

# Estimating the Production Function for Human Capital: Results from a Randomized Control Trial in Colombia

Orazio Attanasio, Sarah Cattan, Emla Fitzsimons,  
Costas Meghir, and Marta Rubio-Codina\*

## APPENDIX FOR ONLINE PUBLICATION

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\*Attanasio: University College London and Institute for Fiscal Studies (o.attanasio@ucl.ac.uk). Cattan: Institute for Fiscal Studies (sarah.c@ifs.org.uk). Fitzsimons: UCL Institute of Education and Institute for Fiscal Studies (e.fitzsimons@ioe.ac.uk). Meghir: Yale University, NBER and Institute for Fiscal Studies (c.meghir@yale.edu). Rubio-Codina: Institute for Fiscal Studies and Inter-American Development Bank (marta.r@ifs.org.uk). We thank participants at the NBER Summer Institute, Barcelona GSE Summer Forum and Montreal CIREQ Applied Microeconomics on Fertility and Child Development and seminars at Stanford University, University of Chicago, Oxford University, Cornell University, Bristol University and the Institute for Fiscal Studies for their comments. We are grateful to the Economic and Social Research Council (Grant ES/G015953/1), the Inter-American Development Bank, the International Growth Centre, and the World Bank for funding the intervention and data collection. Some of this research was financed by the European Research Council's Advanced Grant 249612 and by the Grand Challenges Canada Prime Award 0072-03 (sub-award reference number 560450). Sarah Cattan gratefully acknowledges financial assistance from the British Academy Postdoctoral Fellowship pf140104, as well as from the European Research Council's Grant Agreement No. 240910. Costas Meghir thanks the Cowles foundation and the ISPS at Yale for financial assistance. All errors are the responsibility of the authors.

## **A The Intervention**

This appendix provides a detailed description of the intervention, its implementation and roll-out. The material in this section draws heavily on Attanasio et al. (2014).

### **A.1 Description of the Intervention**

The integrated early child development intervention was designed so that it could be delivered by local people, readily identifiable through administrative infrastructures of social welfare systems (the conditional cash transfer program Familias en Accion (FeA) in our case). The intervention included psychosocial stimulation on its own, micronutrient supplementation on its own, and both combined. Each of these arms had 24 clusters (municipalities).

#### **A.1.1 Psychosocial Stimulation**

The psychosocial stimulation component was inspired by and based on the Jamaican home visiting model (Walker et al 2011), the overarching aim of which is to facilitate developmentally appropriate learning activities between mothers (primary caregivers) and their children through demonstration of play activities centred around daily routines. Play activities draw on resources in the home, low cost home-made toys and the intervention toy kit. The toy kit included picture books, naming plates, conversation scenes, puzzles, lotteries, and blocks. Play activities followed steps aimed towards children's gradual mastery of a learning objective: (1) child observes play activity (modeling),

(2) mother and child do the activity together, (3) child attempts the play activity on his/her own, (4) mother prompts naming and verbalisation of objects and actions linked to the play activity, (5) the developmental level of play activity is adjusted by increasing or decreasing the challenge based on the child's performance (scaffolding). Throughout the play activities, mothers are encouraged to provide children with contingent positive reinforcement for progress toward the learning goals (praise) and to follow the child's interest.

Materials for the stimulation component were adapted from the Jamaican intervention guide to the local cultural context and to the average educational level of home visitors and program beneficiaries. Such adaptations included (1) inclusion of local songs and rhymes; (2) modification of the home-made toys instruction manual to use local recyclable materials, (3) incorporation into the the intervention toy kit of culturally relevant pictures, scenes and objects, (4) re-organization of the psychosocial stimulation guide in weekly instruction cards for specific age groups, and (5) ordering of play materials, via an index, by developmental stage to facilitate the scaffolding of activities.

