

Research Paper

**Do conditional cash transfers reduce child labor?:
Evidence from the Philippines**

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Abstract

The measured impact on child labor varies among the conditional cash transfer (CCT) programs with observed significant impact on children's schooling. In the Philippines, the Pantawid Pamilyang Pilipino Program (4Ps) was regarded by World Bank as one of the best targeted social protection programs in the world. This research investigated whether or not 4Ps has reduced the incidence of child laborers, particularly those aged 12 to 14 years. Using the Annual Poverty Indicator Surveys of 2011, propensity score matching method was implemented to estimate the treatment effects on the treated (ATT). The results indicated positive and significant impact on schooling outcomes, which ranged from 5.7 to 7.5 percentage points. The 4Ps helped in narrowing the gap between male and female in terms of school attendance. Moreover, greater impact was observed among older children. However, despite the significant school attendance increase caused by the program, the results showed no significant impact in the reduction of child labor across age and gender.

Keywords: child labor, CCTs, 4Ps, PSM, schooling outcome

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Do conditional cash transfers reduce child labor?: Evidence from the Philippines

I. Introduction

The measured impact on child labor varies among the conditional cash transfer (CCT) programs with observed significant impact on children's schooling. Some CCT programs have been proven to be effective in reducing child labor, while others were not. In the Philippines, the Pantawid Pamilyang Pilipino Program (4Ps) was regarded by World Bank as one of the best targeted social protection programs in the world. Based on recent impact evaluation studies, 4Ps has successfully increased enrollment rates of children and improved their access to health facilities.

This research paper contributes to the growing literature on CCTs by taking the case of the Philippines' CCT, and by focusing on the older age group. Emphasis was given to children who are transitioning from primary to secondary school since high dropout rate was observed at this stage. Also, these children are still below the minimum legal working age in the Philippines. This implies the absence of benefits and protection usually accorded to laborers meeting the age requirement.

In particular, this research sought to achieve the following objectives: (1) review past studies about the impact of CCTs on schooling and child labor outcomes; (2) validate the impact on schooling outcomes as compared with earlier 4Ps evaluation studies; (3) investigate whether or not 4Ps has reduced the incidence of child laborers; and (4) explore potential heterogeneous impacts of the program (i.e. by gender and by age).

To understand child labor more deeply, its definition and relevant issues were discussed in Section II. Section II also delivered a brief background on existing CCTs. Section III explained the details of the Philippine CCT program and the data set used. Various variables and basic statistics about the sample were discussed as well. In Section IV, the assumptions and actual implementation of the econometric method called propensity score matching were explained. The results were presented in Section V, followed by a discussion in Section VI. Conclusion and recommendations for future research were presented in Sections VII and VIII, respectively.

II. Review of Related Literature

A. Child labor

Before delving into the issues of child labor, it is necessary to define it first. Edmonds (2008) discussed various meanings of the term “child labor.” Though no consensus has yet been achieved, the activities that children do as work may be broadly described into two categories: market work and domestic work.

Market work usually describes economic activities done inside or outside the household, which may be paid or unpaid. On the other hand, domestic work refers to those non-economic activities which cover chores such as cooking, cleaning, and child and elder care. Community service and volunteer work are often excluded from the list of activities under domestic work. Since these are not the absolute categories of “child labor” activities, Edmonds (2008) noted that researchers must define explicitly in their research papers how they use these terms.

Official definitions of child labor vary from country to country. In Pakistan, child work is defined as wage work¹, while in Vietnam, it points to market work that has adverse effects on the future well-being of children. On the other hand, those work activities that are unlikely to be harmful to children’s health and development are called “light work”² and often are not considered as child labor (Edmonds 2008).

Vietnam’s definition is similar with the one adopted in the Philippines, where child laborers are referred to as a subset of working children aged five to 17 who have worked in hazardous industries and occupations, and have worked for long hours in non-hazardous occupations (PSA 2011).³

The legal age at which child laborers start to work differs across countries too. Many countries have ratified the International Labor Organization’s (ILO) Convention 138 on the Minimum Age for Admission to Employment. The

¹ “...receives cash or in-kind payments for economic work” (Edmonds 2008, p. 3616).

² Light work is not considered as child labor partly because it does not interfere with school attendance (Edmonds 2008). In the Philippines, the term used is “permissible work.” Age group 5 to 14 years old is permitted at most 4 hours of work per day, while age group 15 to 17 years old is allowed 8-hour work per day in non-hazardous industries (PSA 2011).

³ “Children aged five to 17 years who worked even for only one hour during the past 12 months” (PSA 2011).

determination of age rests on the consideration of the effects of such activities on the child's health and development. Minimum employment age usually coincides with the minimum age of completion of compulsory education, which is at least 15 or 14 years old in very poor countries (Edmonds 2008).

1. Causes of child labor

Many studies have argued that poverty was the main cause of child labor (Basu and Van, 1998; Basu 1999; Ray, 2000; Basu and Tzannatos, 2003; Emerson and Souza, 2003; Edmonds, 2005; Edmonds and Pavcnik, 2005)⁴. Basu and Van's (1998) seminal work on child labor introduced the luxury axiom, which explains that families are forced to send their children to work as soon as their income level goes below subsistence regardless of the child's potential amount of earning.

A corollary argument is that families will never send their children to the labor market if their income is above subsistence level, regardless of the child's earning potential (Edmonds and Schady 2009).

Apart from the current economic situation of the household, Emerson and Souza (2003) observed the existence of an intergenerational child labor trap. Upon examination of a household survey data from Brazil, which include data on child labor experience of parents and grandparents' educational attainment, they found out that the probability of being a child laborer increases when the parents start working at a younger age. Also, the lower the educational attainment of the parents and grandparents, the higher the probability of child labor participation.

Bhalotra and Heady (2003), as cited in Basu et al (2010), challenged the idea that poverty causes child labor. Using Ghana and Pakistan data sets, they found out that more children work as the amount of landholdings of the family increases. In Vietnam, Edmonds and Turk (2004) found out that owning a business increases the probability of making their children work.

Basu et al. (2010) pursued this issue and found out that there was an inverted-U relationship between child labor and landholding. This means that

⁴ As cited in Basu et al. (2010)

beyond a certain point of land ownership, the parents become well-off enough to not allow their children to work anymore.

2. Household survey as data source

The number of child laborers captured in household surveys of low income countries is often smaller than what “social observers” perceive it to be (Schultz 2004). Edmonds (2008) listed four major problems faced by researchers when using household surveys in child labor analysis. The first set of problems is about who to ask about the child’s labor supply and how the information was gathered.

Second is how to measure compensation of these working children. Most of them are unpaid, or if paid, the children may not know the amount as their employers may be directly giving the payment to their parents (Edmonds 2008).

Third, estimates are dependent on how appropriate the recall period is for the study. Child laborers do not have a regular schedule of work. Some may be occupied heavily for specific months of the year, especially in agricultural activities during harvest season, and be unemployed for the rest of the year (Edmonds 2008).

The last problem is about the difficulty of finding the most vulnerable children in the society, as they may be engaged in illicit activities, such as human trafficking, forced labor, or child pornography among others. It is quite impossible that a randomized survey can capture them especially when they do not live in households and there are too few cases (Edmonds 2008).

3. Gender differences

Girls and boys participating in market or domestic work perform different activities. The difference was evident in the case of Bangladesh, where boys are more engaged in fishing, wooden furniture manufacturing, construction site preparation, and cereal crops farming, while girls are found in textile and sewing handicrafts, private household services, and vegetable and poultry farming (Edmonds 2008).

Using a broader industry grouping, such gender difference was also evident in the Philippines. About 70 percent of boys engaged in child labor are working in the agricultural sector. Although girls are also working in the agricultural sector, which accounts for 38 percent of female child laborers, more than 56 percent are in the services sector (PSA 2011).

Moreover, male children are more likely to work than the female ones. In 2011, 22.3 percent of boys were working, while it was only 15.4 percent among girls (PSA 2011). Due to noticeable differences in work activities between genders, Edmonds (2008) supported the idea that bifurcating the data by gender is a reasonable strategy in analyzing child labor.

4. Age patterns

Interestingly, there could also be differences by age group in terms of activities done by child laborers. Using MICS⁵ data, Edmonds (2008) found substantial increases in domestic work among girls at the age of 8, while there were increases in market work at the of 10 and 12 years old for girls.

Based on another type of data set, sourced from the SIMPOC⁶, it was found that in Tanzania, private household work decreased as children grew older, while participation in agricultural work and related industries increased with age. The opposite pattern was observed in Kenya. In Ethiopia, Namibia, Ghana, and Nicaragua, less children were engaged in agricultural work as they aged.

