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EMPOWERING MOTHERS AND ENHANCING EARLY CHILDHOOD INVESTMENT:
EFFECT ON ADULTS OUTCOMES AND CHILDREN COGNITIVE AND NON-COGNITIVE SKILLS

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Empowering Mothers and Enhancing Early Childhood Investment: Effect on Adults Outcomes and Children Cognitive and Non-Cognitive Skills

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ABSTRACT

Empowering women and enhancing children's early development are two important goals that are often pursued via independent policy initiatives in developing countries. In this paper we study a unique approach that pursues both goals at the same time: empowering mothers through tools that also advance their children's development. A program operated by AVSI, an Italian NGO, in a poor neighborhood of Quito, Ecuador, targets parents of children from birth to age 5. It provides family advisor-guided parent training sessions once every two weeks for groups of six to eight mothers and their children. We find that the program empowered women in various dimensions, including higher labor force participation and employment, higher likelihood of a full-time job in the formal-sector and higher wages. Treated mothers are also more likely to continue their education, make independent decisions regarding their own finances, have greater role in intra-household decisions, especially on issues involving children's education and discipline and increase parental inputs into their children's development. We find that treated children improve their cognitive and non-cognitive skills, for example, they are less likely to repeat a grade or temporarily drop-out from schooling, are less absent from and have improved behaviors in school, have better attitudes towards learning, and achieve higher scores on cognitive tests. Applying a recently suggested factor model of children's relative non-cognitive skills reaffirms our finding of significant gains in children non-cognitive skills. All results hold when we estimate aggregate treatment impacts, use summary indices instead of individual outcomes in order to account for multiple inference, when we use entropy balancing to adjust for differences in pre-treatment covariates, and when we use other robustness checks.

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1. Introduction

Empowering women and enhancing early childhood development are important policy goals which are often pursued as separate, discrete initiatives in developing countries. We study an approach that exploits potential complementarity by pursuing both goals through one measure, based on empowering mothers and teaching parenting skills that advance their children's development. Empowerment for mothers in this program is based on acquiring knowledge, home and personal practices that strengthen their role in the family and community and increase awareness of their role in their children's education. These sessions include joint activities for mothers and their children, and separate group activities for the children in the program.

The accumulation of evidence that education programs are both more effective and less costly when delivered to younger children has sharpened the focus on early childhood research and policy (Heckman, Pinto and Savelyev 2010, Heckman et al. 2013, Gertler. et al 2014). However, questions remain about which policy tools are most effective.

Similarly, empowering women has been the focus of research and policy because engaging women as equal participants in the community and economy has been seen to enhance development outcomes (Klugman et al. 2014; Wong 2012). Doing both - empowering women in a way that also supports early childhood development - has not been widely studied, however, it could be a means of achieving both goals. This approach has the potential to deliver improvements in women's empowerment and status at home and in the community, as well as improving children's education. Duflo (2012) defines women's empowerment as "improving the ability of women to access the constituents of development – in particular health, education, earning opportunities, rights, and political participation". Improving mothers' access to each of these domains can have positive effect on early childhood, which has been shown to deliver life-long benefits (Barber and Gertler 2009, Carneiro et al. 2013, Kiernan and Huerta 2008¹). Evidence of spillover effects from early child development programs on the empowerment of their mothers is scarce and needed (Baker-Henningham and Lopez-Boo 2010).

In this paper we study the consequences of a home-preschool program designed to enhance both women's empowerment and children's early childhood development. The *PelCa* (*preescolar en la casa* – home pre-schooling) program started in Pisullì, one of the poorest neighborhoods of Quito, Ecuador, in 2005. It is run by the Association of Volunteers in International Service (AVSI), an international non-governmental organization founded in Italy that focuses on human development. The

¹ Carneiro et al. (2013) find that maternal education improve the home environments, particularly for low-ability mothers. Moreover, more educated mothers invest more quality time with their children (breastfeeding, reading books to children and engaging children in more outdoor recreational activities). The authors suggest that these child investments lead to better children's cognitive outcomes and fewer behavioral problems. Barber and Gertler (2009), argue that encouraging women to be more informed and active health consumers reduces child mortality, morbidity, anemia, and stunting. Kiernan and Huerta (2008) show that economic deprivation and maternal depression negatively affect children's cognitive and emotional outcomes, partly because of less nurturing and parental engagement.

program is open to mothers with children aged up to three years old, and currently involves hundreds of mothers and children.

In the program we studied, a qualified family advisor trained groups of six to eight mothers. Children accompanied their mothers in these group sessions, which were held every two weeks in the NGO offices. There were three parts to each group session. In the first part, mothers received structured training focused on strengthening their role in the family, and learned parenting techniques that emphasized their children's early development. At the same time, children socialized using educational games and didactic materials. In the second part, family advisors taught mothers and children educational activities that could be reproduced at home, to improve the quality of maternal-child interactions and enhance mothers' participation in child development activities. In the third part, advisors monitored and assessed the home assignments from the previous meeting.

The program was implemented non-experimentally, but since its initiation in 2005, new families have joined every year. Assuming that new applicants resemble those who joined the program earlier, we selected a control group from the applicants in 2012. Following our suggestion, the NGO made a special effort to reach as many eligible families as possible in 2012. This provided us with a large pool of applicants from which we selected our control group, which consisted of families that had an older child in any grade in primary school and a younger child who would enroll in the program jointly with his or her mother. This can be viewed as a quasi-natural experiment, and we will demonstrate that it yields well-balanced treatment and control groups.

We evaluate the effect on women's empowerment after two to seven years of participation in the program by focusing on: self-esteem, inputs into child education, labor-market participation and earnings, allocation of decision-making within the household, and economic and social independence. We also examine the impact on children's educational outcomes, such as how likely children were to repeat a grade or drop out of school, and how they fared in cognitive tests. Our evidence shows that the program empowered women in various dimensions: mothers who participated in the program for two to seven years are more likely to be employed, more likely to have a full-time job, and more likely to have a formal-sector job. Mothers who have been in the program also earn higher wages, and are more likely to manage their own money and to make independent decisions about how to spend it. Women's autonomy is also reflected in a higher likelihood of deciding by themselves whether to work outside the home, and a higher likelihood of returning to school as an adult. Moreover, there is evidence that these women take on a greater role overall in intra-household decisions, especially on matters involving children's education and discipline. Mothers who participated in the program increased their child investment, for example by spending more time practicing cognitive and social skills with their children. We also carry out an additional analysis, in which we limit the control sample to mothers who did not enroll in the program because they did not hear about it. In this analysis, the control sample is down by half yet the results we obtain are very similar.

The program had positive effects on children: it significantly reduced the drop-out rate and likelihood of temporarily withdrawing from school, strengthened non-cognitive skills, and improved scores in cognitive tests (though it is precisely measured only for some sub-groups of the overall sample).

Allowing for heterogeneity of treatment effect by mother's pre-program characteristics and outcomes and by child gender reveals meaningful differences, which we use to interpret our findings. All of the above results hold when we estimate aggregate treatment impacts, using summary indices instead of individual outcomes, in order to account for multiple inference, when we use entropy balancing to adjust for differences in pre-treatment covariates, and when we use other robustness checks.

The remainder of our paper is structured as follows. In Section 2 we present an overview of the literature on women's empowerment and on early childhood development. Section 3 outlines the background and design of the quasi-natural experiment. In Section 4 we describe the data and in Section 5 we discuss the empirical analysis, results and we explore potential mechanisms through which results are achieved. In Section 6 we discuss robustness checks and the conclusion is in Section 7.

2. Related Literature on Early Childhood Interventions

The present work is related to two different literatures: studies on women's empowerment and studies on early childhood development. The literature on women's empowerment is more extensive. Kabeer (2005) defines empowerment as the "ability to make choices" in ways that change power relations and affect women's education, employment, and political participation. Duflo (2012) defines women's empowerment as improving women access and utilization of social, political and economic opportunities. Decision-making within the household is also an important indicator of the distribution of power within the household (Alkire 2007, Narayan et al. 2005). We will follow this approach and explore intra-household decisions, capturing women's power relations within the household and their access to the constituents of development (e.g. whether they are allowed to work).

Different channels for empowering women have been explored. Education is sometimes proposed as one of the main drivers of empowerment (Oyitso and Olomukoro 2012), but the evidence is mixed. There is substantial evidence that education can improve cognitive skills, raise aspirations, allow access to information, raise awareness to real conditions, and help coping with dis-equilibrium (Kabeer 2005, LeVine 2001). More educated women also experience less domestic violence (Kabeer 2005, Sen 1999). Mocan and Cannonier (2012) find that more educated women in Sierra Leone are "more intolerant of practices that conflict with their well-being". It is less clear, however, whether this change in preferences translates into behavior. Andrabi et al. (2012) show that higher maternal education improves maternal child care, but the study does not find an effect on intra-household decision-making.

Women are also empowered by accumulating wealth but there is little evidence on how to

enhance the mechanism. Microfinance programs can facilitate the accumulation of economic assets but evidence for a causal effect of such programs on women's empowerment is mixed. Kabeer (2001, 2005) suggests that women's access to credit improves women's self-perception, reduces domestic violence and increases women's power in the household decision-making process. In households where the loan recipient was male, the role of women in decision-making regarding loan use, enterprise management and allocation of profits was much lower than in households where the loan recipient was a female. However, Banerji et al. (2013) find no short- or long-run effects of micro-credit in India on women's empowerment.

Baker-Henningham and Lopez Boo (2010) suggest that training mothers in group parenting sessions is a cost-effective method of service delivery but little is known about the effect of such programs on mothers' longer term well-being and life course outcomes. Our study is the first to focus on long-term exposure to group parenting sessions and its impact on both mothers and their children and it contributes to the growing literature on early age interventions. Among others, we note the Abecedarian project, High Scope Perry Preschool Program, Chicago Child-Parent Centers and the Head Start Program. Evidence suggests that these programs led to improved schooling attainment and better outcomes in adulthood (higher employment rate and earnings, lower crime rates). For example, the preschool Abecedarian project improved children's reading and mathematics achievements, lowered grade retention and increased completed education at adulthood (Campbell et al. 2002, Temple and Reynolds 2007). The High Scope Perry preschool program affected the schooling outcomes of girls only: by age 19 treated females had a higher school GPA and completed a higher grade (Heckman et al. 2013); by age 27 treated females were 30 percent less likely to drop-out from high-school (Nores et al. 2005). We note however, that these interventions target the most-disadvantaged groups and that such programs may be unfeasible in most developing countries because they are expensive. Most related evidence in developing countries is often based on very short interventions and small samples (see Baker-Henningham and Lopez Boo 2010 and Nores and Barnett 2010 for a literature review). Few studies focus on longer treatment and long-term child outcomes. Exceptions are Watanabe et al. (2005) and Kagitcibasi et al. (2009), both providing evidence of positive effects on cognitive outcomes, while Kagitcibasi et al. (2009) find positive effects on other socio-economic outcomes. For example, children exposed to an early treatment entered the workforce later (due to longer schooling) and found jobs of a higher status as young adults.

Another related study is Rosero and Oosterbeek (2011), which evaluates the effect of home visits and child care centers on mothers and children in Ecuador. Child care centers provide day care for the whole day throughout the entire year, and groups of 8-10 children are supervised by a trained teacher. Weekly home visits, each lasting about an hour, teach mothers how to stimulate and nourish their children, in individual sessions if children are younger than three, and in groups if children are older. Rosero and Oosterbeek (2011) find that child care centers increase mothers' labor force participation

but have detrimental effects on children's cognitive and health outcomes, while they observe the opposite effects for home visits. The early childhood development program that we study is more similar to the home visits than to the child centers described above.² However, while Rosero and Oosterbeek (2011) can analyze short term treatment effects only³, we are able to explore long term effects on the mother and children. Attanasio et al. (2014) also evaluate the effects of a weekly home visit program in Colombia that targeted children 12-24 months and lasted for 18 months. They find that enhancing mothers' engagement with their children positively affects their cognitive and socio-emotional domains through an increase in parental investments and find no effects on mothers' depression (Attanasio et al. 2014, 2015).

3. Background and Research Design

AVSI, the Association of Volunteers in International Service, is an international not-for-profit, non-governmental organization (NGO) based in Milan, Italy. Founded in 1972, it operates in 30 countries in Eastern Europe, Africa, Latin America and the Middle East and it runs more than 100 long-term projects. It started its activities in Ecuador in 2001, focusing on infant and child development and education. In 2005 an AVSI branch was opened in Pisullí, a disadvantaged, urban neighborhood to the northwest of Quito. In collaboration with Fundación Sembrar, a local non-profit organization, and the local parish, AVSI funded a community development center where it implements a modified version of *PelCa*. The program expanded rapidly, providing after-school programs and other services to more than 700 children, youth and their families in 2013, with more than 50 members on the local staff.

3.1 The Intervention

PelCa is a preschool program targeted at parents of children age 5 and under, based on group-parenting sessions. Fortnightly meetings are held in the NGO for small groups (usually six-eight mothers – with their children), under the guidance of a family advisor. In the first part of the meeting, children socialize with each other, playing games using didactic materials, while parents read and discuss material about family education. In the second part of the meeting, parents and children work together: they learn songs, educational games and various development activities that parents can reproduce with their children at home (e.g., reading books, playing with puppets, playing building games, etc.). The family advisor gives every child a notebook of age-appropriate activities that focus on different areas of development, and parents and children are expected to undertake these activities

² The main difference between the *PelCa* program and the home visits analyzed by Rosero and Oosterbeek (2011) is that in the latter mothers with their children are visited in their homes once a week, and individually if the child is younger than 3, while in the *PelCa* program mothers and children go to the NGO twice a month and are taught in groups from the beginning.

³ Data was collected after the children in the program were exposed to treatment during 21 months (Rosero and Oosterbeek 2011).

in the two weeks between the program sessions. In the last part of the meeting, the family advisors monitor the progress made by each child and verify whether they have completed home assignments with the parent (e.g., by having children show drawings, or having children answer questions based on a story that was to be read to them by the parent). The family advisor gives each parent and child reinforcement activities to perform at home in the next two weeks. These activities are geared towards mothers and children achieving specific targets and goals.⁴ These NGO-set goals are the basis for the outcomes that we evaluate in the paper.

Goals for the mother: build self-confidence and self-awareness and a greater ability to relate to their environment and the people in their peer group; to build a sense of value in oneself and in material assets.

At the personal level: awaken interest in life; assume responsibility through personal commitment; enhance self-perception of own abilities and the capacity to take initiative; and to give appropriate value to assets and saving.

At the level of relationships with the family and community: to take pleasure in dialogue, patience and reflection; strengthen the level of involvement of each member of the family in the light of existing dynamics; share between the couple the responsibility for the children's education; develop an attitude that favors the autonomy of children and teenagers; develop relationships of intimacy and solidarity with the group in the meetings, and with neighbors in the neighborhood.