Home visits lasted approximately one hour. Home visits took place with the child's biological mother or primary caregiver. Other adults in the household, where present, were also encouraged to participate in the home visit. In advance of the visit, the home visitor selected the weekly instruction card from the psychosocial stimulation guide according to the appropriate developmental level of the target child, and prepared the toys and materials for the visit. The home visit had three parts. At the beginning, the home visitor did an informal assessment of the child's progress in the sequence of play activities, by asking

about the play activities the mother and child practiced during the previous week and identifying where challenges arose (or on the contrary, where activities were overly simplistic). In the second and main part of the visit, new play activities were shown and practised. At the end, the mother was prompted to summarize the play activities and agree a plan on how to practice them over the following week.

### **A.1.2 Micronutrient Supplementation**

The micronutrient supplementation component consisted of micronutrient supplementation in the form of sprinkles (encapsulated micronutrients). Each single-dose sachet contains 12.5 mg iron, 5 mg zinc, vitamin A 300 mg RE, 160mg g folic acid and 30 mg vitamin C and each displayed a pictorial representation of use. In addition to the fortnightly provision of sprinkles, participating families received a booklet with detailed instructions for use and storage and daily record forms to track use. Families were provided with enough sachets for all children below six years of age to prevent sharing with siblings.

## **A.2 Implementation**

We obtained institutional cooperation from the National Director of FeA, the coordinator of the Strategic Planning and Monitoring Unit of FeA, and FeA administrative staff at the municipality level. From the latter, we obtained rosters of female community representatives (Madres Lideres) and selected three female community representatives in each of the 96 target municipalities.

In municipalities assigned to receive stimulation, 63% of selected female

community leaders took on the role of home visitor. The remainder declined due to other work commitments or not meeting the minimum reading comprehension criteria (established using a short reading comprehension test designed by the study data collection team). Replacements were found through referral; women who were referred were screened for reading comprehension skills, motivation and availability. If they met established criteria, they were offered the opportunity to become home visitors.

The intervention staff included a local field coordinator, six mentors, and a team of home visitors. The field coordinator oversaw the roll out of the intervention and monitored the mentors from the central office (in Bogota) and also on site. Six mentors, with an undergraduate degree in psychology/social work or comparable fieldwork experience, were recruited to train and supervise home visitors throughout the study. They had six weeks' pre-service training focused on the home visiting curriculum and protocols, training and supervision skills, creating home-made toys, and supervised practice. Four short (one-to four-day) refresher and feedback sessions took place in Bogota during the course of the intervention. These also provided the mentors the opportunity to exchange experiences, challenges and solutions. In addition, the mentors were in regular email/phone communication with the field coordinator, and email communication with a member of the research team, as needed.

Each mentor trained and supervised 24 home visitors, covering eight municipalities. The home visitors' pre-service training on the stimulation component lasted two weeks, with an additional week of in-service training after the team of mentors had completed the first round of itinerant supervision

(one to two months after the intervention roll-out). The home visitor training sessions included: (1) basic concepts of child development and early learning; (2) the aims of the stimulation intervention and the role of the home visitor in this; (3) an introduction to play activities, the steps to demonstrate and scaffold each activity and guidelines to assess the progress of the child towards the learning goals; (4) guidelines to help manage difficult children; (5) a toy making workshop; (6) guidelines for record keeping. The training of home visitors emphasized the importance of a good working relationship with the beneficiary mother, positive reinforcement, and listening skills.

In addition, home visitors participated in a 5-hour training session on the micronutrient component of the intervention before rollout. The training sessions included a description of the micronutrient supplement, storage requirements, instructions for use, potential side effects, toxicity risks, and safety protocols in case of side effects.

### **A.3 Rollout and Monitoring**

The intervention was rolled out over four months from February through May 2010, and phased out 18 months later, from September through December 2011. Training and supervision was rolled out by geographical location, evenly across treatment groups, following baseline data collection. Once the intervention was up and running, mentors visited intervention communities once every 7 to 10 weeks to monitor implementation, provide support, and reinforce home visitors' motivation. At this time, mentors also distributed one-page bulletins to home visitors, with reminders of best practices in home visiting. In addi-

tion, mentors sent short text (SMS) messages to home visitors every month to reinforce key aspects the stimulation protocol. Home visitors were encouraged to call mentors for advice where necessary (calling cards were provided by the study team).