With this in mind, any research about child labor must be careful in choosing which age group to focus on. Edmonds (2008) reminded that researcher's age grouping may differ from country to country. In addition, to help the researcher choose the age threshold, he or she may look at the level of dropout rates during the transition stages in school (e.g. pre-school to primary⁷, primary to secondary, or secondary to tertiary).

⁵UNICEF's Multiple Indicator Cluster Surveys (MICS) from 2000 and 2001

⁶ ILO's Statistical Information and Monitoring Program on Child Labor (SIMPOC)

⁷ Primary school is synonymous with elementary school, while secondary school is synonymous with high school. In the Philippines, the old educational system was six years of primary school, and four years of secondary school. However, in 2012, a new educational system, called Kto12, was introduced to the Philippines. Primary school is still six years, but secondary school became six years (<http://www.gov.ph/k-12/>).

In the Philippines, the data on working children in 2011 show that 8.8 percent of children aged five to nine are working. The share of working children jumped drastically to 38 percent among the 10 to 14-year-old age group. It even reached 53.2 percent among 15 to 17-year-old children (PSA 2011).

If the stricter definition of child labor would be adopted, the estimated number of child laborers would be much lower. For example, based on the 2011 Survey on Children data, only 4.2 percent of all aged five to 14 years were considered as child laborers. On the other hand, 20.4 percent of children aged 15 to 17 were in child labor. Considering all children five to 17 years old, the share of child laborers was 7.9 percent (UCW 2015).

5. Birth order

Other child labor researchers have explored the intra-household aspect of child investment. It has been established that first-born children have higher IQ and cognitive abilities than later-born children and some studies found that these earlier-born children are given more investment by the parents due to their higher potential returns. However, Emerson and Souza (2008) challenged this view. According to their study, poor households were more inclined to favor later-born children.

The proposition of Basu and Van (1998) that child labor was mainly triggered by the poverty status of households led Emerson and Souza to surmise that birth order could largely explain which among the children will be sent to the labor market.

Using a household survey data from Brazil, they found that, after controlling for family size, first-born children are less likely to go to school than their younger siblings, and are more likely to work. The reason was that, older children have the potential to earn higher wages than their younger siblings (Emerson and Souza 2008).

Edmonds (2006) observed a similar pattern in Nepal. Older girls spent more time working than their brothers. Additional time for work increases with the number of younger siblings.

6. Addressing child labor issues

Edmonds (2008) cited numerous ways to reduce child labor. In this study, the researcher reclassified the solutions into two sets: civil society-led and state-led.

Civil society, which involves advocates, community leaders, and non-governmental organizations, works to raise awareness through campaigns that target not just the parents and children, but also the employers. Some consumer groups, especially in developed countries, do not only raise awareness, but also stage product boycotts to discourage imports from child labor-patronizing countries, which are usually developing countries (Edmonds 2008).

The second set is state-led solutions. The first and most apparent is the enforcement of laws that prohibit employment of children. Apart from domestic laws and policies, states also adopt international standards and regulations. Another measure is the imposition of trade sanctions by one state on another state that allows its domestic industries to exploit children (Edmonds 2008).

On the domestic level, governments also administer programs to specifically address child labor, such as income replacement programs, flexible schooling programs, reintegration projects (Edmonds 2008) and cash transfer programs. One example of cash transfer program is Brazil's *Programa de Erradicação do Trabalho Infantil* (PETI) (Yap et al. 2002; and Cardoso and Souza 2004).

B. Conditional cash transfers (CCT)

Social safety nets, in general, have been widely utilized by governments as a poverty alleviation tool. Morley and Coady (2003) discussed a number of weaknesses of these safety nets.

Transfer programs often require massive investment from governments or other financial institutions. Some programs were found to be cost-ineffective, since a large chunk of the budget was usually spent on the administrative aspect of program implementation (Morley and Coady 2003).

Despite the huge amount, some programs failed to reach the most vulnerable segment of the population. In order to be more effective, the components of social safety net programs (e.g. public works, feeding, and cash transfer programs) had to be well coordinated in pursuit of a shared goal. Lastly, the impact of some social safety nets was not sustained in the long run, so it is important to look at how these programs were designed (Morley and Coady 2003).

Furthermore, according to Morley and Coady (2003), conditional cash transfer for education was a new approach of social protection because it integrated a developmental aspect (i.e. long-term solution to poverty) with the conventional preventive role (i.e. alleviation strategy for current poverty situation).

The main reason for targeting the educational outcomes of poor children was to break the cycle of intergenerational poverty. It was designed to target the poorest households and to set conditions to keep children in school (Morley and Coady 2003).

Several CCTs had been successful in bringing about positive improvements in schooling outcomes of children (Saavedra and Garcia 2012). Their impacts on schooling and, possibly, on child labor are discussed in Annex 1.⁸

III. The Philippine CCT program and the data

A. Pantawid Pamilyang Pilipino Program (4Ps)

The Philippine Government initiated a conditional cash transfer program in 2008⁹ called the Pantawid Pamilyang Pilipino Program (4Ps). It targets poor households with children and also pregnant women. World Bank (2015) has considered 4Ps as

⁸ Morley and Coady (2003), Saavedra and Garcia (2012), Cecchini and Madariaga (2011), and Fiszbein and Schady (2009) provide succinct overview of program design and impacts of CCTs across different countries in the world.

⁹ The 4Ps started as a pilot program of the Department of Social Welfare and Development (DSWD) in 2007. It has been continuously expanded and as of 2014, it covers about four million households with an allocated budget of PHP 62 billion (USD 1.4 billion) for that year. Based on the Listahanan, which is a poverty targeting mechanism, there are 5.2 million households who are poor. Other agencies (from national to municipal levels) work closely with DSWD to reach the intended beneficiaries of the program (Patel et. al 2014).

one of the best targeted social protection programs and the fastest growing conditional cash transfer program in the world (Magtulis 2015).

The two main goals of the program are: (1) to provide educational or health cash grants to poor households to reduce poverty in the short run; and (2) to break the cycle of intergenerational poverty through human capital investments (Patel et. al 2014).

The 4Ps employed a two-step targeting mechanism, namely, geographic and household targeting. Geographic targeting made use of poverty incidences for the selection of provinces and municipalities. Two enumeration strategies were adopted at the municipalities level (Fernandez and Olfindo 2011).

Those municipalities with more than 50 percent poverty incidence were considered “very poor municipalities” and all households were assessed. On the other hand, those with less than 50 percent poverty incidence were considered “moderate poor”. For poor areas within a city or district, the strategy was to have a full assessment, while for non-poor areas, on-demand applications was applied (Fernandez and Olfindo 2011).

The next level was household targeting. A Proxy Means Test (PMT)¹⁰ was used to estimate the income of the household. The estimated household incomes were compared to their respective provincial poverty thresholds. Those below the threshold were considered as poor households. (Fernandez and Olfindo 2011)

In 2011, the eligibility for the awarding of education grant set by the Philippine’s Department of Social Welfare and Development (DSWD) was from 6 to 14 years old. The amount of education grant was PHP 300 (or equivalently, USD 7¹¹) per month per child for 10 months. Only up to 3 children were allowed to be registered in the program (Tutor 2014).

However, some program improvements was done in 2012. The so-called Extended Conditional Cash Transfer (ECCT) had its pilot implementation in 2012, wherein

¹⁰ Instead of relying on income level, PMT estimate household income through proxy variables that could determine poverty status.

¹¹ In 2011, the exchange rate was PHP 43.31 per USD (BSP 2014).

children aged 15 to 17 belonging to eligible households, which exited early in the original 4Ps¹², were registered (DSWD 2012).

Other extensions done were the inclusion of homeless street families (HSF) and the families in need of special protection (FNSP). As of 2014, eligible and chosen beneficiaries should comply with a set of conditions to continue receiving their monthly cash grants ranging from PHP 500 to PHP1,400 (DSWD 2012).

Current conditionalities are presented below:

- i. Children 6-18 years old enroll in primary/ secondary schools or equivalent Alternative Learning System/ Alternative Delivery Method, and have at least 85% school attendance; and*
- ii. Children 3-5 years old attend daycare/preschool program with at least 85% school attendance.*

For the health grant, these are the conditions set by DSWD:

- i. Children 0-5 years old get regular preventive health check-ups, growth monitoring and vaccines;*
- ii. Pregnant women get pre-natal care and attended by skilled/professional health worker during child birth. Mothers who have given birth get post-natal care in accordance with the standard Department of Health (DOH) protocol; and*
- iii. Children 6-14 years old must receive de- worming pills twice a year*

B. Research Data

This research used the Annual Poverty Indicator Survey (APIS) 2011, which was a national household survey conducted mainly to gather non-income indicators of poverty for years when Family Income and Expenditure Survey (FIES)¹³ was not conducted (Ericta and Luis 2009). APIS 2011 was the first national household

¹² Reasons for exiting early include not having 0 to 14 year old children (DSWD 2012).