Goals for the children: facilitate children's integral growth in different areas of development (psychometric, language, cognitive, socio-affective).

Families usually find out about the program via word of mouth or a poster outside the NGO. If they express interest, AVSI employees visit the family at home to collect information about the family circumstances, observe conditions at home, assess the need for support, and identify family weaknesses and strengths. Children up to three years old are eligible to enter the program (so that they can participate in the program for at least two years). The mother commits to participating in fortnightly meetings and to performing the assigned tasks at home. The selection process also takes into account the family's financial standing and the proximity of the home to the NGO sites where sessions are held. Parents and children can remain in the program until the child is 12 years old but once the child reaches five years of age they move to the NGO *PelCa* school program. The application process for the *PelCa* pre-school program starts at the end of April and lasts for two weeks. Approximately 50 families (the number can vary depending on funding for that year) are selected to start the program in September.

3.2 Design: choosing a comparison group

Our treatment group was selected from many applicants, and is made up of mothers who enrolled

⁴ The goals are taken from the NGO handbook in Spanish.

in the *PelCa* preschool program and their children, who are now in primary school. In the summer of 2012, we selected a control group by mimicking the program's selection process, but on a larger scale. The NGO advertised the *PelCa* program in schools and through posters, as had been done previously in the program. However, it extended the application period to approximately two months to reach as many families as possible, and, indeed, attracted a much larger pool of applicants compared to other years. We selected applicant families with a preschool-age child and, similar to our treated mothers, at least one child enrolled in primary school. The identifying assumption is that the sample of mothers with children of primary school age who did not participate before in *PelCa* but chose to do so now with a younger child, represents a sound counterfactual for *PelCa* mothers and their primary-school-age children.

The families making up the control and treatment groups were invited to an interview in June-July 2012. The mother participated in a structured interview, while her primary school children were tested for cognitive and non-cognitive skills. The mother was asked to bring her children's vaccination certificate and birth certificate, which includes a record of the child's birth height, weight and head circumference and the older child's school report cards for the previous and current years. We then selected from among the applicants, those who had an older child at a primary school age. We also held a follow-up interview with these control and treatment groups a year later in the summer of 2013.

In addition, control mothers were asked as to why they did not enroll in the program. As a robustness check, we exploit this information and also re-estimate all models in Section 6 by limiting the control sample to those who did not participate in the program due to different reasons.

4. Data

The data were collected through face-to-face interviews with mothers and children, using a questionnaire we developed specifically for this study.⁵ The questionnaire seeks information on family members (mother, partner and children), demographic characteristics, labor-market activities (type of job, full-time/part-time, formal/informal sector, wage, etc.), intra-household decision-making, and parents' inputs into child rearing. All questions targeted information current or prior to enrollment in the program.⁶ The interview lasted approximately 45 minutes. The mother then took the Big Five

⁵ We piloted the survey questionnaire in January 2012, interviewing 23 treated mothers: 12 of them had a primary-school-age child who participated in the *PelCa* preschool program and 11 of them had a primary-school-age child who did not participate in the *PelCa* program. We revised the questionnaire following this pilot test.

⁶ We will provide details about the questionnaire upon request.

Personality Test⁷ and the Rosenberg self-esteem scale.⁸

Each child took cognitive tests in Spanish and mathematics.⁹ Data on weight, height and head circumference at birth of the school age children were gathered through vaccination certificates and birth certificates. For some children, this information was incomplete or unavailable.

The control group for 2012 was 164 children and 115 mothers, while the treatment group was 219 children and 166 mothers, a total of 383 children and 281 mothers. We interviewed some grandmothers who participated in the program on behalf of the mothers, but we excluded these families from the analysis because we do not have grandmothers in the comparison group.

In summer 2013, we conducted follow-up interviews. Ten female interviewers from the area conducted home visits with all of the mothers in the sample. To obtain comparable information in the two rounds of data collection we used the same questionnaire, but with slight modifications. Some questions were added in order to clarify issues we encountered in the 2012 data. However, where we introduced new questions, we also sought retrospective information. Mothers were asked to bring the vaccination and birth certificates again (because many of these documents had been missing in the previous year). Eventually we collected data on height at birth for 44 percent of the children, weight at birth for 41 percent, and head circumference at birth for 38 percent. We think that the extent of missing values for these variables preclude a meaningful analysis of this information. Mothers were also asked to bring children's school report cards for 2010-11 and 2011-12. The children were tested again in Spanish and mathematics, using tests appropriate for the student's school grade. The follow-up sample included 136 control children (83 percent) and 98 control mothers (85 percent), and from the treatment group, 197 children (90 percent) and 150 mothers (90 percent).

4.1 Treatment-Control Comparisons: Balancing Tests

We examine in this section whether pre-treatment covariates are balanced between treatment and control groups. The evidence suggests that mothers and children in both groups are very similar on observed and predetermined characteristics, supporting our view of the empirical setup as a quasi-natural experiment. The first two columns of Tables 1-2 display the means for the treatment and control

⁷ The Big Five Personality Test is based on decades of research. It consistently evaluates five broad traits of personality through a series of questions: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. In 1981 these factors became known as the "Big Five" to indicate the broad dimensions to which they refer. It has since been used intensely.

⁸ The Rosenberg test, developed in 1965 by Dr. Morris Rosenberg, includes 10 Likert-type questions and it is used to evaluate the self-esteem of an individual and is widely used today by psychologists, sociologists, and social scientists. It has been translated into various languages (e.g., French, Norwegian, Spanish, Portuguese, Chinese, and Italian).

⁹ Grade specific language and mathematics tests were constructed based on national tests from Ecuador, known as "pruebas SER (Sistema de Evaluación y Rendición de la Educación)" and on Peruvian national tests for grades for which Ecuadorian tests were not available.

groups, while the last two columns present the difference in means between the two groups and the standard error.

Mothers' characteristics (Table 1) are balanced in most of the dimensions, except that control mothers were more likely to be employed before joining the program: 47.0 percent of treated mothers were working versus 60.9 percent of control mothers. Control mothers were also more likely to be working full-time. Pre-treatment paternal characteristics and most of the household characteristics are well balanced,¹⁰ with a few exceptions: whether the family owned a house, the number of rooms and the availability of drinkable water in the house. Overall, 3 of the 32 pre-treatment maternal characteristics differences are significantly different at 10 percent level of significance. This is less than 10 percent. The F-test on the bottom of Table 1 on all of the pre-treatment maternal characteristics¹¹ is also not significantly different from zero, suggesting that the imbalance in the pre-program employment status of the mothers is an exception. We will however include in the regressions pre-treatment control variables to capture these differences between the treatment and control groups. It will be shown that the estimates are not sensitive to adding these controls.

With respect to the child characteristics (Table 2), control group children are half a year older on average. This is probably due to the fact that we selected children from 1st to 7th grade and that, as we will see, control children are more likely to repeat a grade and therefore be older at survey date. The F-test on the significance of all the characteristics together suggests that overall children's characteristics are not linearly correlated with treatment status.

4.2 Entropy Balancing

An alternative way to control for the differences in some of the pre-treatment characteristics is to use entropy balancing (Hainmueller 2011). Entropy balancing is a data-preprocessing method to achieve covariate balance. It computes the means (or higher moments of covariate distributions) of the covariates in the treatment group and looks for a set of entropy reweights so that the means in the reweighted control group match the means in the treatment group. We implement entropy balancing for the means of the covariates that we will include as control variables in our analysis (child and household pre-treatment economic characteristics).¹² Entropy balancing makes the treatment-control covariate balance almost perfect: differences in means are not significantly different from zero for all covariates (Table A3).¹³ This approach is preferred over a propensity score matching because the former eliminates all treatment-control imbalances. In addition, the propensity score matching requires treated

¹⁰ Details are provided in the Table A1 and A2 in the Appendix.

¹¹ Pre-treatment characteristics related to intra-household decisions before treatment are included.

¹² We also include an indicator of whether mothers were working full-time before treatment.

¹³ We also obtain balanced samples through entropy balancing when we consider the children's samples or when we pool the two years of data together.

and controlled units to be comparable within the common support. As a consequence, the individuals who do not lie in the common support (5 out of 281 mothers in 2012 and 22 out of 496 mothers in the pooled data) are dropped from the sample.¹⁴

4.3 Relative Measure of Children's Non-cognitive Skills

To study the program effects on children's non-cognitive skills, we use information from our survey and adopt a novel approach suggested by Heckman et al. (2016) and Kautz and Zanoni (2014), to construct a relative measure of non-cognitive skills. This approach is motivated by the concern that the standard non-cognitive measures are partly a function of cognitive attainment (Heckman and Kautz 2012). For example, empirical evidence suggests that measures of non-cognitive skills are related to students' school grades (Duckworth and Tsukayama 2012, Borghans et al. 2011). The new suggested factor model is a relative measure of non-cognitive skills net of related cognitive skills. Following Heckman et al. (2016) and Kautz and Zanoni (2014), we use the following factor model of relative non-cognitive skills¹⁵:

$skills_{k,j}$ ($k = 1, \dots, K_j, j = C, -C$) are the observable outcomes of children's cognitive skills ($j = C$) and non-cognitive skills ($j = -C$). $Cognitive^*$ and $NonCognitive^*$ are two latent variables of cognitive skills and non-cognitive skills, respectively. Hence, the factor model can be formulated by:

$$skills_{k,C} = \alpha_{k,C}Cognitive^* + \varepsilon_{k,C}$$

$$skills_{k,-C} = \alpha_{k,-C}Cognitive^* + \beta_{k,-C}NonCognitive^* + \varepsilon_{k,-C}$$

where $Cognitive^*$ and $NonCognitive^*$ represent the common factors in the model, and $\varepsilon_{k,j}$ ($j = C, NC$) indicates the specific factor of outcome k . The factor loadings are denoted by (α_k, β_k) , in which the first element is normalized to one to correctly identify the parameters.

In the first equation we assume that observable outcomes on cognitive skill ($skills_{k,C}$) depend only on the cognitive skills factor, while the second equation implies that the remaining outcomes ($skills_{k,-C}$) depend on factors of both cognitive and non-cognitive. Hence, the latent variable $NonCognitive^*$ can be referred as a measure relative to the cognitive skills. The model is estimated through a standard maximum likelihood procedure. We replace children's cognitive skill and non-cognitive skill outcomes by predicted latent variables from the factor analysis, and finally we re-estimate the average treatment effects.

¹⁴ For purposes of robustness, we also re-estimated the effects of the program through a propensity score matching, with and without replacement, and the results are very similar to the estimates we present in the paper (these results are available upon request).

¹⁵ Kautz and Zanoni (2014) use factor model to predict the pre-treatment cognitive and non-cognitive skills. They use predicted values as confounding variables for matching, as well as control variables in regressions.

5. Empirical Strategy and Results

We estimate the effect of participating in the program on the outcomes of interest using the following regression model:

$$y_{it} = \beta_0 + \beta_1 Treatment_i + \beta_2 ChildCharacteristics_i + \beta_3 HouseholdDemographics_i + \beta_4 HouseholdEconomics_i + \beta_5 TimeFE_t + \beta_6 SchoolFE_i + \varepsilon_{it}$$

where i is the individual and t is time. y_{it} is a vector of maternal and child outcomes of interest. Since we face a multiple outcomes problem, we will also compute summary indices¹⁶¹⁷ for domains of outcomes. $Treatment_i$ is a dummy equal to 1 when mother and child participate in the *PelCa* program and 0 otherwise. To shed light on heterogeneous treatment effects by number of years of participation in the program, we will also use the specification outlined above with a linear effect of number of years a mother/child participated in the program. Exposure to the program varies from two years and four months to seven years and eleven months.

$ChildCharacteristics_i$ includes year of birth, birth order, number of siblings as of 2005, i.e. before the program started, and gender. $HouseholdDemographics_i$ are pre-treatment household demographic characteristics: mother's and father's age, their civil status (married, lived together, mother was divorced, separated, widow, single) at the time of the birth of the first child, and the parents' level of education before the birth of the first child, a dummy equal to 1 if the mother was born in Quito, a dummy equal to 1 if the parents came from the same city, and the number of children the mother had in 2005. $HouseholdEconomics_i$ are pre-treatment household economic characteristics: whether the mother worked before treatment, whether the father worked, the mean firm size of mother's and father's employer, average monthly family income before treatment. $TimeFE_t$ is a dummy equal to 1 when the observation corresponds to 2013, 0 if 2012; ε_{it} is the error term, clustered at the mother level when we run regressions pooling the observations in the two years together or when we analyze outcomes for children. $SchoolFE_i$ are school fixed effects.¹⁸ They are included when we analyze outcomes for children. A more detailed description of the control variables is provided in the Appendix.

5.1 Results based on Summary Indices

As we note in Section 3.1, the primary purposes of the *PelCa* program are to empower mothers, harmonize intra-family relations, and increase investment in education in early childhood. The breadth

¹⁶ We followed Kling et al. (2007) to construct each summary index as an “equally weighted average of z-scores of its components, with the sign of each measure oriented [...] so that more beneficial outcomes have higher scores. The z-scores are calculated by subtracting the control group mean and dividing by the control group standard deviation.”

¹⁷ We developed a Stata package “mseffect” to calculate the mean effect size on the summary index with the advantage that we account for different weights, reversibility of outcome sign, and different types of robust standard errors. The Stata package “mseffect” is available at the online appendix to this paper.

¹⁸ 55 are the number of schools that children attend in 2012.

of the goals implies that the consequences of the program can be measured in multiple domains. We decide to measure the following domains, each of which contains multiple outcomes for mothers and children. For mothers, the domains (and specific outcomes) are: labor-market outcomes (whether working, working full-time, working with a contract and average family monthly income), mothers' economic and social independence (whether she has control over her own money, participates in voluntary activities, is currently studying and whether she has a role in her own employment decisions), mothers' intra-household decision-making (role in decisions regarding child's education, health, and discipline, expenditures in general and on food, having children, use of contraceptives, own health), mothers' child investment (own time inputs with child, aspirations/expectations for child's education), mothers' self-esteem (Rosenberg scale) and Big Five personality traits (agreeableness, conscientiousness, extraversion, neuroticism and openness to experience). Summary statistics on the domains indices and individual outcomes are presented in Table 3, in panel A for mother's labor market outcomes, in panel B for mother's economic and social independence outcomes, in panel C for mother's role in intra-household decision making, in panel D for mother's child's investment, in panel E for mother's non-cognitive skills and fertility choices, and in panel F for the father's labor market outcomes.

For children, the domains (and outcomes) are: test scores (language and mathematics test score), school dropout and grade repetition, non-cognitive I: attitudes towards schooling (whether child likes school from both their own and their mothers' perspectives, and whether the child chose a book as gift¹⁹), and non-cognitive II: absences and behavior in school.