To monitor the psychosocial stimulation component, home visitors filled in a form at the end of each visit with basic information on the visit (e.g. date, activities performed, who present), as well as a short assessment of children's performance and engagement with the activities. Home visitors were paid \$100,000 Colombian pesos (COP) (19.4% of legal monthly minimum wage for 2010) per month.

To monitor the micronutrient component, the home visitor collected the empty sachets and intake charts (monitoring forms) from the household every two weeks. During these visits, mentors checked that tracking charts were filled in correctly, reminded the mother about the protocols of use, how to react if side effects arose and addressed any other queries and concerns. The home visitor was paid \$25,000 Colombian pesos (COP) per month for these activities.

## **B Measures of skills and investments**

In this section, we provide detailed information on each of the instruments we used to measure children’s cognitive and socio-emotional skills, mother’s cognitive and socio-emotional skills, and parental investments. In subsection B.4, we describe the non-parametric procedure we followed to standardize the measures of child and mother’s skills for age.

### **B.1 Measures on the target child**

#### **B.1.1 Bayley Scales of Infant and Toddler Development, third edition (Bayley-III) (Bayley, 2006)**

We administered the cognitive, receptive language, expressive language, fine motor and gross motor scales of the Bayley-III both at baseline and follow-up, following standard procedures. The scales assess children from birth up to 42 months by direct observation of performance on a series of items and are considered by many the “gold standard” for the assessment of children of these ages (Fernald et al., 2009). Bayley-III subscales were translated into Spanish, back translated to English to ensure accuracy, and piloted by testers. Children were assessed in local community centers with their mothers present. Testers held degrees in psychology and had a six-week training, including practice sessions with children of the target age groups. Inter-rater reliability (intra-class correlation) was above 0.9 on each subscale. Furthermore, 5% of the measurements were supervised by the trainer (reliabilities above 0.9) and corrective feedback was given when appropriate.



### **B.1.2 MacArthur-Bates Communicative Development Inventories I, II and III - Spanish short Forms (SFI, SFII, SFIII)**

We assessed language comprehension and production using the short-form versions of the Spanish Communicative Development Inventories. This is a parent report inventory and was collected in the house as part of the household survey. At baseline, we administered Spanish short forms of Inventories I and II to children of 12-18 and 19-24 months of age, respectively, which have been validated in Mexico (Jackson-Maldonado et al., 2012, 2003). At follow-up, we administered the Spanish short form of Inventory III to children 30-42 months. This form was under validation at the time of data collection (Jackson-Maldonado, 2011; Jackson-Maldonado and Conboy, 2011). We collaborated with the developer of the test in Spanish in the identification of suitable words in Colombian Spanish, prior and during piloting activities. We administered the vocabulary checklist (words the child “understands” and words the child says) for all Short Forms (SFs) and sentence structure sections (for SFIII only), and counted the number of words the child could say (as reported by the mother/caregiver) and number of more complex sentence structures the child uses.

### **B.1.3 Infant Characteristics Questionnaire (ICQ) (Bates et al., 1979)**

The Infant Characteristics Questionnaire (ICQ) assesses the construct of “difficult” temperament by maternal (caregiver) report. As such it measures parents’ perceptions of the infant, not necessarily the infant’s behavior as it might be objectively recorded. Both at baseline and follow-up, we used those items (17 in total) in questionnaires for 13-months and 24-months old children that

related to the following constructs: difficult, unadaptable, unstoppable, and unsociable, as part of the household questionnaire. We made minor adjustments to the Spanish translations of the forms in order to maximise comprehension and the test predictive ability. For simplicity, we converted the 7-point rating items into 5-point ratings. We discussed these modifications with the author over email correspondence and piloted them before use in the field.