¹³ FIES is another type of a national household survey.

survey data set to provide information about the 4Ps beneficiaries (Tutor 2014 and Reyes et al. 2015).¹⁴

1. Treatment variable

About 3,066 households out of the 42,063 total households in the survey had reported that they were 4Ps recipients. Based on the self-reported¹⁵ treatment status, the researcher was able to identify the households and individual beneficiaries.

2. Covariates

Covariates, as used in this research, refer to variables that are good predictors of treatment status. At the individual level, the child's age, gender, and educational attainment were used as predictors of treatment participation. The number of older and younger siblings have also been computed per child observation. Household head and spouse characteristics were also important. Both of their ages and educational attainment were included. In addition, household head's employment status and type of work were used.

At the level of the household, other predictors were dummy variables for the number of eligible children aged six to 14 (see Annex 2), dummy variable for children aged 0 to five, and number of elderly family members. Asset and housing characteristics such as type of ownership, floor area, materials used for the roof and walls were included in the covariate list. Landholdings for agricultural purposes and urban indicator provided relevant area characteristics. Moreover, access to basic utilities such as clean and safe water, sanitary toilets, and electricity added valuable information about the poverty level of the households.

Apart from variables available in APIS, provincial and regional variables have also been utilized. At the provincial level, the number of public elementary and secondary schools provided helpful information about the supply-side condition of the education sector (Department of Education 2011). Fertility

¹⁴ As of writing, APIS 2013 and 2014 have been released and both of them contain the 4Ps indicator. Although the researcher was able to obtain the two latest data sets, the researcher decided to focus on 2011 due to some comparability issues after PSA patterned the new APIS questionnaires from FIES.

¹⁵ Tutor (2014)

rate (per 100 female population aged 15 to 49) and maternal mortality rate at the regional level, on the other hand, indicated the state of the health sector (Department of Health 2011).

3. Outcome variables

Two outcome variables of interest in this research were schooling and child labor. Data about schooling was determined by the dummy that takes the value of 1 if the child was currently attending school either in the public or private school and regardless of the educational level.

Child labor in this research was defined as working children. This was a much broader definition compared to the official definition which particularly points to children in working in hazardous types of job or working for very long hours.

The same labor-related variables for adult members of the household were used to determine child labor participation. The main labor variable used was a dummy variable which answered the question “Did ____ work or have a job or business at Jan. 01 to June 30, 2011?”.

The intensity of labor force participation as represented by number of work hours was, unfortunately, unavailable in the data set. Neither the type of work nor the industry they belong to was available.

The only available categories of work were (1) private household work; (2) private establishment work; (3) government work; (4) self-employed without any employee; (5) employer in own family-operated farm or business; (6) worked with pay in own family-operated farm or business; and (7) worked without pay in own family-operated farm or business.

As can be seen from the categories, only market work was captured by the household survey data. Domestic work, however, was not measured.

4. Summary statistics of the base sample

a. The base sample

The focus of this study was limited to the immediate children aged 12 to 14 of the household head, and these constituted the base sample. In those households, both parents, the household head and the spouse, were present. The reason for including only the sons and daughters of household head was because of the manner the sibling-related variables were constructed.

In the treated sample of children aged 12 to 14, about 94 percent of their relationship to the household head was either that of a son or a daughter. The remaining portion consisted of the other relationships to the household head, namely as brother or sister, as grandson or granddaughter, and as other relatives.¹⁶

The chosen age group (12 to 14) was a subset of all children eligible for the cash transfer program, which were all children aged 14 years and below. The lower limit was decided based on the transition stage from primary to secondary school. Based on the sample, at age 12, most children have already finished primary school. Also, dropout rates drastically increased around this age.

The upper limit of age 14 was based on the age limit for the program as of 2011. In addition, the minimum legal working age in the Philippines is 15 years old.¹⁷ This implies the employment opportunities and benefits received by child laborers above this age threshold.

b. Sample statistics (full sample)

Basic statistics about the sample were presented in Table 1. Out of all the children in the base sample, 19 percent were 4Ps beneficiaries. Most of

¹⁶ In official program reports, the term ‘children’ refers to household member(s) whose relationship to the head is either that of a son/daughter or grandson/granddaughter (DSWD 2012).

¹⁷ As per the Labor Code of the Philippines (Department of Labor and Employment)

them were attending school, which accounted for 93 percent. 64 percent of the children in the base sample had already finished primary school.

Among those who were studying, about 18 percent, 28 percent and 23 percent were in the sixth grade of primary school, first year and second year of secondary school, respectively.

The educational level with the highest share of out-of-school children was the end of primary school. About 30 percent of the out-of-school children¹⁸ were primary school graduates (see Table 2).

Since about 70 percent of the base sample were in either sixth grade, first year secondary school, or second year of secondary school, a closer inspection revealed that drop-out rate was highest around this transition stage from primary school to lower secondary school (see Table 3).

In terms of the share of child laborers in the sample, only eight percent were found to be working. Due to this small number of observations, the researcher decided to regroup the 17 administrative regions into 5 bigger regions.¹⁹

In terms of the characteristics of the parents, majority of the household heads and spouses were found to be elementary graduates at the maximum. Ninety-seven percent of the household heads were employed or had business. Most of them worked for the public or private sector, or were self-employed.

At the household level, it was observed that the mean family size was seven, with an average of four children aged 14 and below. The mean income decile was 3.4. On average, the per capita monthly income (without any cash grant from 4Ps) was PHP 12,686 (or USD 292).

¹⁸ Children not currently attending school

¹⁹ The grouping was based on proximity with other regions. Officially, there are three main islands in the Philippines, namely, Luzon, Visayas, and Mindanao. Since Luzon and Mindanao regions are big islands, the researcher decided to split them into North and South for Luzon, and East and West for Mindanao.

Around 70 percent had homes built with strong materials. Around 70 percent also had access to safe water, sanitary toilet, and electricity. Only 28 percent were living in urban areas. Since most were living in rural areas, it was also found that around 26 percent owned land for agricultural purposes.

c. Sample statistics (4Ps vs. Non-4Ps)

There were a number of noticeable differences between 4Ps and Non-4Ps children. At the child level, Non-4Ps children were found to be more educated than 4Ps children. For instance, there were more first year secondary students in the Non-4Ps group. On the other hand, labor participation was more rampant among 4Ps children.

The household heads of 4Ps children were mostly self-employed, which accounted for 56 percent. There were more household heads in the Non-4Ps group who were high school graduates.

In terms of socioeconomic status, Non-4Ps children belonged to more well-off households compared to 4Ps children. Thus, Non-4Ps children had more access to basic utilities such as safe water and electricity. In addition, there were fewer Non-4Ps children living in rural areas compared to 4Ps children.

At the provincial level, 4Ps children lived in provinces with fewer public primary and secondary schools.

IV. Methodology

A. Propensity Score Matching (PSM)

When randomization is not possible, one among other impact evaluation techniques that could be used to construct a counterfactual group is the propensity score matching²⁰ (PSM). A control group is selected based on its comparability to

²⁰ “Matching is a method of sampling from a large reservoir of potential controls to produce a control group of modest size in which the distribution of covariates is similar to the distribution in the treated group” (Rosenbaum and Rubin 1983, p. 48).

treated group over on a large number of *observable* characteristics. It is assumed that *unobservable* characteristics should be similar between the treated and control groups. After controlling for these observable characteristics, participation in the program is said to be independent from any other determinants of outcome (Janvry and Sadoulet, 2016).

PSM was employed in this study to measure the impact of 4Ps on eligible children. The impact is called the average treatment effects on the treated (ATT). PSM involves two matching assumptions (Tutor 2014). The first one is called the conditional independence assumption²¹ (CIA) (Caliendo and Kopeinig 2008; Tutor 2014), which states that “given a set of observable covariates X , which are not affected by the treatment, potential outcomes are independent of treatment assignment” (Caliendo and Kopeinig 2008, p.4).

If all factors that jointly affect treatment assignment and outcomes are controlled for by the researcher, which means that there is no selection bias left from any underlying heterogeneity, then a “single-difference PSM gives an unbiased impact estimates” (Ravallion and Chen 2005, p. 2188).