Before presenting the detailed estimates of the effects on each specific outcome, we analyze each domain by creating domain-specific summary indices. This allows us to control for the potential problem of over-rejection of the null hypothesis due to multiple inference. Because different outcomes have different data scales, simply averaging the estimators for the treatment effect is not likely to produce a meaningful statistic. To address this concern, we follow the summary-index approach per Kling et al. (2007). The summary index of multiple outcomes is the average of z-scores of each outcome variable. Z-scores are calculated by subtracting the control mean from the outcome and dividing by the control standard deviation. This summary index is a special case of the z-score²⁰ and is identical to the mean effect size of treatment if there is no missing value.²¹ In general, the sign of the summary index

¹⁹ At the end of each interview, children were offered a gift. They could choose between a book and a game. We interpret the choice of a book as interest in schooling activities.

²⁰ Here we replace the minuend and the divisor in the z-score by the control group mean and standard deviation respectively. In other words, we do require some dispersion in the controlled outcomes to guarantee the validity of standardization.

²¹ In the regression specification this approach yields standardized estimators as follows: the treatment effects for K outcomes are aggregated and reflected in a single standard normal statistic,

$$\tau = \frac{1}{K} \sum_k \frac{\beta_{1k}}{\sigma_{kC}}, \quad k = 1, \dots, K$$

reveals information on the direction of the aggregate impact of a class of outcomes, and the more the summary index deviates from zero, the stronger is the implied aggregate effect.

Estimated effects on summary indices of mothers based on the 2012 data (panel A) and on the pooled 2012-13 data (panel B) are presented in Table 4. We report estimates from three different specifications, with only the treatment indicator as a covariate (column 1), with child and household demographic characteristics as controls (column 2) and with the addition of household economic characteristics as additional controls. Based on the fully specified regression (column 3), we conclude that the program enhances mother's participation in the labor market; the treatment effect on the corresponding summary index based on the 2012 data is 0.482 (se=0.098) and based on the pooled 2012-13 data it is 0.503 (se=0.098). These positive estimates are precisely measured and are practically unchanged after controlling for child and household demographics (column 2) and for economic covariates (column 3) as well. The entropy balancing estimates in columns 4-6 are very similar to the unweighted estimates presented in columns 1-3.

The corresponding treatment estimates on mothers' economic and social independence are also positive and large, 0.366 (se=0.076) when using the 2012 data and 0.276 (se=0.056) when using the pooled 2012-2013 data. A similar positive treatment effect is evident for the household decision-making outcomes, albeit the estimated coefficient for this summary index is smaller, 0.126 based on the 2012 data and 0.093 based on the 2012-13 pooled sample. The program encouraged an increase in parental investment in early child development. The estimated effect on the overall index capturing mothers' investment is positive and significant, 0.207 (se=0.065). This positive effect is seen in improvements in several measures of children's outcomes (test scores, drop-out rates, repetition). It is possible that the better education outcomes for children were the result of other improvements generated by the program, such as the increase in family income, and the direct training in cognitive and non-cognitive skills that the children received in the biweekly meetings with the family adviser. We will discuss this further when we present evidence of the effect of the *PelCa* program on children.

We note again that the estimates for these summary indices are robust to the inclusion of control variables and also to a re-weighting with entropy balancing. Taken together, these results suggest that we can gain further insights by examining in detail the effect on the mothers' outcomes. However, we do not find a strong average treatment effect on mothers' self-esteem and on personality traits (openness

where β_{1k} indicates the average treatment effect for outcome k and σ_{kC} denotes the standard deviation of the k^{th} control outcome. Having included the covariates, the K average treatment effects (β_1) and sample variances can be easily acquired through a linear regression. By doing so, the above equation can be thought of as a point estimator representing a collection of standardized treatment effects. However, this paper also takes into account the covariance of effects and therefore adapt a seemingly uncorrelated regression (O'Brien 1984, Kling et al. 2007):

$$Y = I_K \otimes (T \quad X) \beta + v$$

where T is the treatment indicator(s), and X consists of controlled regressors as well as a constant term.

to experience, conscientiousness, extraversion, agreeableness, neuroticism): the estimated effect on the summary index of these aspects is small (0.045) and not precisely measured²². This contrasts with Kabeer (2001), who finds that access to credit improves women's self-esteem. However, our findings do not necessarily imply the absence of a treatment effect on self-esteem or personality traits, as it could also be that the instruments used to measure these outcomes were not the most appropriate.

Heterogeneous Treatment Effects

Next, to gain more insight into the treatment effects on mothers, we explore treatment heterogeneous effects. Table 5 presents the aggregate-estimated effect on the summary indices with control for all covariates and for subsamples of mothers based on the 2012 data. We first examine the subsamples of mothers by pre-treatment working conditions: this evidence is presented in columns 1-2 of Table 5. Among the group of treated mothers, 148 reported that they were working when their interviewed child was born, and 133 reported they were not working at that time. Our estimates indicate that the program had larger effect on labor market outcomes of mothers who were not working before joining *PelCa*, 0.794 (se=0.191) versus 0.340 (se=0.126), the F-test strongly rejecting that they are equal (at 5 percent significance level).

For intra-household decisions, the same pattern emerges between the two treated subsamples. Although the F-statistic is less significant, the estimated effect for mothers who were not working before *PelCa* is greater, 0.213 versus 0.086, respectively. The program has the same effect for the two groups' summary measure of economic and social independence outcomes (0.351 and 0.484, respectively). Interestingly, the average effect on child investment comes mainly from the effect among mothers who worked at baseline (0.373) with practically no effect among mothers who did not work before enrolling in the program. The mothers with a higher pre-program employment rate might have had a more enriched upbringing, which complemented the knowledge about child rearing acquired during the program.

In columns 3-4, we present estimates by sub-samples stratified by mother's pre-program educational attainment (up to/more than primary school education). These are almost equal samples, 144 and 136, respectively. The treatment effect on the labor market index for the higher education mothers is 0.611 (se=0.163), versus 0.462 (se=0.130) in the lower education sample, both estimates being statistically significant. A similar heterogeneous pattern is seen in the effect on mother's role in family decision-making, larger for the more educated mothers, 0.205 (se=0.087) versus 0.098 (se=0.076), though the difference is not statistically significant. We find a similar effect size on the summary index of all mothers' economic and social independence outcomes for both groups (0.420 vs.

²² When we evaluate the effects on a summary index for fertility choices separately we find no effects.

0.386). The effect on child investment is strikingly different however for the two groups, 0.320 (se=0.105) for less-educated mothers and 0.070 (se=0.100), for more educated mothers, and the difference is statistically significant. One possible explanation is that mothers with lower education levels are less skilled in child rearing and hence have higher marginal benefits from their participation in the *PelCa* program.

Next, we explored heterogeneous treatment effects by mothers' pre-treatment role in decision-making. We expect that mothers who initially (before 2005) were less involved in family decision-making would benefit more from the program.²³ The estimates in Table 5, columns 5-6, suggest that this group had larger gains in the labor market and in household decision-making. With respect to the latter effect, the difference is striking, 0.197 (se=0.073) versus -0.017 (se=0.083).

We next examine heterogeneity in the treatment effects by child gender. The results are presented in Table 6. Based on 2012 data, the treatment effect on labor market outcomes does not vary by the child gender, 0.534 for mothers of boys vs. 0.500 for mothers of girls. The effect on child investment is larger for boys (0.268 vs. 0.193) but the difference is not statistically significant. Interestingly, mothers of boys have also a larger and significant treatment effect on the score in the Rosenberg self-esteem scale test and the Big Five Personality Traits test (0.177 vs. -0.021). However, mothers of girls have larger treatment effects on intra-household decision-making (0.161, significant at 5 percent level, versus 0.079 and not significant) and on economic and social independence outcomes (0.471, significant at 1 percent level, versus 0.323, significant at 1 percent level).

In the rest of the paper we will study which specific mother's and child's outcomes drive the response of our aggregate measures. First we will present and discuss estimates based on the full sample, with and without the pre-treatment covariates. Second, we will check if our results hold when the sample is reweighted through entropy balancing. Finally, we will perform other robustness checks.

5.2 Estimated Effects on Mothers' Specific Outcomes

Labor-Market Outcomes

The estimates based on the 2012 data are presented in panel A of Table 7 and those based on the pooled 2012-13 data are presented in panel A of Table 8. Labor-market outcomes reflect the empowerment and emancipation of women. As we pointed out in the previous section, the effect on the summary index in Table 4 suggests an overall significant improvement in mothers' employability and family income, and the evidence in Tables 7-8 strengthens this conclusion. Treated mothers are 17.6

²³ We made use of pre-treatment variables of mothers' intra-household decisions. After calculating the number of total household decisions that mothers made in 2005, we divide the full sample into two by the mean of total decisions. In the 2012 sample of mothers there are 179 and 93 mothers who made more decisions and fewer decisions respectively.

percent more likely to be working, 20.7 percent more likely to be working full-time and 20.4 percent more likely to be working in the formal sector. These estimated effects relative to the untreated mothers are an increase of 36 percent, 130 percent and 230 percent, respectively, indicating a large increase in mothers' employability.²⁴ Results based on the pooled 2012-13 data are very similar. All these estimated coefficients are significantly different from zero at the 1 percent significance level, and they are not affected by adding any of the control variables in the regression. Moreover, we find that treated mothers have more stable employment: 69 percent of the working mothers from the program were working in both 2012 and 2013, whereas only 49 percent of the working mothers in the control group were working in both years.

Another important result in Table 7 shows that the 2012 average monthly income of treated families is \$44.48 higher than the families in the control group – a finding that we attribute largely to increased wages for mothers. The median wage of workers in the neighborhood is the minimum wage (\$292 per month in 2012) and, therefore, the income gain from the program is large. In 2013 we collected the data on mothers' wages. Using this information we estimate that family income is up mainly because of an increase in mothers' wages: treated mothers earn \$13.33 (se=4.87) more per week than control mothers, i.e. more than \$57 extra per month (Table 8, panel A), while fathers' wages are not significantly different in the two groups. Our result of a significant impact on mothers' wages without any similar effect on the spouse is in contrast to the findings reported in Rosero and Oosterbeek (2011) who study the effect of child care centers on labor market outcomes of mothers. They report an estimated increase in the likelihood that a mother is working by 22 percent²⁵ and of household income by \$80²⁶, but unlike in the *PelCa* program the latter is not driven by a rise in mothers' earnings, but by the partners' income. Actually Rosero and Oosterbeek (2011) even find that home visits reduce the proportion of mothers working by 17 percent, while leaving mothers' income unaffected; however, we note that our study is based on a longer term follow-up and that the long term effect of the home visits program might be different than the short term effect reported in Rosero and Oosterbeek (2011).

Economic and Social Independence

As seen from Table 4, the effect on mothers' independence from an economic and social perspective is very large. The evidence presented in panel B of Tables 7 and 8 shows that treated mothers in 2012 are 21.3 percent (se=0.056) more likely to manage their own money. Relative to the control group mean (44.7 percent), this is a 47.7 percent increase. Again, these effects are unchanged when we

²⁴ The types of jobs that treated mothers hold are typically low-skilled jobs: mainly domestic cleaners, but also seamstresses and shopkeepers. More details on the job categories are available upon request.

²⁵ The child care centres' effect on mothers' employability is stronger than the *PelCa* program effect (22 percent vs. 16.4 percent), but it goes in the same direction.

²⁶ Please note that household income in Rosero and Oosterbeek (2011) is measured in 2007, while in the current analysis it is measured in 2013, making the two incomes not perfectly comparable.

add to the regression each set of control variables and when we expand the sample to include also the 2013 data.

Another sign of the program's effect on women's empowerment is a larger proportion (8.1 percent more, $se=0.036$) of treated mothers who are studying at the survey date, which is about 155 percent higher than the rate of mothers in the control group. This estimate is significant at the 5 percent level and is unchanged even after adding all the control variables. When using the pooled 2012-13 data, the treatment effect on this outcome is 8.5 percent ($se=0.031$). A concern may be that entering the job market may lower the incentives and time for studying, and mothers who participated in the program were more likely to be working. To address this issue, we check whether mothers who quit studying in 2013 also found a job in 2013; we find little evidence of such correlation.

More evidence of the program's effect on women's empowerment is based on the program effect on mothers' role in the decision whether she can work. In the 2012 survey, we asked the mother who decides whether she can work. Treated mothers were 13.2 percent ($se=0.044$) more likely to report that this decision is taken by themselves or jointly with their partner. The estimated impact relative to the control group is 16.4 percentage points higher. This holds true when we pool data from the 2012 and 2013 surveys: treated mothers are 10.4 percent ($se=0.031$) more likely to have a role in this decision. Both estimates are statistically significant at the 1 percent level. Here as well, adding controls and using a weighted regression does not move the point estimates at all.

Household Decision-Making

Treated mothers are more likely to make decisions alone or with their partners about issues related to children's education (9.9 percent effect, significant at the 1 percent level) and on children's discipline (8.7 percent effect, significant at the 5 percent level), which are 11.6 and 10.4 percent greater, respectively, than the outcome means of control mothers. These estimated effects remain unchanged when controls are added. In the 2012 and 2013 pooled data, we estimated similar effects. However, we find no effect on the other domains (intra-household decisions on spending, on having children, on contraceptives and on what to do when children are ill). In the follow-up survey in 2013, we also collected intra-household decision outcomes on who decides on issues related to mothers' health, on purchasing important items and on whether mothers can visit friends and relatives. Effects on these intra-household decisions are non-conclusive. When stratifying the sample by length of participation in the program (Tables A10-A11), we find that mothers who have been in the program for a longer period of time are more likely to be involved in household decision-making.

Together with the results based on the single-treatment dummy, it seems safe to conclude that mothers participating in the *PelCa* program assume greater intra-household responsibilities and participate more fully in intra-household decision-making.

Access to credit was also found to have a positive effect on women's power in household

decision-making, for decisions related to the loan (Kabeer 2001, 2005). The effect of access to credit seems higher than what we find here. However, this might be due to the lower initial power of women who received the loan in the analysis by Kabeer (2001, 2005), where 20 percent of women in the comparison group had some sort of role in decision-making, compared to the women in our study, where even before the treatment, 70/80 percent of women had some power within the household.

Mothers' Child Investments

The program is intended to improve children's outcomes by enhancing investments in children's cognitive and non-cognitive skills. We therefore asked mothers in the 2012 survey how much time per week they spend interacting with their children in a variety of activities. Table 11 presents evidence on forms of child investment that we aggregated in the overall respective index. The *PelCa* program enhanced three of the four types of maternal investment that we considered. The estimates show that treated mothers are more likely to have conversations with children (4 percent effect, significant at 5 percent level) and also more likely to listen to and talk to their children about the books or other material they read (10 percent effect, significant at 5 percent). Treated mothers also invest more time in playing educational leisure games (for example dancing) with children (6.6 percent effect, $se=0.025$). We find no similar effects on mothers going to the library regularly with children (2 percent effect, $se=0.040$).