#### **B.1.4 Early Childrens Behavior Questionnaire (ECBQ) (Putnam et al., 2006, 2010)**

At follow up, we complemented the assessment of temperament with measures of attention and inhibitory control by maternal report using the attentional focusing (sustained duration of orienting on an object of attention; resisting distraction), attentional shifting (the ability to transfer attentional focus from one activity/task to another) and inhibitory control (the capacity to stop, moderate, or refrain from a behavior under instruction) sub-scales in the short versions of the Spanish translation of the ECBQ. The ECBQ is designed to measure temperament in children aged 3-7 years. As before, for simplicity, we converted the 7-point rating scale into a 5-point rating scale. Minor language modifications to wording and sentence structure, with the aim to better reflect Colombian Spanish, were extensively piloted in the field.

## **B.2 Measures on the mother**

### **B.2.1 Maternal vocabulary**

We assessed maternal receptive vocabulary in the first follow-up survey. For this, we used a selection of 50 words from the Spanish version of the Peabody Picture Vocabulary Test (PPVT), the Test de Vocabulario en Imagenes de Peabody (TVIP) (Dunnn et al., 1986). The reason why we used a selection of the words is because the Spanish version of the test is developed for ages 2.5-18 years. Hence, we could not use the test as designed (using established start and stopping rules) on our sample of mothers. Instead, we selected those words exhibiting a reasonable level of varying difficulty, after extensive piloting, and administered them all in the order in which they appear in the test. For each word, the subject points at the one picture (out of four) that best relates to the word (noun, action, abstract concept, adjective) that the tester calls out. The test was administered in the home by the interviewer at the end of the household interview

### **B.2.2 Standard Progressive Matrices (RPM) (Raven, 1981)**

We used the RPM system to measure mothers' reasoning ability or what is often referred as general intelligence in the second follow-up. This is a non-verbal test typically made of multiple choice items listed in order of difficulty, requiring ever greater capacity to encode and analyze the information, and which are organised in sets. In each test item, the subject is asked to identify the missing element that completes a pattern. Test items are presented in black

ink on a white background. Out of the 5 sets of 12 matrices, we administered the middle 3 – hence, those with an intermediate level of difficulty. This decision was made after careful piloting.

We collected RPM at second follow up only under the presumption that maternal reasoning ability should not be affected by the intervention, and because of the monetary and time restrictions we faced in previous rounds.

### **B.2.3 Center for Epidemiological Studies Depression scale (CES-D) (Andresen et al., 1994; Gonzalez et al., 1995; Radloff, 1977)**

We assessed maternal depressive symptoms by direct interview with the mother using the 10-item Spanish version of the CES-D, the CESD-10, by Radloff (1977). We used the same measure both at baseline and follow up.

### **B.3 Measures of parental investments: Family Care Indicators (FCI) (Frongillo et al., 2003)**

The quality of the home environment (or level of stimulation in the home) was measured using items in the Family Care Indicators (FCI) developed by UNICEF (Frongillo et al., 2003). The FCI has been validated against the Home Observations for Measurement of the Home Environment (HOME) (Caldwell and Bradley, 2001), against which it was validated in Bangladesh (Hamadani et al., 2010).

Both at baseline and follow up, we collected by direct observation during the household survey the following information: the number of books for

adults, the number of newspapers and magazines, and the number of varieties of play materials in the home that the child often played with. We collected by maternal (caregiver) report the number of play activities the child engaged in with an adult over the three days before the interview. Play materials include toys that make/play music; toys/objects meant for stacking, constructing or building; things for drawing, writing, colouring, and painting; toys for moving around; toys to play pretend games; picture and drawing books for children; and toys for learning shapes and colours. Play activities include reading or looking at picture books; telling stories to child; singing songs with child; playing with child with her toys; spending time with child scribbling, drawing, or colouring; and spending time with child naming things or counting; and taking child out for a leisure walk.