The second assumption is common support or also called the overlap condition (Caliendo and Kopeinig 2008; Tutor 2014). According to Heckman et al. (1999), as cited in Caliendo and Kopeinig (2008), overlap condition allows observations with the same values of pre-treatment variables to have a positive probability of being both in the treatment and control groups.

Rosenbaum and Rubin (1983) found matching appealing. One reason is that matching allows researchers to immediately understand that treatment and control groups are equivalent in a matched pair, and to make simple matching analyses that adjust for confounding variables. Another is that, compared to random samples, the variance of the estimated ATT is lower for matched samples.²² Third, the reduced reliance on model extrapolations allows model-based adjustments on matched samples to be more robust than that of matched samples.

²¹ In 1983, Rosenbaum and Rubin proved that if treatment dummy is independent over all observations, and outcomes are independent of treatment assignment given a vector of pre-treatment variables, then outcomes are also independent of treatment assignment given the propensity scores (Ravallion and Chen 2005).

²² This is mainly because the distribution of covariates in treated and control groups is more similar in matched sample (Rosenbaum and Rubin 1983).

B. PSM Implementation

As the name implies, matching is based on propensity scores, which are computed from a propensity score (PS) model. The PS model²³ uses a set of covariates to predict the treatment status of an individual/household. The list of covariates²⁴ used in this study are presented in Annex 1.

Matching implies that a child who received the cash transfer is matched with another child who did not. A Non-4Ps child should possess similar characteristics as that of the 4Ps child after matching. This makes the matched children comparable and valid for analysis.

Following Jalan and Ravallion's framework²⁵ (2003), as cited in Janvry and Sadoulet (2016), 4Ps children were matched with Non-4Ps children living in untargeted municipalities where the program was not offered. Due to time and other constraints, the assumption made in this paper was that those municipalities that have at least one household beneficiary was considered as targeted municipalities²⁶. At the provincial level, only those with at least five treatment households were retained in the sample.

There are various matching methods available in different statistical softwares. This research used *Stata* commands *psmatch2* and *teffects psmatch* to estimate the ATT. The most common matching algorithm, which is nearest neighbor matching, was implemented with different specifications for robustness check.

Before analyzing the ATT estimates, balance checks must be satisfied first. This means that the distribution of characteristics has to be well distributed between treatment and control children (Tutor 2014). In general, the balance of the covariates may be assessed by looking at their means before and after matching.

²³ The PS model in this study is different from the specification of the Proxy Means Test (PMT) model of the DSWD.

²⁴ For emphasis, covariates should be independent of the treatment status of the individual/household.

²⁵ Jalan and Ravallion (2003) evaluated the impact of a workfare program in Argentina named *Trabajar*. They matched the treated households with those households living in areas where the program was not offered.

²⁶ Considered targeted municipalities under this study may be different from actual targeted municipalities of the DSWD.

Moreover, Pseudo- R^2 and LR-statistic in the propensity score model are assessed in the same way (Caliendo and Kopeinig 2008; Tutor 2014).

Tutor (2014) noted that there was a better way to judge the success of matching, and that was through the standardized bias²⁷, as first suggested by Rosenbaum and Rubin (1985). Based on most empirical studies, a standardized bias of five percent and below is sufficient to consider the matching successful (Caliendo and Kopeinig 2008; Tutor 2014).

V. Results

A. Estimated Propensity Scores

Using logit regression, the propensity score model was estimated. The dependent variable is the individual treatment variable that takes a value of 1 if that child is a 4Ps beneficiary, and 0 if not. Based on the results shown in Table 4, the model is in line with the objectives of the program, that is to target poor children. Age dummies are significant in predicting the participation in the program.

Other correlates of poverty such as the household head's and spouse's educational attainment are also significant. The lower the education levels attained by the child's parents, the more likely they will participate in the program.

Moreover, poverty indicators like access to basic utilities (such as water and electricity), housing conditions, landholding, and area classification are significant in predicting program participation. Those without access to clean water and those without access to electricity in their own homes are more likely to be granted the cash transfer. Small floor area and weak housing materials are also good indicators for participation. Owning an agricultural land and living in rural area increase the probability of the household to be selected for the program.

Provincial and regional-level variables are included in the model. The number of public secondary schools is a significant predictor for program participation

²⁷ "Standardized bias (SB) is the difference of sample means in the participant and matched non-participant groups as a percentage of the square root of the average sample variance in both groups" (Tutor 2014, p. 14).

especially for the age group of interest in this research, that is 12 to 14 years old children.

Minimum wage, high fertility rate and high mortality rate are all significant predictors at the regional level. Furthermore, among the five big regions, two are significant predictor of participation. Both of which are part of the Mindanao region. This is consistent with the report²⁸ of DSWD (2011), which states that about 50 percent of the registered households reside in the Mindanao region.

B. Balance Check

Both visual and statistical methods are needed to check the quality of matching. Figures 1 and 2 showed that the distribution of propensity scores between the treated and control groups are distinct from each other. As expected, the distribution of propensity scores in the treated group becomes a mirror image of that in the control group after matching.

Apart from visual inspection, it is important to look at the balance of each covariate. In Table 5, it was shown that all covariates in the treated and control groups are not statistically different from each other after matching. Although not shown, the standard difference of each covariate were close to zero or at most 10 percent. In addition, Table 6 presented other matching quality indicators before and after matching. Overall, the results imply that the covariate balance is satisfied.

C. Impact on Schooling

The majority of children in the sample are attending school. Table 7 summarized the treatment effect estimates for schooling across age groups and by gender. The results showed that schooling among 12 to 14-year-old children increased significantly. Attendance rate of 4Ps children was 96.4 percent, while Non-4Ps was 89 percent. The positive impact ranged from 5.7 to 7.5 percentage points.

The effect was much larger among males ranging from 7 to 9.4 percentage points. Attendance rate of 4Ps male children was 95.2 percent, while Non-4Ps was 87.1 percent. Among female children, the increase was about 3.9 to 4.8 percentage points. Female children belonging to 4Ps households had an attendance rate of 98

²⁸ DSWD's 2011 Second Quarter Program Implementation Report

percent, while those in Non-4Ps had 94.1 percent. As mentioned earlier in this paper, the attendance rate of females in the sample were greater than that of males. The 4Ps helped in narrowing the gap between male and female in terms of school attendance.

Based on the sample statistics, attendance rate decreased as a child grew older. The average attendance rate among 12-year-old children was 97 percent. At age 13, it became 93.4 percent, then 89.4 percent for 14-year-olds. The estimated effect of the program after matching appeared to be significant and greater in magnitude for older children, which ranged from 8.4 to 11.3 percentage points for 14-year-olds. Male 14-year-olds benefit more from such increase. For 13-year-old children, attendance significantly increased by 3 to 5.1 percentage points. The least increase was felt by the 12-year-old age group, which ranged from 1.5 to 2.9 percentage points. All of these findings are consistent with the objectives of the 4Ps, that is to improve the schooling outcomes among the targeted age group.

D. Impact on Child Labor

Despite the significant school attendance increase caused by the program, the results showed no significant impact on the reduction of child labor. The summary of treatment effect estimates in Table 8 revealed that there were some slight reductions across age groups, but these were not significant. Moreover, small reductions were more apparent among females than males.

Due to the small number of observations on working children, comparison of effects across age groups and by gender was not pursued. For instance, the researcher tried to estimate the treatment effects for 14-year-old males and females, but as shown in the table, the figures were not robust across different specifications of matching.

VI. Discussion

The findings of this research were consistent with earlier studies about 4Ps. Various institutions and researchers have evaluated the Philippine CCT and have found encouraging results (WB 2014a and 2014b; Tutor 2014; Reyes et al. 2015). The two impact evaluation researches commissioned by the World Bank assessed the impact of

the program on beneficiaries before the large upscale in 2011, which were known as Set 1²⁹ beneficiaries.

Positive and significant impacts of 4Ps were observed on schooling and on health outcomes. For instance, a research paper by Reyes et al. (2015) noted a 3-percentage-point increase in school participation rate among six to 14-year-olds. They used the APIS 2011 data set, which was matched with the Labor Force Survey (LFS) 2011.

Reyes et al. also analyzed the impact on 12 to 14-year-olds and found a 4 percentage point difference in school attendance between 4Ps and Non-4Ps children. They based these results from kernel matching.

Apart from looking at the impact on different age ranges, they also did separate analysis for the individual age. They found positive and significant results for all the ages covered by CCT. The magnitude appeared to grow as the age increased.

In terms of health outcomes, World Bank's second wave of impact evaluation found that nine out of 10 treated children received Vitamin A supplementation.