Taken together, the results suggest that participation in the *PelCa* program has increased mothers' investment in their children, in the form of increased mother-child educational interaction and recreational activities. In the next section we will report positive effects of the *PelCa* program on children's schooling and non-cognitive outcomes and we view the above evidence on maternal investment as indication of a possible mechanism through which the program might have improved child development. These reduced form effects are similar to findings about the effect of a home visiting program in Colombia that increased varieties of play materials and play activities in the home and also improved children's cognitive, language and socio-emotional development (Attanasio et al. 2014). Using a structural model, Attanasio et al. (2015) provide evidence that directly links these parental investments in children to the children's improved cognitive outcomes.

Treatment Effect by Number of Years in the Program

We estimated the treatment effect where exposure is measured by number of years in the program. This specification imposes a linear effect of years in the program. We prefer this specification over estimating separate regressions using stratified samples by number of years in the program because of sample size considerations. The number of years that mothers in our sample participated in the program ranges from two to eight and the mean is 5.5 years. We note that when using a linear effect specification of years in the program as a treatment measure, the summary index cannot be calculated because the treatment variable is no longer binary. In Tables A8 and A9 we report the linear effect estimate for each of the mothers' outcomes. Most of the estimates are positive and significantly different

from zero. The pattern of positive or no effects in these two tables is consistent with the estimates we present in earlier tables. For example, the intensity of treatment measured as number of years in the program has no effect on mothers' role in decision making regarding food expenditure, having children and use of contraceptives (Table A8), which is exactly in line with the evidence presented in Tables 8-9, where we use a simple indicator of program participation as a measure of treatment.

Next, we re-estimated the effect on mothers' and children's outcomes by two subsamples -- whether the treated enrolled in the program before 2007 or from 2007. Enrollment in early years is positively correlated with the length of time mothers were in the program, and therefore it is an alternative approach to assess the effect of treatment intensity. The resulting estimates are reported in panels A of Tables A10-A11. Overall, the estimated effects on labor market outcomes, mothers' economic and social independence and mothers' care of children are larger for early participants than participants who joined later. For example, the effect on probability of making intra-household decisions among mothers who joined the program early is 0.195, while for later participants (from 2007) this effect is small and non-significant. The results based on the pooled sample of 2012 and 2013 present a similar pattern. The results presented in Tables A12-A13 suggest that the effect on children's overall summary indices for mothers who started the program before 2007 is positive and significant (0.138, $se=0.063$), whereas it is smaller and not significant for mothers who enrolled in the program later (0.109, $se=0.094$). However, we cannot reject the possibility that the two estimates are not statistically different from each other.

5.3 Effect on Children's Outcomes

The estimated effect of the program on children's outcomes are presented in Table 12. In the first row we present the program impact on summary index of children's outcomes and in rows 2-4 we present the estimates on the specific outcomes that make this index.²⁷ The effect on the summary index is based on fewer observations than the sample size of each of the detailed outcomes because there are missing values for some of these outcomes, mostly for test scores, because not all the children were tested in both subjects. The estimated effect on the summary index of children's outcomes is positive and significant, 0.195 ($se=0.055$), suggesting that children are positively affected by participating in the *PelCa* program. We note again that this estimate is not sensitive at all to adding child, household demographics and household economics controls, nor to the entropy balancing.

The estimated effect on the average of the test scores in Spanish language and mathematics is

²⁷ The effect on the summary index is estimated through a seemingly uncorrelated regression which considers only outcome observations that are all observable. However, when looking at data on children's report cards, 193 out of 383 report cards do not contain information about non-cognitive II index (i.e. the school absence and the behavior of the child) and, therefore, the non-cognitive II outcomes are excluded in the overall summary index. Specifically, the overall summary index is made up of outcomes of tests scores, schooling dropout and grade repetition, and non-cognitive I: attitudes towards schooling.

0.115 (se=0.103) when including all the controls. This implies that treated children have marginally higher school performance. This effect becomes clearer when we divide the children's sample by gender. Table 13 reports the heterogeneous effects on children's outcomes by gender and mothers' education. In columns 1 and 2, the estimated summary indices are based on 191 girls and 192 boys, separately. The *PelCa* program increased girls' average test score by 0.378 (se=0.144) and boys' by 0.012 (se=0.147). The effect on girls is larger and precisely measured and the difference between the two groups is statistically significant. The F-test statistic for this difference is 3.146, significant at 10 percent level. These results are different from Rosero and Oosterbeek (2011), who do not find significant gender differences in the (positive) treatment effects of home visits on children's cognitive outcomes. The High Scope Perry Preschool program however had stronger effects on female students (Heckman et al. 2013).

We also estimated the program effect on this cognitive outcome when we stratified the child sample by the mother's educational levels. The results are presented in Table 13, columns 3-4. We divide the full sample of children into two groups according to whether their mothers had completed primary school; our data show that 207 mothers finished up to primary school, and 176 mothers have more than primary education. The estimates in columns 3-4 suggest that the effect of the program on this cognitive index is higher for children of less educated mothers (0.341, se=0.117). The respective estimated effect on children with more educated mothers is actually negative though imprecisely measured (-0.193, se=0.154). F-statistics for group differences in the treatment effects are reported in square brackets and show that the estimated impacts for the two groups are significantly different. The negative effect on children of more educated mothers could be related to the higher employment rate of these mothers before and after they joined the program and also to the lower increase in child investment during the program. We have noted above the lower gain in early childhood investment in children of educated mothers that could be explained by the small impact the program had on time inputs of these mothers into child rearing. The estimates presented in Table 13 columns 5-6 provide additional support for this explanation. In these columns we present program effect on stratified samples by mother's pre-program employment status and find that the effect of the program on test scores was much higher for the sample of children whose mother did not work at baseline, 0.302 (se=0.180) versus -0.092 (se=0.122).

The effect size on children's dropout rates and grade repetition presented in Table 12 is -0.192 (se=0.082) in a specification without covariates; it practically remained unchanged, -0.182 (se=0.073), when adding all the relevant controls, clearly indicating that treated children generally have improved educational attainment due to the program. The estimates presented in Table 13 suggest that impacts on girls' dropout rate or grade repetition (-0.256, se=0.089) are larger than on boys' (-0.087, se=0.116), and the difference is marginally significant. The negative effect on these outcomes is in line with evidence from other pre-school early childhood programs such as the Abecedarian project, the High Scope Perry Preschool program and the Chicago Child-Parent Centers, where grade retention is significantly

lowered for treated students (Nores et al. 2005, Temple and Reynolds 2007).

In Table 12 we also observe that the estimated effect on children's attitudes towards schooling (non-cognitive I) is less precise (0.104, se=0.075). However, when the sample is stratified by gender (Table 13), the point estimate is positive and significant among male participants. The estimated effect on this index is 0.231 (se=0.100) for boys, and smaller for girls (0.137, se=0.105).

Among 383 children, 190 have information on their report cards about school absence and behavior in school (non-cognitive II). The estimated mean effect size of the program is 0.286 and is statistically significant at 5 percent level. In particular, in Table 13 we present a virtually large improvement in the school attendance and behavior for children whose mothers have poorer educational background (0.483, se=0.131). On the other hand, it seems that children who have more-educated mothers, after participating in the program, did not make a progress in this dimension, compared to controlled children with better educated mothers.

Results Based on Relative Measures of Children's Non-cognitive Skills

Next, we apply the approach described in Section 4.3 to create the factor scores of children's relative non-cognitive skills, which can be viewed as measures relative to the cognitive skills by construction. We propose two specifications of the factor model to predict the relative measure of non-cognitive skills. First, Duckworth and Tsukayama (2012) and Borghans et al. (2011) have empirically shown that standard non-cognitive measures are correlated with students' scores. We then assume that tests scores depend on cognitive skills, and remaining outcomes depend on both cognitive and non-cognitive skills. This results in a non-cognitive skill factor that is relative to students' test scores (panels A of Tables 14-15). Second, one might argue that schooling dropout and grade repetition outcomes, which are measures of students' perseverance, could also be direct functions of cognitive outcomes. Then we further allow the dropout and repetition variables to depend on the cognitive skill factor; and as a consequence, this specification generates a non-cognitive skills factor which is relative to test scores, and the schooling dropout and grade repetition as well (panels B of Tables 14-15). Furthermore, considering that only half of the children provided their report card information, we construct our relative non-cognitive skill variable in two different ways, namely Non-cognitive Skills I and Non-cognitive Skills II. The first measure is constructed on the basis of outcomes including schooling dropout, grade repetition, whether the child likes school (from both their own and their mothers' points of view), and whether the child chooses books as a gift. The Non-cognitive Skills II further includes outcomes of school absence and behavior in school. It has a smaller sample size as it is based on the children's sample whose report cards contain relevant information about absence and behavior in school.

The estimated results are presented in Tables 14-15. Table 14 shows positive and significant treatment effects of the program on children's relative non-cognitive skills, based on both the

unweighted sample and the reweighted sample by entropy balance. In Table 15, we stratify the sample by children's gender, mothers' pre-treatment educational levels and working status. The point estimates on the two relative non-cognitive skills variables consistently suggest that both male and female students made progress on their non-cognitive skills through their participation in the *Pelca* program. The estimates for the female student subsample are higher and statistically stronger than those for the male students, though the statistical difference of effects by gender are insignificant. The estimates within subsamples by mothers' educational attainment show that children of less educated mothers benefited more from the program as seen from columns 3-4 of Table 15. These estimates are positive and statistically significant, while they are small and insignificant for children of more educated mothers. In comparison to the results based on the original non-cognitive measures presented in Tables 12-13, the estimates in Tables 14-15, based on the full or stratified samples, tell pretty much the same story.

Moreover, after separating the cognitive component from non-cognitive measures, regressions by mothers' pre-treatment working status show that the treatment effects on children whose mothers did not work before are higher than children whose mothers worked before (columns 5-6 of Table 15). However, this is slightly opposite to the estimates using unadjusted non-cognitive measure presented in Table 13, which show that children of mothers with prior work experience had a larger improvement in their non-cognitive skills. Nonetheless, F-test statistics (columns 5-6 of both Table 13 and 15) indicate that these differences are fairly insignificant.

6. Robustness Checks

Evidence on Entropy Balancing: In this section we examine whether treatment effects are robust to reweighting the sample with entropy balancing. The results after imposing entropy balancing are reported in columns 4-6 of Tables 4, Tables 7-12, Table 14 and online appendix Tables A3-A6. With respect to mothers' outcomes, we also calculate summary indices for the reweighted sample. The estimated effects on the indices of mothers' labor-market outcomes, independence and household decision-making exhibit similar patterns to those previously reported. The estimated impacts on summary indices tend to suggest a slightly larger overall effect on mothers' employment in 2012 (0.577 vs. 0.482 in Table 7). However, the 95 percent confidence interval with re-weighting (0.388, 0.766) overlaps with the confidence interval without re-weighting. The pooled data in Table 8 tell the same story. When it comes to disaggregated labor-market outcomes of mothers, the estimated parameters remain roughly the same: in 2012 treated mothers are 21.6 percent more likely to be working (the estimated coefficient in the reweighted sample is slightly higher than in the sample without reweighting, where we estimated a 17.6 percent increase), 23.4 percent more likely to be working full-time (20.7 percent without reweighting), and 22.0 percent more likely to be working in the formal sector (20.4 percent without reweighting). These estimates are not statistically different from the estimates in the

original sample. The same pattern is observed regarding the estimated effects on average monthly family income in 2012, and mothers' wage in 2013.

The estimated effect on mother's independence does not change much either when we use the entropy re-weighting. Treated mothers are 20.5 percent more likely to control their own money, consistent with the 22.2 percent likelihood we found earlier. The effects of the program on other outcomes are also similar to previous results: treated mothers in the reweighted sample are approximately 9.5 percent more likely to be studying in 2012 or 2013 or both, and they are about 11.6 percent more likely to participate in making the decision on their job status. We find small effects on mothers' engagement in social voluntary activities. Again, the confidence interval at 1 percent for economic and social independence outcomes based on the reweighted sample overlaps greatly with the estimates using the original sample.²⁸

The estimated effects on intra-household decision-making also exhibit the same pattern with entropy re-weighting: positive effect on mother's power in decisions on children's education and children's discipline (columns 4-6 in Tables 9-10) and no significant effect on other decision-making outcomes. The estimated aggregate effect on intra-household decision-making in 2012 is 0.124 (statistically significant at the 1 percent level), which is, again, almost identical to the previous result without re-weighting (0.126). In the pooled data, the estimated effects on the indices using the weighted data are smaller and less significant, which is consistent with our finding using the unweighted data, partly because the effects on the additional outcomes in the panel data are negligible.

The estimated effects on mothers' child investment are similar after we re-weighted the sample. The magnitudes of coefficients on the summary index and the detailed outcomes, albeit being statistically weaker, are still positive and remain within reasonable distance of the unweighted estimates.

We present the estimated effects on the children sample adjusted by entropy balancing in Table 12 (columns 4-6). We find the very same pattern that we found in the unadjusted data. Estimated effects on the non-cognitive I: attitude towards schooling become slightly larger and more statistically significant based on the reweighted sample. The estimates on test scores and educational attainment are also consistent with those found in the original sample.

We also check whether improved women's status hinders men's status in the family. Reassuringly, we find no evidence of a change in the economic status of fathers with entropy-balancing either.

Attrition Analysis: A potential concern in our paper is attrition bias. Since mothers can enroll in *PelCa* soon after their child's first birthday and up to age 5, and then enroll in the *PelCa* school program, participation in the program can be up to twelve years. Mothers who remained in the program for longer may be different to mothers who decided to leave earlier. Therefore, the sample of treated mothers

²⁸ This is true both for 2012 data and the pooled data.

might be different to the mothers in the control group. To examine this potential threat to our identification strategy, we take advantage of a sample of mothers and children who enrolled in the *PelCa* program between 2004 and 2013 and left the program between 2005 and 2015. For this sample we have information on mothers' characteristics such as age, living status, working status and highest educational level, and age of their child who was enrolled in the program. This sample includes 311 mothers and 430 children.

We first restricted this "attrite" sample to 172 mothers and 258 children who joined the *PelCa* program during the same period that the treated mothers joined the program, namely between 2005 and 2009. We find that the two groups are very well balanced in terms of their pre-program characteristics (column 4 of Table A7 in the online appendix). This result is unchanged even if we restrict further the attrite sample to mothers and children who joined the program between 2005 and 2009 and left it after 4 years (column 5 of Table A7).

