0.237			0.238		

Source: TEEP Tracking Survey. Notes: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Table A3 — Robustness check: Regression results of logarithm of monthly earnings from the latest job

	Full Sample		Trimmed and Weighted Sample	
Years of schooling	0.0873***	(5.61)	0.0832***	(4.50)
Age	0.496*	(1.95)	0.757***	(2.92)
Age squared	-0.0119*	(-1.94)	-0.0185***	(-2.98)
TEEP cohort*TEEP province	0.0339	(0.11)	0.191	(0.71)
Years of schooling*TEEP cohort*TEEP province	-0.0196	(-0.58)	-0.0344	(-1.09)
TEEP cohort	-0.0291	(-0.08)	0.0105	(0.03)
Years of schooling*TEEP cohort	-0.0408	(-0.74)	-0.0811	(-1.37)
Female*TEEP cohort*TEEP province	0.240**	(2.16)	0.224*	(1.84)
Female	-0.488***	(-2.94)	-0.388**	(-1.99)
Female*Years of schooling	0.0275*	(1.75)	0.0209	(1.18)
Female*TEEP cohort	0.107	(0.78)	0.189	(1.21)
Mother's years of schooling	0.0105	(1.00)	0.00905	(0.85)
Mother's age	-0.000131	(-0.06)	-0.00277	(-1.27)
Log(consumer durables)	0.0488	(1.60)	0.0169	(0.48)
Height	0.00557*	(1.79)	0.00698*	(1.97)
Number of students per classroom in high school	-0.000624	(-0.70)	0.000799	(0.69)
If phone interview	0.232***	(4.60)	0.244***	(3.24)
Inverse Mills ratio	-0.0445	(-0.12)	0.376	(0.92)
School fixed effects	yes		yes	
Number of observations	1,716		1,592	

Source: TEEP Tracking Survey. Notes: t values are in parentheses.

* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.