In the same studies, there were findings about the child labor impact as well. Based on one of the World Bank studies, which used the Regression Discontinuity (RD) approach³⁰, there was no significant difference in child labor incidence between 4Ps and Non-4Ps children aged 10 to 14 years. However, in terms of number of the working days per month, 4Ps children worked six days fewer than Non-4Ps children (WB 2014b).

Reyes et al. (2015) found gender differences in the proportion of working children aged six to 18. Boys were more likely to work than girls, thus, they recommend a higher cash transfer for boys.

Another 4Ps study utilized the APIS 2011. Tutor (2014) examined the improvement in the consumption of the treated households. She found that there were increases in the consumption of education-related goods and food. Although there was no increase in the average total household consumption among the whole sample, there was a significant

²⁹ Set 1 refers to the batch of households that received treatment between June 2008 and April 2009 (WB 2014).

³⁰ The other World Bank study used Randomised Control Trial (RCT) approach.

increase in the total household consumption among the poorest 20 percent subsample. Moreover, income-reducing effect brought about by the program conditionalities was not observed in the same subsample.

One possible reason for not having an income-reducing effect in the treated households is that children continued to help their parents earn money. Especially those children within the targeted age range (e.g. 12 to 14 years old) were not discouraged from working, as found in this research.

The author believed that the 4Ps, like most CCTs cited in this research, did not primarily aim to reduce child labor. Although, according to the 4Ps Operations Manual (2012), as cited in Tutor (2014), one of the objectives of 4Ps was to contribute to the reduction of incidence of child labor. In spite of this, no conditionality that could possibly induce a change of behavior among the treated households and their children was implemented.

For example, Brazil's PETI, which was the only CCT that explicitly targeted child labor reduction, sought the removal of children aged 16 and below from the labor force (Cecchini and Madariaga 2011). PETI had a distinct conditionality that forced children to spend less time at work. PETI implemented the *Jornada Ampliada*, which was an after-school program.

According to Yap et al. (2002), this additional school activity "roughly doubled the length of the school day" (p. 4). PETI did not only increase time in school, but it also increased academic success for the treated children, and reduced participation in the labor force (Yap et al 2002). Another important feature of PETI was that it initially targeted children in rural areas, where child labor was more rampant.

It can also be argued that implicitly or explicitly targeting the reduction of child labor should not be an issue as evidenced by numerous CCTs already discussed. Most of the impact evaluation studies on CCTs, which specifically targeted and successfully increased children's schooling outcomes, have found significant reductions in child labor incidence. Only a few found no significant impact.

It is important to note, though, that these studies analyzed the outcomes for different age groups and used different methods. Thus, comparison of results among different studies should be done with caution. For instance, Cambodia's CESSP is the only CCT that had

the closest scope with this research, which focused on the children transitioning from primary to lower secondary.

As mentioned earlier, CESSP effectively decreased paid work among these children by 11 percentage points. However, CESSP differed from 4Ps because it purposefully gave cash transfers to children who have completed primary school and were continuing their secondary education. 4Ps, on the other hand, initially targeted children having primary-school to lower secondary-school age.

This paper contributes to the growing literature on CCTs especially those which target older children. Although this paper has highlighted results on attendance more than labor outcomes, due to limited observations for the latter, the fact that the child labor incidence is more than 10 percent (among the beneficiaries) should entail more researches to address this issue.

Moreover, this study could help the implementing agencies of CCTs in the Philippines to better target its beneficiaries by shedding light on gender and age differences.

VII. Conclusions

This research presented a brief review of CCTs that targeted educational outcomes. All of the CCTs mentioned had significant impact on increasing the schooling outcomes of targeted children. However, their impact on child labor varied, with only a few finding no significant impact. Nonetheless, cautiousness must be exercised in comparing the results of several studies on CCT's schooling outcomes for children, since they analyzed outcomes for different age groups and through different methods.

The Philippine's CCT called *Pantawid Pamilyang Pilipino Program* (4Ps) was examined statistically using a household survey data. It was observed that the 4Ps, like most of the CCTs cited in this research, did not take the reduction of child labor as a primary goal due to the non-imposition of a conditionality that could induce a change of behaviour of households on child participation in labor.

With the use of propensity score matching (PSM), the researcher was able to validate the positive and significant results of previous studies about 4Ps' impact on schooling outcomes. However, no significant impact was found in child labor. Differences in impacts by gender and by age were only observed for schooling outcomes.

VIII. Recommendations for future research

Although 4Ps did not show any significant impact on child labor reduction based on results of this study, further research needs to be done to conclusively establish this point and must overcome the limitations of this study. The number of observations of working children was small, thus there were not enough variations to conduct more a rigorous analysis. For instance, examination of impact differences at a more disaggregated level (e.g. 12-year-old males vs. 12-year-old females) was not carried out.

Aside from constructing subsamples based age and/or gender, another important subsample that was not done due to lack of data was the one based on poverty status, i.e. the “extremely poor” subsample. By focusing on this subsample, the luxury axiom could have been tested, that is whether or not the impact was significant among families living on subsistence.

A cash transfer called *Bono de Desarrollo Humano* (BDH)³¹, which was implemented in Ecuador, is an interesting type of cash transfer because it was found to be effective in reducing child labor without attaching conditions to it (Edmonds and Schady 2009; and Schady and Araujo 2008). The share of *BDH*'s cash transfer in the monthly expenditures of the treated households was about seven percent. Edmonds and Schady (2009) argued that the child labor reduction they observed was consistent with the luxury axiom.

Based on the author's calculation, the 4Ps cash transfer was about 13 percent and 8.5 percent of the monthly average income and the monthly average expenditures of the treated households, respectively.³² It was computed by calculating first the average number of eligible children per treated household, which was two. Then the average monthly cash transfer for households with two eligible children was then computed, which amounted to PHP 1,000³³ (or USD 23). The 4Ps cash transfer was greater than

³¹ However, there was confusion among the treated households because some of them believed that there was an enrollment requirement. There was no monitoring done (Schady and Araujo 2008).

³² Without the cash transfer, the average household income for six months among treated households would be PHP 45,290.57, while their corresponding average household expenditures would be PHP 70,493.96 (Author's calculation).

³³ Total grant for a household with two eligible children, PHP 12,000 for one year (Fernandez and Olfindo 2011).

that of *BDH*'s, thus, it is interesting to investigate whether or not the luxury axiom also holds true in the case of the Philippines.

Other possible extensions of this research are evaluation of the effects of siblings, birth order, and other intra-household allocation decisions on program impact estimates. Having siblings could limit the impact of the cash transfer on treated children as in the case of *BDH* (Edmonds and Schady 2009).

Another limitation was the labor variable used in this research. Child labor outcome was based on a dummy variable that indicated whether or not a child worked for the past six months. As mentioned earlier, no data was available on the number of hours a child spent in school or at work. These are crucial data information to examine the substitutability of schooling and work.³⁴

Since 4Ps has significant positive impacts on schooling outcomes, it is worthy to explore its effectiveness in reducing the time spent for work by Filipino children. Moreover, neither the type of work nor the industry they belong to was available. APIS provided only limited information about the work categories, which made it impossible to know if they are engaged in what are considered as worst forms of child labor.

Based on the available categories, only market work was captured by the APIS data. Domestic work was not measured. This could have been useful to fully understand the impact of CCTs on female children since they are more involved in this type of work.

³⁴ Cecchini and Madariaga (2009) discussed several studies which looked at this aspect.

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X. Annexes

Annex 1. Impacts of CCTs on schooling and child labor outcomes

Impact on schooling

Mexico's *Progresa*, which pioneered the spread of CCTs, was successful in raising enrollment rates among the treated communities. The biggest impact was observed among children transitioning from primary to secondary school. An average of 0.66 extra years of education was added to the average educational level of the treated children (Morley and Coady 2003).

In Nicaragua, the *Red de Protection Social* (RPS), which targeted children aged seven to 13, had a larger impact than *Progresa* despite giving out lower transfer level (Morley and Coady 2003). The impact was 13 percentage points increase in school enrollment (Maluccio and Flores 2005, as cited in Fiszbein and Schady 2009).

Both Ravallion and Wodon (2000) and Ahmed and Ninno (2002) found that having a school participant in food-for-education (FFE) program in Bangladesh increases the chance of children to go to school by 17 percentage points and 9 percentage points, respectively. Ahmed and Arends-Kuenning (2002), as cited in Morley and Coady (2003), added that performance of students in FFE schools also improved.