One important difference between the two samples is that all treated children have reached primary school age by 2012 and moved to the school-*PelCa* program while 67 out of 258 attrite children (25.97 percent) were still in the pre-school *PelCa* program. We therefore limit further the attrite sample to mothers whose children were all in the school-*PelCa* program when they left the program. The means of the pre-program characteristics of the attrite group, the treatment group and the control group are presented in columns 1-3 of Table 17. T-tests on pre-program differences of mothers' pre-characteristics (mother's age, number of children in 2005, living status, working status and highest educational level) and in child's age before entering the program are well balanced at 10 percent level of significance. The results of this comparison between the attrite and treatment groups are presented in column 4 and the attrite and the control group in column 5. We think this evidence suggests that the decision to leave the program is not correlated with observed characteristics of mothers and children, which raises the likelihood that they are also uncorrelated with their unobserved characteristics.

Additional Robustness Checks: Our analysis relies on the similarity between treatment and control groups. However, we note that 10 percent of mother or child characteristics were not balanced at the 10 percent significance level. We interpreted this difference in pre-treatment observables characteristics as random, as might happened even in a randomly assigned treatment and control groups. We think that the close similarity between the control and treatment groups results from the similar self-selection of mothers into the two groups, as both have shown their desire to participate in the program. In support of this identification approach we show below that mothers who decided to participate in the program in 2012 did not participate before for reasons that do not affect the outcomes we study. For example, we found some imbalance in mothers working status before joining or showing interest in joining the program. We therefore re-do the analysis by subsamples: first we analyze the treatment effects in the group of treated and control mothers who were not working at baseline, and secondly in a sub-sample of treated and control mothers who were working at baseline (2005). The estimated treatment effects

obtained from these two sub-samples are very similar and they are also very similar to the estimates we obtained from the full sample. This evidence rules out the possibility that our results are driven by non-comparable treatment and control groups in terms of employment rate at baseline.

It is still important, however, to understand why control group mothers did not enroll in the program previously. From the Figure 2 in the online appendix, we can see that a high proportion of mothers did not enroll in the program because they did not know about it (44.55 percent); about a quarter of mothers because they lived too far from the NGO offices (25.74 percent); some had problems with their application forms, for example, losing the forms (11.88 percent), and some because of a previous affiliations with other NGOs in the area (8.91 percent). These responses exclude the possibility that mothers chose not to enroll in the program because they questioned its effectiveness. We also note here that none of these explanations are correlated with the previous working condition or with working full-time before.

As a further robustness check, we re-estimate all models by limiting the sample to the 45 out of 115 control mothers who did not enroll in the program because of their unawareness of the program. Table A14 in the appendix presents the estimated average effect sizes on mothers' outcome using both 2012 data and the pooled data of 2012 and 2013. Reconciling two results using the original sample in Table 4, we find that the estimated effects on mothers' outcomes using this 45 mothers' sub-sample are slightly higher, though they are generally very similar to what we have found using the full sample.

Moreover, we also re-estimate all models by restricting the sample to the control mothers who did not enroll in the program either because they were already affiliated with another NGO, or because there was a problem with their application forms. The first group of control mothers, if anything, should be more attentive than treated mothers. The second group can be interpreted as randomly assigned to the control group. Unfortunately the sample here is very small (21 mothers): the estimated effects we obtain from this sample are qualitatively similar to those obtained from the full sample, but they are much less precisely estimated.

As a final robustness check, we also re-estimate the various models using propensity score matching. Using the mothers' sample in the 2012 data, we find that 281 out of 283 individuals are in the common support of the estimated propensity score, which reassures that the treated sample and the control sample are quite balanced. The propensity score is estimated via a standard probit regression on all observable covariates, and the results are not sensitive if a logit regression is used instead. In the nearest neighbor matching algorithm, 64 control mothers are matched to 166 treated mothers. 100 bootstrap replications are repeated to correct the standard errors from the matching. As indicated above, we prefer the entropy balancing which allows us to maintain the sample size, even though when we

reduce the sample size through propensity score matching, we obtain very similar results.²⁹

7. Conclusions

In this paper we analyze an innovative method to empower women and increase their early childhood investment in their children. *PelCa*, a home-preschool program, placed the mother at the center of her children's education, and provided guidance and training for achieving its goals. Relying on a 'designed' quasi-natural experiment, we are able to identify and measure the causal effects of this program on both mothers and children after several years of program participation.

First, we find that the intervention empowers women across different domains. It facilitates their entry into the labor market: treated mothers are much more likely to be working, more likely to be working full-time and more likely to be working in the formal sector. All of these estimates are precisely measured and are robust to the inclusion of covariates. Moreover, treated mothers become more financially independent and more likely to manage and make spending decisions about their own money; to be studying; and to decide whether they can work outside of the home. The results suggest that after joining the *PelCa* program, mothers are also willing to spend more time interacting with their children, on cognitive or social activities. The treatment further modifies the allocation of power in the house: mothers become more likely to take part in decisions about children's education and discipline. However, we find no effect on mother's role in decisions about what to do when the child is ill, about various types of expenditures, about having children, or the use of contraceptives. Treatment intensity plays a role here: the longer the mother stays in the program, the more empowered she becomes within the household. Moreover, mothers who were less empowered at baseline are the ones who gain the most in terms of advancing their role in decisions about the household and the allocation of resources.

All of the above results hold when we estimate aggregate treatment impacts, use summary indices instead of individual outcomes in order to account for multiple inference, when we use entropy balancing to adjust for differences in pre-treatment covariates, and when we use other robustness checks.

We also evaluate the program's impact on children. We firstly examine children's cognitive tests. The estimated impact on the summary index of cognitive achievement of treated children is positive but only marginally significant. But the average treatment effect disguises meaningful heterogeneity. Girls in the program appear to make large positive progress in test scores but there is no corresponding effect on boys; children whose mothers have a lower educational attainment benefit much more from the program in terms of improved cognitive tests than children of more educated mothers. Our findings also suggest that there are differential treatment effects by mothers' pre-treatment working status and that children with less-educated mothers at baseline (before enrolling in the program) show more

²⁹ These results are not presented in the paper and are available from the authors.

improvements in their cognitive testing.

Moreover, consistent with findings from other pre-school programs, students in the *PelCa* program are much less likely to drop out of school or to repeat a grade. These effects are marginally larger for female students, but the difference between genders is not significant. We also find significant treatment effects on children's non-cognitive skills. After participating in the *PelCa* program, children exhibit less school absence and better behavior at school, and the male students appear to have better attitudes towards schooling. Overall, there is evidence that the home-preschool program that we study helped mothers raise their children in a more learning conducive environment, which led to positive effects on children, as well as on empowering mothers at home and in the community.

8. References

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Table 1: Mothers' Characteristics and Pre-program Outcomes (2012)

| | Treatment mean | Control mean | Difference in means | Std. error |
|--|-------------------|-----------------|------------------------|------------|
| | (1) | (2) | (3) | (4) |
| <i>A: Mothers' characteristics before Treatment</i> | | | | |
| Age | 31.988 | 31.183 | 0.805 | (0.729) |
| From Quito | 0.560 | 0.496 | 0.065 | (0.061) |
| Parents from same city | 0.510 | 0.456 | 0.053 | (0.064) |
| Live together with partner | 0.801 | 0.817 | -0.016 | (0.048) |
| Divorced/separated/widow | 0.018 | 0.009 | 0.009 | (0.014) |
| Single | 0.181 | 0.174 | 0.007 | (0.047) |
| Number of children in 2005 | 1.849 | 1.632 | 0.218 | (0.180) |
| Did not complete primary | 0.114 | 0.148 | -0.033 | (0.041) |
| Completed primary | 0.392 | 0.374 | 0.018 | (0.059) |
| Did not complete secondary | 0.295 | 0.304 | -0.009 | (0.056) |
| Completed secondary | 0.169 | 0.165 | 0.003 | (0.045) |
| Started university | 0.024 | 0.009 | 0.015 | (0.016) |
| Not religious | 0.096 | 0.070 | 0.027 | (0.034) |
| Christian | 0.831 | 0.861 | -0.030 | (0.044) |
| <i>B: Mothers' pre-program outcomes</i> | | | | |
| Manage own money | 0.582 | 0.526 | 0.056 | (0.061) |
| Worked | 0.470 | 0.609 | -0.139** | (0.060) |
| Worked full-time | 0.551 | 0.729 | -0.177** | (0.078) |
| Self-employed | 0.808 | 0.786 | 0.022 | (0.067) |
| Worked in the formal sector | 0.256 | 0.300 | -0.044 | (0.074) |
| Mean firm size | 10.182 | 12.739 | -2.557 | (5.855) |
| <i>Reason Not Working</i> | | | | |
| Because of children | 0.333 | 0.252 | 0.081 | (0.056) |
| Because there was no job | 0.073 | 0.078 | -0.006 | (0.032) |
| Because partner does not want | 0.073 | 0.052 | 0.021 | (0.030) |
| Other reasons | 0.048 | 0.009 | 0.040* | (0.021) |
| <i>Joint Decision with Spouse</i> | | | | |
| Child's education | 0.899 | 0.875 | 0.024 | (0.066) |
| Own health | 0.963 | 0.968 | -0.005 | (0.040) |
| Discipline | 0.875 | 0.903 | -0.028 | (0.069) |
| Expenditures | 0.764 | 0.693 | 0.071 | (0.054) |
| Food expenditures | 0.758 | 0.789 | -0.032 | (0.051) |
| Own labor force participation | 0.800 | 0.770 | 0.030 | (0.050) |
| Having children | 0.878 | 0.858 | 0.020 | (0.041) |
| Contraceptives | 0.896 | 0.856 | 0.040 | (0.040) |
| F(23, 36) = 1.2918 | | | | |
| Prob > F = 0.2402 | | | | |
| Observations | 166 | 115 | 281 | |

Notes: Statistics are based on the 2012 survey of mothers. Standard errors are presented in parentheses in the column (4); * p < 0.1, ** p < 0.05, *** p < 0.01. An F-test on the overall significance of the pre-treatment variables is shown at the end of the table.

Table 2: Children's Characteristics before Treatment (2012)

| | Treatment mean | Control mean | Difference in means | Std. error |
|----------------------------------|-------------------|-----------------|------------------------|------------|
| | (1) | (2) | (3) | (4) |
| Female | 0.521 | 0.470 | 0.051 | (0.052) |
| Age | 8.344 | 8.835 | -0.491** | (0.198) |
| Mean birth order | 2.023 | 1.878 | 0.145 | (0.136) |
| 1 younger sibling in 2005 | 0.201 | 0.201 | -0.000 | (0.041) |
| 2 younger siblings in 2005 | 0.027 | 0.049 | -0.021 | (0.019) |
| 3 younger siblings in 2005 | 0.000 | 0.006 | -0.006 | (0.005) |
| Height at birth (cm) | 48.258 | 48.790 | -0.531 | (0.462) |
| Weight at birth (gram) | 3046.155 | 3029.197 | 16.957 | (74.818) |
| Head circumference at birth (cm) | 33.723 | 33.572 | 0.151 | (0.283) |
| Dummy grade 1/2 | 0.320 | 0.305 | 0.015 | (0.048) |
| Dummy grade 3/4 | 0.365 | 0.348 | 0.018 | (0.050) |
| Dummy grade 5/6 | 0.242 | 0.268 | -0.026 | (0.045) |
| Dummy grade 7 | 0.073 | 0.079 | -0.006 | (0.027) |
| F(11, 103) = 1.3029 | | | | |
| Prob > F = 0.2334 | | | | |
| Observations | 219 | 164 | 383 | |

Notes: Statistics are based on the 2012 survey of children. Standard errors are presented in parentheses in the column (4); * p < 0.1, ** p < 0.05, *** p < 0.01. An F-test on the overall significance of the pre-treatment variables is shown at the end of the table.

Table 3: Treatment-Control Mean Comparisons of Outcomes and Summary Indices

| | 2012 sample | | | | Pooled 2012 and 2013 | | | |
|---|--------------|--------------|-----------------|----------------|----------------------|--------------|-----------------|----------------|
| | Treatment | Control | Difference | Std. | Treatment | Control | Difference | Std. |
| | Mean | Mean | (1)-(2) | Error | Mean | Mean | (5)-(6) | Error |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| <i>A: Labor market outcomes (mothers)</i> | | | | | | | | |
| Summary index | 0.497 | 0.000 | 0.497*** | (0.071) | 0.559 | 0.000 | 0.559*** | (0.062) |
| Works | 0.693 | 0.487 | 0.206*** | (0.058) | 0.767 | 0.546 | 0.221*** | (0.042) |
| Working full-time | 0.378 | 0.157 | 0.222*** | (0.054) | 0.416 | 0.199 | 0.217*** | (0.042) |
| Working with contract | 0.279 | 0.087 | 0.192*** | (0.047) | 0.272 | 0.082 | 0.190*** | (0.036) |
| Average family monthly income | 344.848 | 300 | 44.848** | (20.526) | -- | -- | -- | -- |
| Weekly wage [†] | -- | -- | -- | -- | 46.727 | 28.559 | 18.168*** | (4.460) |
| <i>B: Economic and social independence (mothers)</i> | | | | | | | | |
| Summary index | 0.319 | 0.000 | 0.319*** | (0.064) | 0.251 | 0.000 | 0.251*** | (0.047) |
| Manage own money | 0.661 | 0.447 | 0.213*** | (0.059) | 0.681 | 0.487 | 0.194*** | (0.044) |
| Participates in voluntary activities | 0.639 | 0.562 | 0.077 | (0.066) | 0.584 | 0.550 | 0.034 | (0.048) |
| Currently studying | 0.133 | 0.052 | 0.081** | (0.036) | 0.114 | 0.051 | 0.063** | (0.026) |
| Own or joint decision on own work status | 0.927 | 0.805 | 0.122*** | (0.039) | 0.956 | 0.871 | 0.085*** | (0.024) |
| <i>C: Intra-household decision-making (mothers)</i> | | | | | | | | |
| Summary index | 0.093 | 0.000 | 0.093** | (0.043) | 0.085 | 0.000 | 0.085*** | (0.028) |
| Own/joint decision on child's education | 0.952 | 0.852 | 0.099*** | (0.034) | 0.973 | 0.897 | 0.076*** | (0.021) |
| Own/joint decision on own health | 0.945 | 0.93 | 0.016 | (0.029) | 0.953 | 0.928 | 0.025 | (0.021) |
| Own/joint decision on child's discipline | 0.921 | 0.833 | 0.087** | (0.039) | 0.939 | 0.856 | 0.083*** | (0.027) |

| | | | | | | | | |
|--|-------|-------|--------|---------|-------|-------|---------|---------|
| Own/joint decision on expenditure | 0.805 | 0.754 | 0.05 | (0.050) | 0.819 | 0.732 | 0.087** | (0.038) |
| Own/joint decision on food expenditure | 0.806 | 0.789 | 0.017 | (0.049) | 0.827 | 0.794 | 0.033 | (0.036) |
| Own/joint decision on having children | 0.963 | 0.956 | 0.007 | (0.024) | 0.959 | 0.958 | 0.001 | (0.018) |
| Own/joint decision on contraceptives | 0.920 | 0.946 | -0.026 | (0.031) | 0.918 | 0.957 | -0.039* | (0.023) |
| Own/joint decision on own health | -- | -- | -- | -- | 0.906 | 0.918 | -0.011 | (0.026) |
| Own/joint decision on if mothers can visit | -- | -- | -- | -- | 0.878 | 0.857 | 0.020 | (0.031) |
| Own/joint decision on important matters | -- | -- | -- | -- | 0.899 | 0.837 | 0.062** | (0.030) |