In Brazil, Cardoso and Souza (2004) found three to four percentage points increase in the probability of children attending school due to the cash transfer programs (Fiszbein and Schady 2009).

Other CCTs with positive impacts on schooling, as discussed in Fiszbein and Schady (2009), were Honduras' *Programa de Asignacion Familiar* (PRAF) (Glewwe and Olinto 2004), Chile's *Solidario* (Galasso 2006), Ecuador's *Bono de Desarrollo* (BDH) program (Schady and Araujo 2008), Cambodia's Japan Fund for Poverty Reduction (JFPR) and Cambodia Education Sector Support Project (CESSP) (Filmer and Schady 2008, and Filmer and Schady 2009), Turkey's Social Risk Mitigation Project (Ahmed et al 2007), and Pakistan's Punjab Education Sector Reform Program.

Impact on child labor

Moreover, there are conditional cash transfers (CCT) that implicitly address the problem of child labor through the primary goal of increasing child schooling. However, among the CCT programs with observed significant impact on children's schooling, the measured impact on child labor varies. The magnitude of success notwithstanding, there is a long list of CCT programs that have been proven to be effective in reducing child labor.

Colombia's National Planning Department (2008), as cited in Cecchini and Madariaga (2011), reported a significant reduction in labor participation rates among girls aged 10 to 17 of about 36 percent in rural areas and 29 percent in urban areas because of *Familias en Acción* (FA) program. On the other hand, the reduction was 19 percent among boys of the same age living in rural areas.

Fiszbein and Schady (2009) cited Cambodia's (Filmer and Schady 2009) and Nicaragua's (Maluccio and Flores 2005) cases. The Cambodia Education Sector Support Project (CESSP) led to an 11 percentage point reduction in paid work among children beneficiaries transitioning from primary to lower secondary.

Nicaragua's *Red de Protección Social* (RPS) estimated a smaller reduction of three to five percentage points among children seven to 13 years old. Other countries with same pattern include Bangladesh (Ravallion and Wodon 2000), Mexico (Skoufias and Parker 2001), Brazil (Ferro and Nicolella 2007 as cited in Cecchini and Madariaga 2011).

A few CCT studies have found no significant reduction on child labor. Glewwe and Olinto (2004) as cited in Fiszbein and Schady (2009) found Honduras' *Programa de Asignación Familiar* (PRAF) not effective in reducing child work. Colombia's FA was analyzed by another group of researchers (Attanasio et al. 2006) and contrary to the findings earlier cited, the program did not significantly affect paid work of beneficiary children (Cecchini and Madariaga 2011; and Fiszbein and Schady 2009).

Another study with contrasting results was that of Cardoso and Souza (2004) which found that both income transfer programs, *Programa de Garantia de Renda Mínima* (Minimum Income Program) and *Bolsa Escola*, when assessed simultaneously, did not have significant effects on child labor.

Annex 2. Propensity Score Model

- I. Dependent variable: 4Ps indicator (Child-level)
- II. Covariates:
 - A. Child's characteristics (age, gender, educational attainment, number of older brothers and sisters, number of younger brothers and sisters)
 - B. Household head's characteristics (age, educational attainment, job type)
 - C. Wife/Spouse's characteristics (age, educational attainment)
 - D. Household characteristics
 - 1. Dummy variables for number of children eligible for transfer [ages six to 14]
 - 2. Access to safe and clean water, sanitary toilet, and electricity
 - 3. House type and materials (single, area of house floor, strong and durable materials for the roof and walls)
 - 4. Assets (house, land)
 - 5. Urban indicator
 - E. Provincial-level variables (number of public elementary and secondary schools)
 - F. Regional-level variables (minimum wage, fertility rate, maternal mortality rate)
 - G. Regrouped regional indicators (17 regions → 5 bigger regions)
- III. Outcome variables: school attendance and child labor

XI. Tables

Table 1. Summary Statistics

Variable	Definition	Full Sample		4Ps		Non-4Ps	
		1 mean	2 s.d.	1 mean	2 s.e.	1 mean	2 s.e.
Full Sample, 12-14		N=5,878					
Individual-level							
PPPP	treatment variable	0.190	0.392				
12yo	=1 if age is 12yo	0.324	0.468	0.359	0.015	0.331	0.007
13yo	=1 if age is 13yo	0.349	0.477	0.359	0.015	0.347	0.007
male	=1 if male	0.515	0.500	0.501	0.015	0.503	0.008
old_sis	number of older sisters	0.600	0.815	0.580	0.025	0.606	0.012
old_bro	number of older brothers	0.793	0.966	0.882	0.030	0.762	0.014
young_sis	number of younger sisters	0.874	0.977	0.912	0.029	0.833	0.014
young_bro	number of younger brothers	0.924	1.035	1.076	0.033	0.862	0.015
Elem 5	=1 if the child’s highest grade completed (HGC) is Grade 5 in elementary	0.175	0.380	0.220	0.013	0.172	0.006
Elem grad	=1 if HGC is elementary school	0.279	0.448	0.254	0.013	0.283	0.007
1st HS	=1 if HGC is 1st year of secondary school	0.232	0.422	0.191	0.012	0.256	0.007
2nd up HS	=1 if HGC is 2nd or higher level of secondary school	0.015	0.123	0.015	0.004	0.015	0.002
Household Head and Spouse’ Characteristics							
HH sex	=1 if household head is male	0.989	0.103	0.993	0.002	0.989	0.002
HH age	age of the HH (in years)	44.760	7.532	44.921	0.229	44.671	0.114
spouse age	age of the spouse (in years)	41.435	6.694	41.199	0.211	41.499	0.100
HH status	=1 if married	1.000	0.000	1.000	0.000	1.000	0.000
HH work pub/priv	=1 if HH works in either public or private sector	0.461	0.498	0.360	0.015	0.484	0.008
HH employer	= 1 if HH is employer	0.060	0.238	0.043	0.006	0.067	0.004

HH self-emp	=1 if HH is self-employed	0.427	0.495	0.559	0.015	0.393	0.007
HH otherwork	= 1 if HH does other type of work						
HH employed	=1 if HH has a job or business	0.970	0.170	0.976	0.005	0.969	0.003
HH_educ1	=1 if HH received no education, some elementary education, or is an elementary graduate	0.511	0.500	0.675	0.014	0.448	0.007
HH_educ2	=1 if HH finished some secondary education	0.136	0.343	0.151	0.011	0.136	0.005
HH_educ3	=1 if HH is a secondary school graduate	0.202	0.402	0.126	0.010	0.229	0.006
spouse_educ1	=1 if spouse received no education, some elementary education, or is an elementary graduate	0.451	0.498	0.619	0.015	0.388	0.007
spouse_educ2	=1 if spouse finished some secondary education	0.158	0.365	0.177	0.012	0.155	0.005
spouse_educ3	=1 if spouse is a secondary school graduate	0.233	0.423	0.146	0.011	0.263	0.007
Household-level							
fsize	family size	6.498	2.022	6.753	0.062	6.369	0.030
fam_children	number of family members below 15 years old	3.124	1.568	3.345	0.047	3.018	0.023
fam_15-59	number of family members aged 15 to 59	3.279	1.366	3.308	0.042	3.255	0.020
fam_elderly	number of family members 60 years old and above	0.096	0.326	0.100	0.010	0.096	0.005
Elig_child1	= 1 if there is only one child eligible for the program	0.209	0.406	0.167	0.011	0.223	0.006
Elig_child2	= 1 if there are two children eligible for the program	0.330	0.470	0.313	0.014	0.340	0.007
Elig_child3	= 1 if there are three children eligible for the program	0.270	0.444	0.314	0.014	0.257	0.007
Elig_child4plus	= 1 if there are four children or more who are eligible for the program	0.192	0.394	0.206	0.012	0.180	0.006
decile	income decile	3.390	2.391	2.332	0.047	3.750	0.038
pc_income	per capita income monthly income (in PhP) without grant	12,686	14,914	7,384	148	14,444	251
house_floor	floor area of the house (in sq. m.)	43.671	36.964	35.386	0.940	46.387	0.583
house_wall	= 1 if the house wall is made of strong materials or mixed but predominantly strong	0.643	0.479	0.511	0.015	0.686	0.007
house_roof_str	= 1 if the house roof is made of strong materials	0.682	0.466	0.413	0.015	0.582	0.007
house_own	= 1 if the house and lot is owned by the household	0.651	0.477	0.604	0.015	0.665	0.007
access_water_dwll	= 1 if the water is piped into the household's dwelling	0.244	0.429	0.128	0.010	0.286	0.007
access_water_safetype	= 1 if the water is piped into other safe types excluding own dwelling (i.e. yard/plot, public tap, or protected well)	0.521	0.500	0.557	0.015	0.507	0.008
access_toilet_own	= 1 if the household has its own flush toilet	0.657	0.475	0.549	0.015	0.699	0.007