D: Child's investment (mothers)

| | | | | | | | | |
|--|--------------|--------------|-----------------|----------------|----|----|----|----|
| Summary index | 0.166 | 0.000 | 0.166*** | (0.053) | -- | -- | -- | -- |
| Talk to child (weekly) | 0.988 | 0.965 | 0.022 | (0.018) | -- | -- | -- | -- |
| Listen and talk to child about child's readings (weekly) | 0.891 | 0.809 | 0.082* | (0.042) | -- | -- | -- | -- |
| Visit library with child (weekly) | 0.115 | 0.087 | 0.028 | (0.037) | -- | -- | -- | -- |
| Plays or dances with child (weekly) | 0.988 | 0.928 | 0.060*** | (0.023) | -- | -- | -- | -- |

E: Self-esteem, Big Five Personality Traits and Fertility Choices (mothers)

| | | | | | | | | |
|---|--------------|--------------|--------------|----------------|----|----|----|----|
| Summary index^{††} | 0.030 | 0.000 | 0.030 | (0.041) | -- | -- | -- | -- |
| Rosenberg scale | 3.141 | 3.107 | 0.034 | (0.056) | -- | -- | -- | -- |
| Agreeableness | 3.399 | 3.414 | -0.015 | (0.067) | -- | -- | -- | -- |
| Conscientiousness | 3.724 | 3.714 | 0.010 | (0.078) | -- | -- | -- | -- |
| Extraversion | 3.086 | 3.166 | -0.080 | (0.066) | -- | -- | -- | -- |
| Neuroticism | 3.044 | 2.964 | 0.080 | (0.070) | -- | -- | -- | -- |
| Openness to Experience | 3.570 | 3.507 | 0.063 | (0.075) | -- | -- | -- | -- |
| Pregnant | 0.018 | 0.035 | -0.017 | (0.019) | -- | -- | -- | -- |
| More children (including pregnant women)? | 0.217 | 0.149 | 0.068 | (0.048) | -- | -- | -- | -- |

F: Labor market outcomes (fathers)

| | | | | | | | | |
|----------------------|---------------|--------------|----------------|----------------|--------------|--------------|---------------|----------------|
| Summary index | -0.120 | 0.000 | -0.120. | (0.076) | 0.018 | 0.000 | 0.018. | (0.052) |
| Working | 0.953 | 0.970 | -0.017 | (0.025) | 0.891 | 0.885 | 0.006 | (0.030) |
| Working full-time | 0.860 | 0.890 | -0.03 | (0.043) | 0.817 | 0.785 | 0.032 | (0.038) |

| | | | | | | | | |
|---|---------------|--------------|------------------|----------------|-------|-------|--------|---------|
| Working with contract | 0.480 | 0.550 | -0.07 | (0.065) | 0.428 | 0.451 | -0.023 | (0.047) |
| <i>G: Children's outcomes</i> | | | | | | | | |
| Overall summary index^{†††} | 0.170 | 0.000 | 0.170*** | (0.032) | -- | -- | -- | -- |
| Test scores summary index | 0.117 | 0.000 | 0.117* | (0.069) | -- | -- | -- | -- |
| Language test | 0.076 | -0.058 | 0.134 | (0.110) | -- | -- | -- | -- |
| Maths test | 0.049 | -0.039 | 0.088 | (0.113) | -- | -- | -- | -- |
| Schooling dropout and grade repetition summary index | -0.192 | 0.000 | -0.192*** | (0.056) | -- | -- | -- | -- |
| Repeats at least once | 0.023 | 0.085 | -0.062*** | (0.022) | -- | -- | -- | -- |
| Child temporarily leaves | 0.014 | 0.049 | -0.035** | (0.017) | -- | -- | -- | -- |
| Non-Cognitive I: Attitude towards schooling | 0.153 | 0.000 | 0.153**. | (0.059) | -- | -- | -- | -- |
| Child likes school | 0.010 | -0.040 | 0.050 | (0.104) | -- | -- | -- | -- |
| Child likes school (mother's perspective) | 0.111 | -0.237 | 0.348*** | (0.103) | -- | -- | -- | -- |
| Child chose a book as gift | 0.249 | 0.217 | 0.031 | (0.045) | -- | -- | -- | -- |
| Non-Cognitive II: Absences and behavior in school^{††††} | 0.227 | 0.000 | 0.227*** | (0.075) | -- | -- | -- | -- |
| School absence in report card | -3.878 | -4.506 | 0.628 | (0.653) | -- | -- | -- | -- |
| Behavior of child in report cards | 18.514 | 18.254 | 0.260 | (0.165) | -- | -- | -- | -- |
| Observations of mothers/fathers | 166 | 115 | 281 | | 300 | 196 | 496 | |
| Observations of children | 219 | 164 | 383 | | | | | |

Notes: In each panel, statistics for summary index of corresponding outcomes are reported in shading rows. Each summary index of multiple outcomes is calculated by the z-score (See section 5.1 and Kling et al., 2007 for details). Standard errors are presented in parentheses in columns (4) and (8) * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

† Estimated results for mother's weekly wage is based on the data of 2013;

†† This summary index is constructed by only outcomes of Rosenberg self-esteem scale and Big Five Personality Traits.

††† Signs of outcomes of schooling dropout and grade repetition are reversed when calculating the overall summary index of children's outcomes.

†††† Signs of the outcome of school absence in report card are reversed in this summary index.

Table 4: Estimated Effects on Mothers' Outcomes: Summary Indices

| | Not weighted | | | Weighted | | |
|---|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| <i>A: Sample based on 2012 survey</i> | | | | | | |
| Labor market outcomes | 0.494*** (0.100) | 0.467*** (0.099) | 0.482*** (0.098) | 0.581*** (0.114) | 0.577*** (0.101) | 0.577*** (0.096) |
| Economic and social independence | 0.295*** (0.074) | 0.336*** (0.075) | 0.366*** (0.076) | 0.249*** (0.089) | 0.275*** (0.081) | 0.302*** (0.070) |
| Intra-household decision-making | 0.119** (0.055) | 0.118** (0.056) | 0.126** (0.057) | 0.126* (0.072) | 0.125** (0.061) | 0.124** (0.055) |
| Child investment | 0.175*** (0.061) | 0.209*** (0.063) | 0.207*** (0.065) | 0.213** (0.095) | 0.219** (0.091) | 0.212** (0.085) |
| Self-esteem and Big Five Personality Traits | 0.038 (0.065) | 0.033 (0.067) | 0.045 (0.068) | 0.060 (0.083) | 0.060 (0.090) | 0.063 (0.083) |
| Observations | 281 | 281 | 281 | 281 | 281 | 281 |
| <i>B: Pooled sample of 2012 and 2013</i> | | | | | | |
| Labor market outcomes | 0.554*** (0.099) | 0.502*** (0.103) | 0.503*** (0.098) | 0.660*** (0.116) | 0.664*** (0.105) | 0.665*** (0.102) |
| Economic and social independence | 0.231*** (0.054) | 0.259*** (0.055) | 0.276*** (0.056) | 0.263*** (0.072) | 0.285*** (0.061) | 0.288*** (0.062) |
| Intra-household Decision-making | 0.106** (0.053) | 0.101** (0.051) | 0.093* (0.051) | 0.076 (0.068) | 0.068 (0.056) | 0.070 (0.052) |
| Observations | 496 | 496 | 496 | 496 | 496 | 496 |
| Child Controls | No | Yes | Yes | No | Yes | Yes |
| Household Demographics | No | Yes | Yes | No | Yes | Yes |
| Household Economics | No | No | Yes | No | No | Yes |

Notes: Each cell reports the estimated mean effect from a separate regression. Columns (1)-(3) present results using the original sample without entropy balancing. Columns (4)-(6) stem from the weighted sample adjusted by entropy balancing. Standard errors are presented in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Estimated Effects on Mothers' Outcomes by Pre-Treatment Outcomes Heterogeneity (2012)

| | Mothers' pre-treatment employment status | | Mothers' education | | Mothers' pre-treatment role in decision-making | |
|--|--|---------------------|---------------------------------|-----------------------------|--|---------------------|
| | Not worked before | Worked before | Up to primary schooling | More than primary schooling | Below average | Above average |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Labor market outcomes Index | 0.794*** (0.191) [4.120]** | 0.340*** (0.126) | 0.462*** (0.130) [0.514] | 0.611*** (0.163) | 0.729*** (0.145) [2.650]* | 0.394*** (0.131) |
| Economic and social independence Index | 0.351*** (0.120) [0.776] | 0.484*** (0.095) | 0.420*** (0.105) [0.049] | 0.386*** (0.113) | 0.482*** (0.118) [0.154] | 0.415*** (0.108) |
| Household decisions-making index | 0.213** (0.083) [1.191] | 0.086 (0.079) | 0.098 (0.076) [0.861] | 0.205** (0.087) | 0.197*** (0.073) [2.987]* | -0.017 (0.083) |
| Child investment Index | 0.059 (0.096) [5.586]** | 0.373*** (0.092) | 0.320*** (0.105) [2.890]* | 0.070 (0.100) | 0.219*** (0.103) [0.060] | 0.186** (0.086) |
| Observations | 133 | 148 | 144 | 136 | 93 | 179 |

Notes: Each cell reports the estimated aggregate effect on a summary index from a separate regression based on the 2012 survey. Covariates of child characteristics, household demographics and household economics are included in regressions. In columns (1) – (6), F-test (Chow-test) statistic for subgroup difference in treatment effects are presented in square brackets. Estimated results are based on the original sample without entropy balancing. Standard errors are presented in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Estimated Effects on Mothers' Outcomes by Gender of Child in the Program: Summary Indices (2012)

| | Boy | | | Girl | | |
|---|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Labor market outcomes | 0.582*** (0.147) | 0.493*** (0.137) | 0.534*** (0.135) | 0.466*** (0.125) | 0.479*** (0.123) | 0.500*** (0.122) |
| Economic and social independence | 0.272*** (0.096) | 0.308*** (0.094) | 0.323*** (0.094) | 0.379*** (0.107) | 0.447*** (0.102) | 0.471*** (0.105) |
| Intra-household decision-making | 0.059 (0.078) | 0.084 (0.080) | 0.079 (0.082) | 0.147** (0.067) | 0.128* (0.068) | 0.161** (0.066) |
| Child Investment | 0.226*** (0.085) | 0.265*** (0.087) | 0.268*** (0.090) | 0.141* (0.076) | 0.176** (0.081) | 0.193** (0.081) |
| Self-esteem and Big Five Personality Traits | 0.120 (0.087) | 0.172* (0.088) | 0.177** (0.089) | -0.026 (0.083) | -0.052 (0.085) | -0.021 (0.083) |
| Child Controls | No | Yes | Yes | No | Yes | Yes |
| Household Demographics | No | Yes | Yes | No | Yes | Yes |
| Household Economics | No | No | Yes | No | No | Yes |
| Observations | 159 | 159 | 159 | 165 | 165 | 165 |

Notes: Each cell reports the estimated effect obtained in a separate regression without entropy balancing. Columns 1-3 present results using the sample of mother with a boy in the program and columns 4-6 present estimates for the sample of mothers to girls in the program; * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 7: Estimated Effects on Labor Market Outcomes and Mothers' Economic and Social Independence (2012)

| | Not weighted | | | Weighted | | |
|---|----------------------|----------------------|----------------------|---------------------|---------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| A: Labor market outcomes | | | | | | |
| <i>Summary index</i> | 0.494*** (0.100) | 0.467*** (0.099) | 0.482*** (0.098) | 0.581*** (0.114) | 0.577*** (0.101) | 0.577*** (0.096) |
| Works | 0.206*** (0.058) | 0.172*** (0.061) | 0.176*** (0.062) | 0.213*** (0.081) | 0.216*** (0.069) | 0.216*** (0.066) |
| Working full-time | 0.222*** (0.054) | 0.205*** (0.057) | 0.207*** (0.059) | 0.233*** (0.061) | 0.238*** (0.052) | 0.234*** (0.051) |
| Working with contract | 0.192*** (0.047) | 0.202*** (0.048) | 0.204*** (0.049) | 0.221*** (0.044) | 0.223*** (0.041) | 0.220*** (0.041) |
| Average family monthly income | 44.848** (20.526) | 44.538** (21.189) | 44.479** (20.462) | 44.507* (24.849) | 43.193* (22.267) | 43.242** (20.884) |
| B: Mothers' economic and social independence | | | | | | |
| <i>Summary index</i> | 0.295*** (0.074) | 0.336*** (0.075) | 0.366*** (0.076) | 0.249*** (0.089) | 0.275*** (0.081) | 0.302*** (0.070) |
| Manage own money | 0.213*** (0.059) | 0.233*** (0.062) | 0.222*** (0.064) | 0.202** (0.082) | 0.204*** (0.067) | 0.205*** (0.065) |
| Participates in voluntary activities | 0.077 (0.066) | 0.105 (0.071) | 0.142* (0.072) | 0.069 (0.092) | 0.087 (0.076) | 0.105 (0.074) |
| Currently studying | 0.081** (0.036) | 0.111*** (0.039) | 0.123*** (0.040) | 0.087** (0.037) | 0.086** (0.036) | 0.095*** (0.034) |
| Own or joint decision on own work status | 0.122*** (0.039) | 0.115*** (0.042) | 0.132*** (0.044) | 0.112* (0.061) | 0.108** (0.054) | 0.116** (0.052) |
| Child Controls | No | Yes | Yes | No | Yes | Yes |
| Household Demographics | No | Yes | Yes | No | Yes | Yes |
| Household Economics | No | No | Yes | No | No | Yes |
| Observations | 281 | 281 | 281 | 281 | 281 | 281 |

Notes: Each cell reports the estimated treatment effect from a separate regression based on the 2012 survey. Estimated summary indices of corresponding outcomes are reported in shading rows. Columns 1-3 present results using the original sample without entropy balancing. Columns 4-6 stem from the weighted sample adjusted by entropy balancing. Standard errors are presented in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 8: Estimated Effects on Labor Market Outcomes and Mothers' Economic and Social Independence (Pooled 2012 and 2013)

| | Not weighted | | | Weighted | | |
|---|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| A: Labor market outcomes | | | | | | |
| <i>Summary index</i> | 0.554*** (0.099) | 0.502*** (0.103) | 0.503*** (0.098) | 0.660*** (0.116) | 0.664*** (0.105) | 0.665*** (0.102) |
| Works | 0.221*** (0.056) | 0.167*** (0.061) | 0.164*** (0.060) | 0.204** (0.081) | 0.204*** (0.068) | 0.204*** (0.067) |
| Working full-time | 0.217*** (0.049) | 0.192*** (0.053) | 0.194*** (0.052) | 0.240*** (0.055) | 0.241*** (0.050) | 0.241*** (0.050) |
| Working with contract | 0.190*** (0.038) | 0.193*** (0.038) | 0.193*** (0.037) | 0.218*** (0.036) | 0.218*** (0.035) | 0.218*** (0.034) |
| Weekly wage [†] | 18.168*** (4.460) | 14.848*** (4.852) | 13.331*** (4.874) | 18.504*** (5.713) | 17.886*** (4.999) | 17.081*** (4.966) |
| B: Mothers' economic and social independence | | | | | | |
| <i>Summary indices</i> | 0.231*** (0.054) | 0.259*** (0.055) | 0.276*** (0.056) | 0.263*** (0.072) | 0.285*** (0.061) | 0.288*** (0.062) |
| Manage own money | 0.194*** (0.050) | 0.187*** (0.052) | 0.178*** (0.051) | 0.146** (0.068) | 0.146*** (0.056) | 0.146*** (0.053) |
| Participates in voluntary activities | 0.034 (0.050) | 0.051 (0.053) | 0.067 (0.054) | 0.017 (0.073) | 0.019 (0.059) | 0.019 (0.055) |
| Currently in school | 0.063** (0.028) | 0.077** (0.031) | 0.085*** (0.031) | 0.087*** (0.028) | 0.088*** (0.028) | 0.088*** (0.027) |
| Own or joint decision on own work status | 0.085*** (0.029) | 0.093*** (0.030) | 0.104*** (0.031) | 0.120** (0.048) | 0.123*** (0.045) | 0.125*** (0.041) |
| Child Controls | No | Yes | Yes | No | Yes | Yes |
| Household Demographics | No | Yes | Yes | No | Yes | Yes |
| Household Economics | No | No | Yes | No | No | Yes |
| Observations | 496 | 496 | 496 | 496 | 496 | 496 |

Notes: Each cell reports the estimated treatment effect from a separate regression based on 2012 and 2013 surveys. Estimated summary indices of corresponding outcomes are reported in shading rows. Columns 1-3 present results using the original sample without entropy balancing. Columns 4-6 stem from the weighted sample adjusted by entropy balancing. Standard errors are presented in parentheses and are clustered at the maternal level. [†] Estimated results for mothers weekly wage is based on the data of 2013.

Table 9: Estimated Effects on Mothers' Intra-household Decision-making (2012)

| | Not weighted | | | Weighted | | |
|--|---------------------|---------------------|---------------------|--------------------|--------------------|--------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| <i>Summary index</i> | 0.119** (0.055) | 0.118** (0.056) | 0.126** (0.057) | 0.126* (0.072) | 0.125** (0.061) | 0.124** (0.055) |
| Own/joint decision on child's education | 0.099*** (0.034) | 0.099*** (0.038) | 0.102*** (0.039) | 0.143** (0.062) | 0.145** (0.059) | 0.143** (0.056) |
| Own/joint decision on child's health | 0.016 (0.029) | 0.003 (0.032) | 0.006 (0.032) | -0.019 (0.025) | -0.018 (0.025) | -0.018 (0.026) |
| Own/joint decision on child's discipline | 0.087** (0.039) | 0.081* (0.041) | 0.087** (0.042) | 0.117* (0.061) | 0.116* (0.060) | 0.115* (0.059) |
| Own/joint decision on expenditure | 0.050 (0.050) | 0.052 (0.054) | 0.069 (0.055) | 0.106 (0.077) | 0.106 (0.067) | 0.103 (0.063) |
| Own/joint decision on food expenditure | 0.017 (0.049) | -0.001 (0.051) | 0.017 (0.053) | 0.030 (0.078) | 0.031 (0.067) | 0.029 (0.062) |
| Own/joint decision on having children | 0.007 (0.024) | 0.007 (0.026) | 0.005 (0.027) | -0.004 (0.024) | -0.005 (0.023) | -0.006 (0.023) |
| Own/joint decision on contraceptives | -0.026 (0.031) | -0.008 (0.033) | -0.019 (0.034) | -0.027 (0.040) | -0.030 (0.030) | -0.030 (0.030) |
| Child Controls | No | Yes | Yes | No | Yes | Yes |
| Household Demographics | No | Yes | Yes | No | Yes | Yes |
| Household Economics | No | No | Yes | No | No | Yes |
| Observations | 281 | 281 | 281 | 281 | 281 | 281 |

Notes: Each cell reports the estimated treatment effect from a separate regression based on the 2012 survey. Estimated summary indices of corresponding outcomes are reported in shading rows. Columns 1-3 present results using the original sample without entropy balancing. Columns 4-6 estimates are based on the weighted sample adjusted by entropy balancing. Standard errors are presented in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 10: Estimated Effects on Mothers' Intra-household Decision-making (Pooled 2012 and 2013)

| | Not weighted | | | Weighted | | |
|--|---------------------|---------------------|---------------------|--------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| <i>Summary index</i> | 0.106** (0.053) | 0.101** (0.051) | 0.093* (0.051) | 0.076 (0.068) | 0.068 (0.056) | 0.070 (0.052) |
| Own/joint decision on child's education | 0.076*** (0.025) | 0.063*** (0.026) | 0.066*** (0.026) | 0.095** (0.035) | 0.095*** (0.031) | 0.095*** (0.030) |
| Own/joint decision on child's health | 0.025 (0.032) | 0.018 (0.034) | 0.021 (0.033) | 0.007 (0.032) | 0.007 (0.031) | 0.007 (0.031) |
| Own/joint decision on child's discipline | 0.083** (0.033) | 0.088** (0.036) | 0.086** (0.037) | 0.119** (0.056) | 0.119** (0.054) | 0.119** (0.053) |
| Own/joint decision on expenditure | 0.087 (0.055) | 0.083 (0.057) | 0.090 (0.057) | 0.104 (0.078) | 0.103 (0.064) | 0.104* (0.060) |
| Own/joint decision on food expenditure | 0.033 (0.052) | 0.011 (0.052) | 0.031 (0.051) | 0.031 (0.076) | 0.031 (0.065) | 0.031 (0.060) |
| Own/joint decision on important matters | 0.062 (0.045) | 0.058 (0.051) | 0.048 (0.052) | 0.016 (0.052) | 0.016 (0.047) | 0.015 (0.046) |
| Own/joint decision on having children | 0.001 (0.026) | 0.001 (0.026) | -0.003 (0.027) | -0.018 (0.022) | -0.018 (0.021) | -0.019 (0.021) |
| Own/joint decision on contraceptives | -0.039 (0.031) | -0.018 (0.033) | -0.024 (0.036) | -0.024 (0.043) | -0.026 (0.033) | -0.025 (0.032) |
| Own/joint decision on own health | -0.011 (0.037) | -0.006 (0.040) | -0.021 (0.040) | -0.053* (0.031) | -0.052* (0.031) | -0.054* (0.030) |
| Own/joint decision on if mothers can visit | 0.020 (0.045) | 0.022 (0.049) | 0.013 (0.049) | 0.040 (0.062) | 0.043 (0.058) | 0.043 (0.058) |
| Child Controls | No | Yes | Yes | No | Yes | Yes |
| Household Demographics | No | Yes | Yes | No | Yes | Yes |
| Household Economics | No | No | Yes | No | No | Yes |
| Observations | 496 | 496 | 496 | 496 | 496 | 496 |

Notes: Each cell reports the estimated treatment effect from a separate regression based on 2012 and 2013 surveys. Estimated summary indices of corresponding outcomes are reported in shading rows. Columns 1-3 present results using the original sample without entropy balancing. Columns 4-6 stem from the weighted sample adjusted by entropy balancing. Standard errors are presented in parentheses and are clustered at the maternal level; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 11: Estimated Effects on Mothers' Child Investment (2012)

| | Not weighted | | | Weighted | | |
|--|---------------------|---------------------|---------------------|--------------------|--------------------|--------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| <i>Summary index</i> | 0.175*** (0.061) | 0.209*** (0.063) | 0.207*** (0.065) | 0.213** (0.095) | 0.219** (0.091) | 0.212** (0.085) |
| Talk to child (weekly) | 0.022 (0.018) | 0.038** (0.018) | 0.040** (0.019) | 0.040 (0.039) | 0.045 (0.034) | 0.045 (0.034) |
| Listen and talk to child about child's readings (weekly) | 0.082* (0.042) | 0.089* (0.045) | 0.100** (0.047) | 0.101 (0.066) | 0.105* (0.057) | 0.108* (0.056) |
| Visit library with child (weekly) | 0.028 (0.037) | 0.025 (0.039) | 0.020 (0.040) | 0.054 (0.040) | 0.048 (0.039) | 0.047 (0.038) |
| Plays or dances with child (weekly) | 0.060*** (0.023) | 0.068*** (0.024) | 0.066*** (0.025) | 0.026 (0.018) | 0.034* (0.019) | 0.032* (0.018) |
| Child Controls | No | Yes | Yes | No | Yes | Yes |
| Household Demographics | No | Yes | Yes | No | Yes | Yes |
| Household Economics | No | No | Yes | No | No | Yes |
| Observations | 281 | 281 | 281 | 281 | 281 | 281 |

Notes: Each cell reports the estimated treatment effect from a separate regression based on 2012 surveys. Estimated summary indices of corresponding outcomes are reported in shading rows. Columns 1-3 present results using the original sample without entropy balancing. Columns 4-6 stem from the weighted sample adjusted by entropy balancing. Standard errors are presented in parentheses and are clustered at the maternal level; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 12: Estimated Effects on Children's Outcomes: Summary Indices (2012)

| | Not weighted | | | Weighted | | |
|--|--------------|----------|----------|----------|----------|----------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Overall summary index ^{†,††} | 0.195*** | 0.174*** | 0.186*** | 0.142* | 0.204*** | 0.201*** |
| (290 observations used) | (0.055) | (0.052) | (0.053) | (0.078) | (0.071) | (0.073) |
| Tests scores | 0.122 | 0.124 | 0.115 | 0.068 | 0.131 | 0.120 |
| (322 observations used) | (0.104) | (0.099) | (0.103) | (0.155) | (0.107) | (0.106) |
| Schooling dropout and grade repetition | -0.192** | -0.170** | -0.182** | -0.112 | -0.174* | -0.181* |
| (381 observations used) | (0.082) | (0.073) | (0.073) | (0.089) | (0.096) | (0.098) |
| Attitude towards schooling | 0.161** | 0.109 | 0.104 | 0.165** | 0.159** | 0.135** |
| (347 observations used) | (0.068) | (0.075) | (0.075) | (0.068) | (0.067) | (0.066) |
| Absences and behavior in school ^{†††} | 0.210* | 0.253** | 0.286** | 0.152 | 0.240** | 0.254** |
| (190 observations used) | (0.121) | (0.124) | (0.131) | (0.189) | (0.110) | (0.112) |
| Child Controls | No | Yes | Yes | No | Yes | Yes |
| Household Demographics | No | Yes | Yes | No | Yes | Yes |
| Household Economics | No | No | Yes | No | No | Yes |
| Observations | 383 | 383 | 383 | 383 | 383 | 383 |

Notes: Each cell reports the estimated effect on a summary index from a separate regression based on the 2012 survey. Columns 1-3 present results using the original sample without entropy balancing. Columns 4-6 stem from the weighted sample adjusted by entropy balancing. Standard errors are presented in parentheses and are clustered at the maternal level; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

[†] Signs of outcomes of schooling dropout and grade repetition are reversed when calculating the overall summary index.

^{††} Outcomes of Non-Cognitive II contains 193 missing values and therefore are not included in the overall summary index.

Table 13: Estimated Effects on Children’s Outcomes by Gender, by Maternal Education and by Mothers’ Employment Status (2012)

| | Gender | | Mothers’ education | | Mothers’ pre-treatment employment status | |
|--|-------------------------------|----------------------|------------------------------------|-----------------------------|--|----------------------|
| | Male | Female | Up to primary schooling | More than primary schooling | Not worked before | Worked before |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Tests scores summary index | 0.012 (0.147) [3.146]* | 0.378*** (0.144) | 0.341*** (0.117) [7.610]*** | -0.193 (0.154) | 0.302** (0.180) [3.173]* | -0.092 (0.122) |
| Schooling dropout and grade repetition summary index | -0.087 (0.116) [1.332] | -0.256*** (0.089) | -0.073 (0.101) [0.219] | -0.133* (0.079) | -0.076 (0.104) [1.177] | -0.225*** (0.089) |
| Attitude towards schooling summary index | 0.231** (0.100) [0.422] | 0.137 (0.105) | 0.106 (0.127) [0.513] | -0.024 (0.129) | 0.061 (0.124) [0.340] | 0.155 (0.104) |
| Absences and behavior in school summary index† | 0.178 (0.232) [0.005] | 0.201 (0.239) | 0.483*** (0.131) [21.710]*** | -0.505*** (0.167) | 0.214 (0.168) [0.131] | 0.308 (0.201) |
| Observations | 192 | 191 | 207 | 176 | 185 | 198 |

Notes: Each cell reports the estimated aggregate effect on the summary index from a separate regression based on the 2012 survey. F-test (Chow-test) statistic for subgroup difference in treatment effects is presented in square brackets. Estimated results are based on the original sample without entropy balancing. Covariates of child characteristics, household demographics and household economics are included in regressions. Standard errors are presented in parentheses and are clustered at the maternal level; * p < 0.1, ** p < 0.05, *** p < 0.01.

† Signs of the outcome of school absence in report card are reversed in this summary index.

Table 14: Estimated Effects on Children’s Relative Non-cognitive Skills (2012)

| | Not weighted | | | Weighted | | |
|---|--------------|---------|---------|----------|---------|---------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| <i>Panel A: Relative to Tests Scores</i> | | | | | | |
| Non-cognitive Skills I [†] | 0.262*** | 0.215** | 0.228** | 0.197* | 0.249** | 0.251** |
| (290 observations used) | (0.096) | (0.091) | (0.096) | (0.105) | (0.099) | (0.102) |
| Non-cognitive Skills II ^{††} | 0.138** | 0.129** | 0.131** | 0.114 | 0.155** | 0.157** |
| (167 observations used) | (0.054) | (0.057) | (0.061) | (0.076) | (0.063) | (0.065) |
| <i>Panel B: Relative to Tests Scores, Schooling Dropout and Grade Repetition</i> | | | | | | |
| Non-cognitive Skills I [†] | 0.176* | 0.165* | 0.148 | 0.133 | 0.216** | 0.210* |
| (290 observations used) | (0.093) | (0.094) | (0.102) | (0.134) | (0.107) | (0.109) |
| Non-cognitive Skills II ^{††} | 0.200** | 0.185** | 0.186* | 0.137 | 0.191* | 0.193* |
| (167 observations used) | (0.086) | (0.088) | (0.094) | (0.076) | (0.063) | (0.065) |
| Child Controls | No | Yes | Yes | No | Yes | Yes |
| Household Demographics | No | Yes | Yes | No | Yes | Yes |
| Household Economics | No | No | Yes | No | No | Yes |
| Observations | 383 | 383 | 383 | 383 | 383 | 383 |

Notes: Same as Table 12.