access_toilet_sani	= 1 if the household has access to sanitary type of toilet excluding own flush toilet (i.e. shared toilet or closed pit)	0.202	0.401	0.220	0.013	0.191	0.191
access_electric	= 1 if there is electricity in the house	0.770	0.421	0.621	0.015	0.819	0.006
own_agriland	= 1 if the household owns a land for agricultural purposes	0.255	0.436	0.376	0.015	0.226	0.006
urban	= 1 if urban	0.279	0.448	0.164	0.011	0.315	0.007
Provincial-level							
public_elem	total number of public elementary schools at the provincial-level	641.786	314.585	577.981	8.299	655.657	4.877
public_secondary	total number of public secondary schools at the provincial-level	128.774	80.165	109.318	1.841	133.605	1.259
Regional-level							
regn_wage	regional minimum wage (in PhP)	259.622	32.372	255.709	0.727	260.841	0.517
regn_fertility	regional fertility rate (per 100 female population aged 15 to 49)	6.825	2.075	6.915	0.045	6.825	0.033
regn_maternal_mortality	regional maternal mortality rate	0.878	0.189	0.953	0.006	0.860	0.860
Larger regional groupings							
Luzon_north	= 1 if the the household lives in region 1, 2, 3 or CAR	0.199	0.400	0.061	0.007	0.234	0.006
Luzon_south	= 1 if the the household lives in region 4A, 4B, 5, or Metro Manila	0.246	0.431	0.268	0.014	0.243	0.006
Visayas	= 1 if the the household lives in region 6, 7, or 8	0.211	0.408	0.170	0.011	0.219	0.006
Mindanao_west	= 1 if the the household lives in region 9, 10, or ARMM	0.177	0.381	0.248	0.013	0.156	0.005
Mindanao_east	= 1 if the the household lives in region 11, 12, or 16	0.168	0.374	0.252	0.013	0.147	0.005
Outcome variables							
Attendance		0.933	0.251	0.963	0.006	0.925	0.004
Labor		0.083	0.276	0.125	0.010	0.073	0.004
Age 12	N=1,902						
Attendance		0.970	0.171	0.992	0.004	0.964	0.005
Labor		0.054	0.226	0.090	0.015	0.045	0.005
Age 13	N= 2,051						
Attendance		0.934	0.248	0.953	0.011	0.930	0.006
Labor		0.080	0.271	0.119	0.016	0.070	0.006
Age 14	N= 1,925						
Attendance		0.894	0.308	0.941	0.013	0.885	0.008
Labor		0.115	0.319	0.174	0.021	0.104	0.008

Table 2. All out-of-school base sample

Highest Grade Completed	%
No Grade Completed	11.11
Nursery	0.25
Kinder	0.25
Preparatory	0.51
Grade 1	5.05
Grade 2	10.10
Grade 3	10.86
Grade 4	10.61
Grade 5	9.09
Elementary Graduate	29.55
1st Year Secondary	7.07
2nd Year Secondary	3.28
3rd Year Secondary	1.52
4th/5th Year Secondary	0.76
Total	100.00

Table 3. Attendance and drop-out rate per educational level

Highest Grade Completed	Current Grade	% attending school	% out-of-school	Total
Grade 5 elementary school	Grade 6 elementary school	96.50	3.50	100.00
Elementary graduate	First year secondary school	92.86	7.14	100.00
First year secondary school	Second year secondary school	97.94	2.06	100.00

Table 4. Estimated Propensity Scores Model (using logit regression)

Variable	Coef.	S.E.	z
12yo	0.361	0.113	3.21
13yo	0.267	0.098	2.72
HH_educ1	0.782	0.179	4.37
HH_educ2	0.792	0.192	4.12
HH_educ3	0.460	0.184	2.50
spouse_educ1	0.614	0.170	3.62
spouse_educ2	0.377	0.179	2.10
access_water_dwell	-0.293	0.130	-2.25
access_electric	-0.237	0.092	-2.58
house_floor	-0.003	0.001	-2.20
house_roof_str	-0.318	0.088	-3.62
own_agriland	0.601	0.086	7.03
urban	-0.245	0.104	-2.37
public_secondary	-0.004	0.001	-3.50
regn_wage	0.009	0.002	5.10
regn_fertility	0.100	0.029	3.43
regn_maternal_mortality	2.674	0.380	7.05
Mindanao_west	0.797	0.134	5.92
Mindanao_east	0.700	0.138	5.06
Constant	-7.620	0.829	-9.19
N	5,878		
Pseudo-R2	0.166		

Table 5. Covariate balance check

Nearest neighbor N=1, cal(0.01) common ties				
Variables	Treated (mean)	Control (mean)	SB (%)	p>t
12yo	0.348	0.347	0.200	0.965
13yo	0.364	0.351	2.600	0.536
male	0.509	0.516	-1.400	0.735
old_sis	0.576	0.555	2.700	0.514
old_bro	0.874	0.851	2.400	0.567
young_sis	0.923	0.951	-2.900	0.503
young_bro	1.071	1.107	-3.400	0.442
Elem 5	0.258	0.248	2.200	0.592
Elem grad	0.214	0.202	3.000	0.497
1st HS	0.188	0.186	0.400	0.913
2nd up HS	0.096	0.092	1.400	0.717
HH age	45.007	45.335	-4.400	0.311
spouse age	41.291	41.468	-2.600	0.545
HH work pub/priv	0.359	0.351	1.600	0.690
head_employerfam	0.041	0.042	-0.400	0.916
HH self-emp	0.562	0.553	1.800	0.670
HH otherwork	0.013	0.022	-6.600	0.111
HH_educ1	0.683	0.697	-2.800	0.492
HH_educ2	0.147	0.155	-2.300	0.595
HH_educ3	0.123	0.113	2.600	0.470
spouse_educ1	0.626	0.609	3.500	0.408
spouse_educ2	0.175	0.186	-2.900	0.509
spouse_educ3	0.143	0.165	-5.700	0.142
Elig_child2	0.317	0.296	4.400	0.291

Elig_child3	0.305	0.293	2.800	0.517
Elig_child4plus	0.198	0.232	-8.500	0.056
house_floor	35.112	34.297	2.400	0.499
house_wall	0.505	0.487	3.900	0.374
house_roof_str	0.516	0.510	1.300	0.767
house_own	0.605	0.624	-3.900	0.361
access_water_dwell	0.125	0.111	3.400	0.325
access_water_safetype	0.560	0.583	-4.500	0.285
access_toilet_own	0.550	0.541	1.900	0.671
access_toilet_sani	0.219	0.216	0.700	0.878
access_electric	0.619	0.610	2.000	0.663
own_agriland	0.376	0.400	-5.400	0.241
urban	0.162	0.143	4.700	0.195
public_elem	578.120	571.340	2.300	0.554
public_secondary	109.380	109.060	0.400	0.900
regn_wage	255.680	254.200	5.100	0.205
regn_fertility	6.917	6.965	-2.600	0.547
regn_maternal_mortality	0.952	0.952	0.200	0.963
Luzon_north	0.062	0.057	1.600	0.590
Luzon_south	0.268	0.303	-7.800	0.075
Mindanao_west	0.245	0.213	8.100	0.070
Mindanao_east	0.254	0.258	-0.900	0.846

Table 6. PSM quality indicators before and after matching

	Pseudo R-squared before matching	Pseudo R-squared after matching	p>chi-square before matching	p>chi-square after matching	mean standardized bias before matching	mean standardized bias before matching
n(1) cal(0.01) common ties	0.166	0.012	0	0.827	19.5	3.0
n(2) cal(0.01) common ties	0.166	0.007	0	0.999	19.5	2.3
n(1)	0.166	0.012	0	0.820	19.5	3.0

Table 7. ATT results for the schooling outcome

	Teffects																	
	Nearest neighbor N=1, cal(0.01)					Nearest neighbor N=2, cal(0.01)					Nearest neighbor N=1							
Outcome Variables	N (raw)	N (matched)	ATT	SE		N (raw)	N (matched)	ATT	SE		N (raw)	N (matched)	ATT	SE				
base sample	5,877	2,230	0.057	0.013	***	5,866	2,212	0.063	0.011	***	5,878	2,232	0.073	0.014	***			
males	3,019	1,118	0.075	0.020	***	2,992	1,092	0.094	0.018	***	3,029	1,138	0.074	0.020	***			
females	2,844	1,086	0.048	0.015	***	2,836	1,076	0.042	0.014	***	2,849	1,094	0.044	0.017	***			
12 y.o.	1,894	770	0.029	0.012	**	1,812	748	0.029	0.011	***	1,902	778	0.015	0.012				
13 y.o.	2,035	792	0.030	0.020		2,014	774	0.043	0.020	**	2,051	810	0.049	0.022	**			
14 y.o.	1,918	630	0.113	0.031	***	1,898	604	0.086	0.026	***	1,925	644	0.093	0.028	***			
14 y.o. males	981	322	0.081	0.049	*	835	308	0.101	0.036	***	997	338	0.104	0.049	**			
14 y.o. females	910	288	0.090	0.037	**	817	242	0.066	0.029	**	928	306	0.065	0.029	**			
	Psmatch2																	
	Nearest neighbor N=1, common cal(0.01)						Nearest neighbor N=2, common cal(0.01)						Nearest neighbor N=1					
Outcome Variables	N	Treated (mean)	Control (mean)	ATT	SE		N	Treated (mean)	Control (mean)	ATT	SE		N	Treated (mean)	Control (mean)	ATT	SE	
base sample	5,876	0.964	0.890	0.075	0.014	***	5,876	0.964	0.895	0.069	0.011	***	5,878	0.963	0.890	0.073	0.014	***
males	3,018	0.952	0.871	0.081	0.020	***	3,018	0.952	0.882	0.070	0.017	***	3,029	0.947	0.873	0.074	0.020	***
females	2,845	0.980	0.941	0.039	0.015	**	2,845	0.980	0.935	0.045	0.013	***	2,849	0.980	0.936	0.044	0.016	***
12 y.o.	1,896	0.992	0.977	0.016	0.011		1,896	0.992	0.966	0.026	0.012	**	1,902	0.992	0.977	0.015	0.011	
13 y.o.	2,042	0.952	0.909	0.043	0.023	*	2,042	0.952	0.902	0.051	0.020	**	2,051	0.953	0.904	0.049	0.024	**
14 y.o.	1,918	0.943	0.857	0.086	0.031	***	1,918	0.943	0.859	0.084	0.027	***	1,925	0.941	0.848	0.093	0.031	***
14 y.o. males	989	0.919	0.798	0.121	0.046	***	989	0.919	0.818	0.101	0.039	***	997	0.911	0.808	0.104	0.048	**
14 y.o. females	918	0.972	0.909	0.063	0.042		918	0.972	0.909	0.063	0.039		928	0.974	0.908	0.065	0.044	

Table 8. ATT results for the child labor outcome

	Teffects																	
	Nearest neighbor N=1, cal(0.01)					Nearest neighbor N=2, cal(0.01)					Nearest neighbor N=1							
Outcome Variables	N (raw)	N (matched)	ATT	SE		N (raw)	N (matched)	ATT	SE		N (raw)	N (matched)	ATT	SE				
base sample	5,877	2,230	0.021	0.016		5,866	2,212	-0.014	0.015		5,878	2,232	0.012	0.016				
males	3,019	1,118	0.004	0.027		2,992	1,092	0.020	0.022		3,029	1,138	0.005	0.026				
females	2,844	1,086	-0.013	0.020		2,836	1,076	-0.002	0.017		2,849	1,094	0.011	0.019				
12 y.o.	1,894	770	0.003	0.025		1,812	748	0.004	0.020		1,902	778	0.021	0.022				
13 y.o.	2,035	792	0.020	0.024		2,014	774	-0.006	0.025		2,051	810	-0.022	0.027				
14 y.o.	1,918	630	-0.059	0.039		1,898	604	0.023	0.027		1,925	644	-0.022	0.038				
14 y.o. males	981	322	0.006	0.049		835	308	0.026	0.050		997	338	0.027	0.054				
14 y.o. females	910	288	0.028	0.036		817	242	0.017	0.035		928	306	0.007	0.042				
	Psmatch2																	
	Nearest neighbor N=1, common cal(0.01)					Nearest neighbor N=2, common cal(0.01)					Nearest neighbor N=1							
Outcome Variables	N	Treated (mean)	Control (mean)	ATT	SE		N	Treated (mean)	Control (mean)	ATT	SE		N	Treated (mean)	Control (mean)	ATT	SE	
base sample	5,876	0.125	0.113	0.012	0.016		5,876	0.125	0.122	0.003	0.014		5,878	0.125	0.113	0.012	0.016	
males	3,018	0.172	0.163	0.009	0.026		3,018	0.172	0.152	0.020	0.023		3,029	0.170	0.165	0.005	0.026	
females	2,845	0.077	0.063	0.015	0.019		2,845	0.077	0.081	-0.004	0.017		2,849	0.077	0.066	0.011	0.019	
12 y.o.	1,896	0.086	0.070	0.016	0.024		1,896	0.086	0.078	0.008	0.021		1,902	0.090	0.069	0.021	0.024	
13 y.o.	2,042	0.119	0.129	-0.010	0.029		2,042	0.119	0.133	-0.014	0.025		2,051	0.119	0.141	-0.022	0.029	
14 y.o.	1,918	0.171	0.184	-0.013	0.036		1,918	0.171	0.167	0.005	0.031		1,925	0.174	0.196	-0.022	0.036	
14 y.o. males	989	0.236	0.208	0.028	0.052		989	0.236	0.192	0.045	0.046		997	0.231	0.204	0.027	0.052	
14 y.o. females	918	0.112	0.098	0.014	0.045		918	0.112	0.087	0.024	0.041		928	0.111	0.105	0.007	0.045	

XII. Figures

Figure 1. Before and after matching propensity score distribution

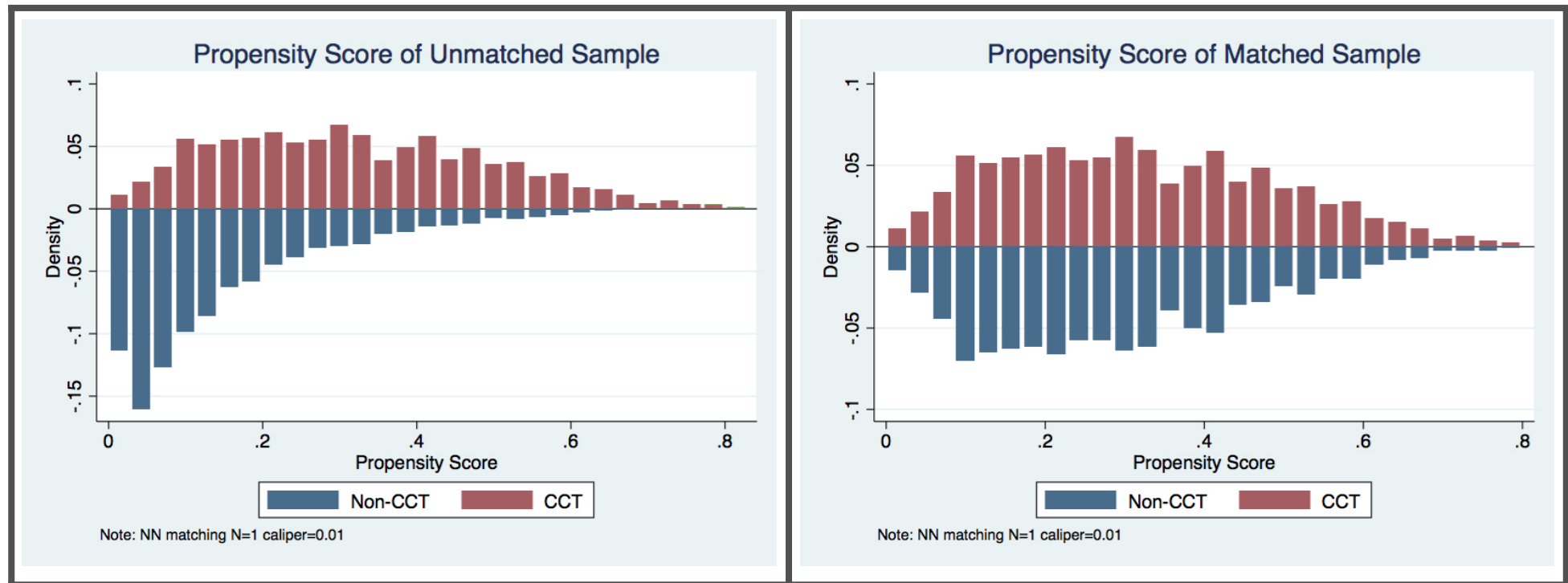


Figure 2. Before and after matching box plots