† The first non-cognitive skills variable in panel A, which is relative to the tests scores, represents outcomes of schooling dropout, grade repetition, whether the child likes school (from both her own and mother’s prospective), and whether the child choose the book as a gift. In panel B, the outcomes of schooling dropout and grade repetition depend on the cognitive skills as well.

†† The second non-cognitive skills variable further represents outcomes of the absences and behavior in school. It has a smaller sample size as it is based on the children’s sample who reported the school absences and behavior in report cards.

Table 15: Estimated Effects on Children's Relative Non-cognitive Skills by Gender, by Parental Education and by Mothers' Employment Status (2012)

| | Gender | | Mothers' education | | Mothers' pre-treatment | |
|---|------------------|---------------------|--------------------|-------------------|------------------------|-------------------|
| | Male | Female | Up to primary | More than primary | Not worked | Worked |
| | (1) | (2) | schooling | schooling | before | before |
| | | (3) | (4) | (5) | (6) | |
| <i>Panel A: Relative to Tests Scores</i> | | | | | | |
| Non-cognitive Skills I [†] (290 observations used) | 0.228 (0.173) | 0.343** (0.137) | 0.250 (0.168) | 0.037 (0.128) | 0.221 (0.161) | 0.215 (0.148) |
| | [0.31] | | [0.99] | | [0.00] | |
| Non-cognitive Skills II ^{††} (167 observations used) | 0.152 (0.100) | 0.229*** (0.082) | 0.241** (0.101) | -0.060 (0.088) | 0.182* (0.105) | 0.069 (0.088) |
| | [0.41] | | [5.72]** | | [0.80] | |
| <i>Panel B: Relative to Tests Scores, Schooling Dropout and Grade Repetition</i> | | | | | | |
| Non-cognitive Skills I [†] (290 observations used) | 0.052 (0.152) | 0.354** (0.152) | 0.286** (0.141) | -0.057 (0.159) | 0.275 (0.176) | -0.015 (0.143) |
| | [2.22] | | [2.81]* | | [2.07] | |
| Non-cognitive Skills II ^{††} (167 observations used) | 0.168 (0.167) | 0.352*** (0.130) | 0.354** (0.144) | -0.105 (0.133) | 0.273* (0.159) | 0.070 (0.140) |
| | [0.91] | | [5.46]** | | [1.08] | |
| Observations | 192 | 191 | 207 | 176 | 185 | 198 |

Notes: Same as Table 13.

[†] The first non-cognitive skills variable in panel A, which is relative to the cognitive skills, represents outcomes of schooling dropout, grade repetition, whether the child likes school (from both her own and mother's prospective), and whether the child choose the book as a gift. In panel B, the outcomes of schooling dropout and grade repetition depend on the cognitive skills as well.

^{††} The second non-cognitive skills variable further represents outcomes of the absences and behavior in school. It has a smaller sample size as it is based on the children's sample who reported the school absences and behavior in report cards.

Table 16: Correlations between Working Condition Before Treatment and Reasons Why Control Mothers Did Not Apply

| | Worked before | Working now | Worked full-time before | Working full-time now |
|--------------------------------|---------------|-------------|-------------------------|-----------------------|
| Worked before | 1 | | | |
| Working now | 0.2108* | 1 | | |
| Did not know about the program | -0.0440 | -0.0952 | 0.1217 | -0.0616 |
| Did not have children | -0.1049 | -0.0497 | 0.0803 | 0.0838 |
| Distance | 0.0833 | -0.0292 | -0.1444 | -0.0694 |
| Problems with the application | -0.0306 | 0.1407 | -0.1118 | 0.0921 |
| Mother was working | 0.0777 | 0.1051 | 0.0803 | 0.2305* |
| Affiliation with another NGO | 0.0277 | -0.0193 | 0.0855 | -0.0405 |
| Did not know the age limits | 0.0777 | -0.0952 | -0.2008 | -0.0434 |
| The child was over age | -0.0519 | 0.0101 | 0.1145 | 0.0509 |

Notes: Each cell reports the correlation coefficient based on the 2012 survey; * $p < 0.05$.

Table 17: Characteristics and Pre-program Outcomes of the Usable Sample and the Sample of Mothers/Children who Enrolled between 2005 and 2009 and All Children who were in the School-PelCa when They Left

| | Attrition mean | Treatment mean | Control means | Difference in means (1)-(2) | Difference in means (1)-(3) |
|--|-------------------|-------------------|------------------|-----------------------------------|-----------------------------------|
| | (1) | (2) | (3) | (4) | (5) |
| Mother age when enrolled | 26.321 | 26.185 | --- | 0.136 (1.291) | --- |
| Number of children in 2005 | 1.974 | 1.849 | 1.632 | 0.125 (0.211) | 0.342 (0.237) |
| Mother lived together with partner | 0.781 | 0.801 | 0.817 | -0.020 (0.078) | -0.036 (0.079) |
| Mother worked | 0.493 | 0.470 | 0.609 | 0.023 (0.071) | -0.116 (0.075) |
| Highest educational level: primary school | 0.676 | 0.687 | 0.678 | -0.010 (0.067) | -0.002 (0.072) |
| Highest educational level: secondary school | 0.250 | 0.169 | 0.165 | 0.081 (0.057) | 0.085 (0.061) |
| Highest educational level: started university | 0.015 | 0.024 | 0.009 | -0.009 (0.021) | 0.006 (0.016) |
| Family lived in Pisulli | 0.579 | 0.675 | 0.583 | -0.096 (0.066) | -0.004 (0.073) |
| Child age when enrolled | 2.903 | 2.696 | --- | 0.207 (0.189) | --- |
| Observations of mothers | 77 | 162 | 115 | | |
| Observations of children | 108 | 219 | 164 | | |

Notes: The column (1) is based on the sample of mothers/children who enrolled between 2005 and 2009 and all children were in the School-PelCa program when they left. Columns (2) and (3) are based on the 2012 survey. Standard errors are presented in parentheses in the column (4); * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Figure 1: Identification Strategy

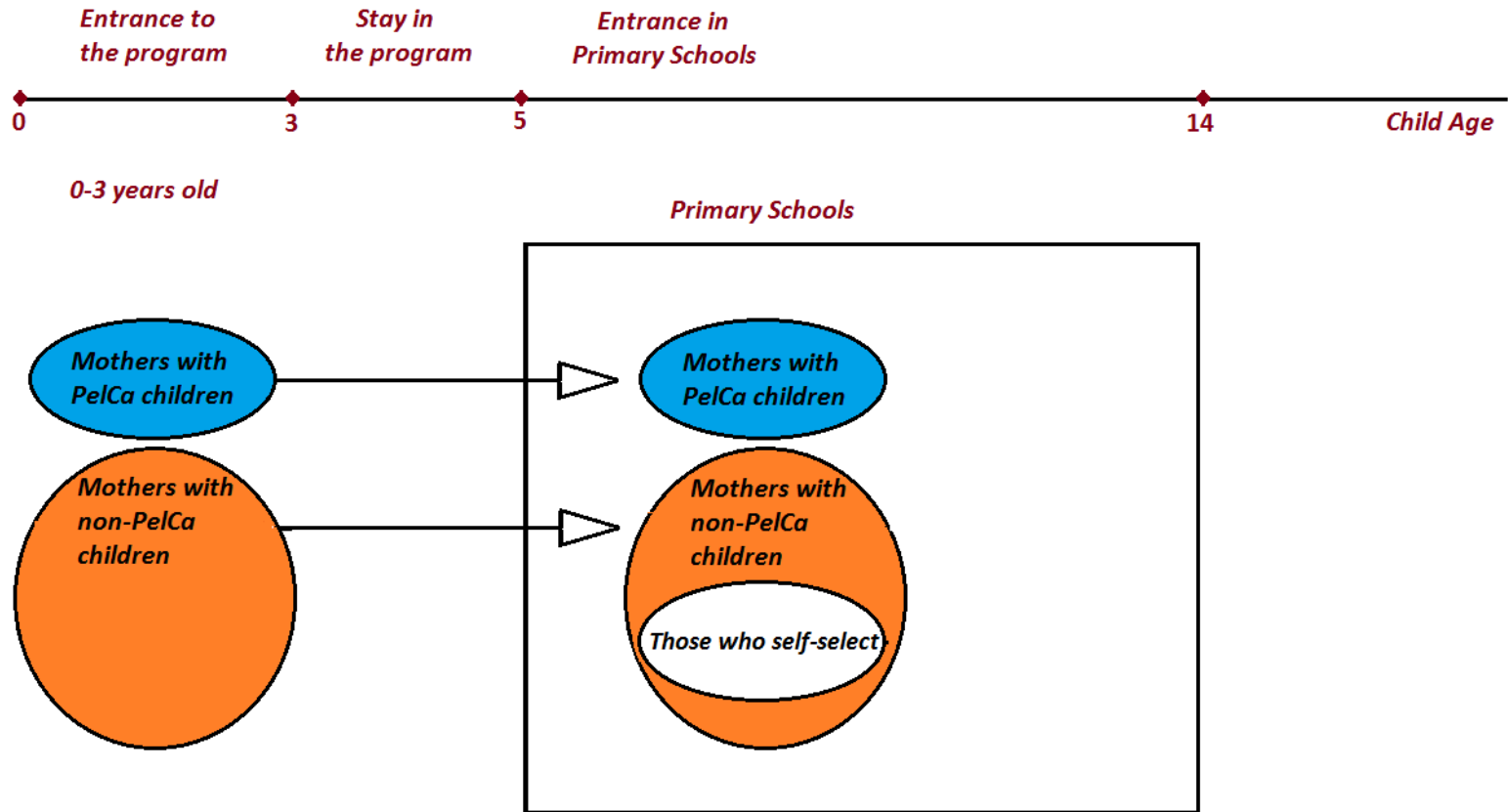
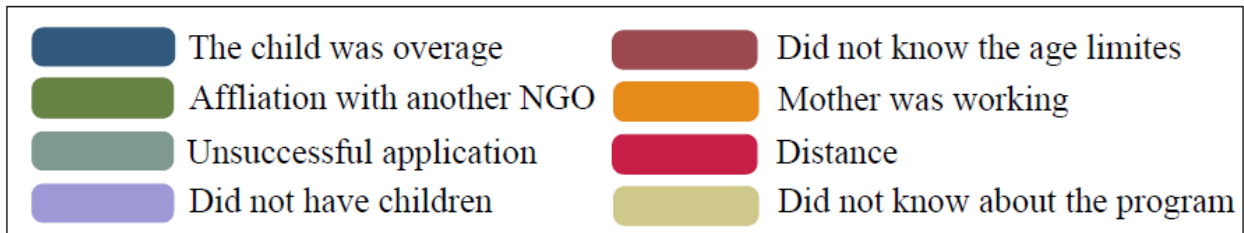
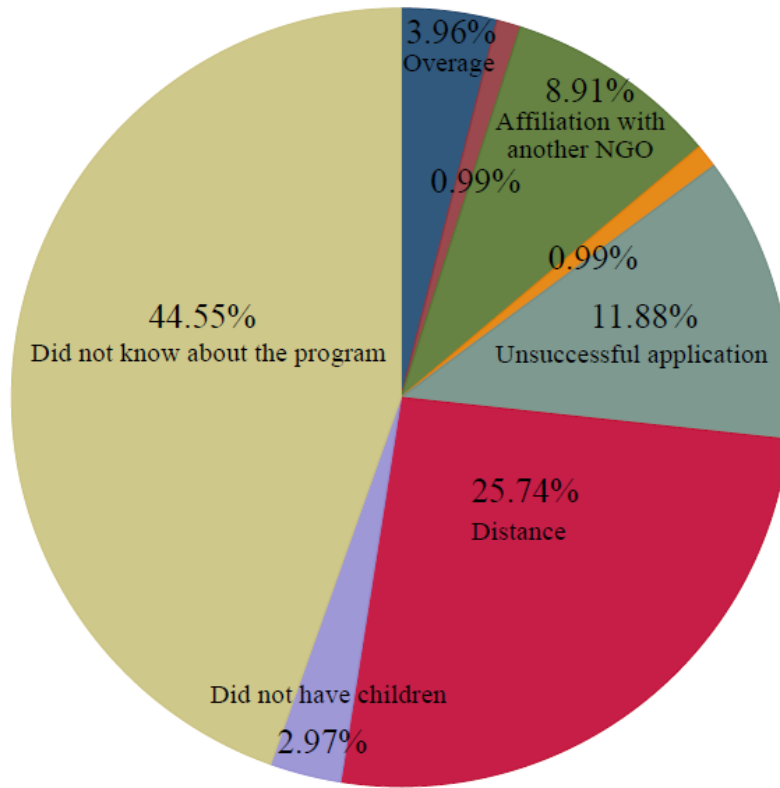


Figure 2: Why control mothers did not enroll before in the program



Appendix: Construction of Control Variables

Household demographics controls

- *Mothers' and fathers' education* (separately): indicator variables (0/1) for whether primary schooling not completed, primary schooling completed, secondary schooling not completed, secondary schooling completed, and university schooling completed.
- *Mother age* and *Father age*.
- *Mother personal status*: indicator variables (0/1) for whether the mother was married, cohabitated, or single.
- *Mother origin*: the indicator variable (0/1) for whether the mother is from Quito.
- *Parents from same city*: the indicator variable (0/1).
- *Number of children in 2005*.

Household economics controls

- *Mother working before child enrolled in PelCa*: the indicator variable (0/1).
- *Father working before child enrolled in PelCa*: the indicator variable (0/1).
- *Mother's firm size* if employed: (0, 1, 3.5, 8, 15.5, 35.5, 75.5, 300.5).
- *Father's firm size* if employed: (0, 1, 3.5, 8, 15.5, 35.5, 75.5, 300.5).
- *Family average income*: before child enrollment in *PelCa* (0, 50, 200, 350, 450, 600, 800).

Child controls

- *Birth order* (1,...,10).
- *Child age* (5,...,14).
- *Number of young siblings in 2005* (0,...,3).
- *School fixed effects*