#### **B.4 Age standardization of the measures**

Total raw scores are increasing in age. Since we are interested in within sample comparisons, we internally standardize scores to remove the effect of age (child’s age for the child’s measures and mother’s age for the mothers’ measures). We compute internal z-scores using the empirical age-conditional means and standard deviations estimated using non-parametric regression methods. In particular, for each measure to standardize, we compute the age-conditional mean using the fitted values of the following regression, estimated by kernel-weighted local polynomial smoothing methods:

$$Y_i = f(X_i) + \epsilon_i \tag{1}$$

where  $Y_i$  is the raw score of individual  $i$  in a given scale and  $X_i$  is the age of the individual (in months for the child, in years for the mother). Next, we regress the square of the residuals in equation (1) on age of the child as shown in the following kernel-weighted local polynomial regression:

$$(Y_i - \hat{f}_i)^2 = g(X_i) + v_i \quad (2)$$

Our estimate of the age-conditional standard deviation is the square root of the fitted values in equation (2). Finally, we compute the internally age-adjusted z-score,  $ZY_i$ , by subtracting from the raw score the within sample age-conditional mean estimated in (1) and dividing by the within sample age-conditional standard deviation obtained from (2). More specifically:

$$ZY_i = \frac{(Y_i - \hat{f}_i)}{\sqrt{\hat{g}_i}} \quad (3)$$

This procedure, less sensitive to outliers and small sample sizes within age category, resulted in smooth normally distributed internally standardized scores, with mean zero across the age range.

## **C Exploratory factor analysis**

This appendix describes the exploratory factor analysis (EFA) we performed to inform the specification of the measurement system described in Table 2 of the paper. Following the psychometric literature (Gorusch, 1983, 2003), we aim to build a measurement system with dedicated measures (measures that only proxy one latent factor) as it makes interpretation of the latent factors easiest and most transparent. EFA consists of two main steps. First, we select the number of latent factors that should be extracted from all the measures we have on each of the aspect we want to measure (e.g. child’s development at baseline, child’s development at follow-up, etc.). Second, we allocate measures to factors, estimate factor loadings and discard measurements that load on multiple factors in order to achieve a dedicated measurement system.

### **C.1 Selecting the number of latent factors**

The first step aims to determine how many latent factors should be extracted from each set of measures we have available to measure the child’s development at baseline, the child’s development at follow-up, parental investment at follow-up, the mother’s skills, and the household’s wealth at baseline. A variety of methods are available to select the number of factors, and here we implement four of the most popular methods developed in the literature. Below, we succinctly describe each one of them, before commenting on the number of factors they suggest to extract.

### C.1.1 Description of methods

**Kaiser's eigenvalue rule** The Kaiser's criterion consists in retaining only factors with eigenvalues greater than 1 (Kaiser, 1960). The intuition behind this rule is that unless a factor extracts at least as much variance as the equivalent of one original variable, it should be dropped.

**Cattell's scree plot** The scree test was proposed by Cattell (1966) and is based on the analyst's inspection of a plot of the eigenvalues associated with the data. Cattell's rule is such that the number of factors should be equal to the number of eigenvalues before which the smooth decrease of eigenvalues appears to level off to the right of the plot.

**Velicer's minimum average partial (MAP) correlation rule** Velicer (1976)'s minimum average partial (MAP) involves a complete factor analysis followed by the examination of a series of matrices of partial correlations. In the first step, the first factor is partialled out of the correlations between the variables of interest, and the average squared coefficient in the off-diagonals of the resulting partial correlation matrix is computed. In the second step, the first two factors are partialled out of the original correlation matrix and the average squared partial correlation is again computed. These computations are conducted for  $k - 1$ , where  $k$  is the number of measurements. The number of components is determined by the step number in the analyses that resulted in the lowest average squared partial correlation. Intuitively, components are retained as long as the variance in the correlation matrix represents systematic



variance. Components are no longer retained when there is proportionately more unsystematic variance than systematic variance.

**Horn’s parallel analysis** Horn’s parallel analysis, described in Horn (1965), involves extracting eigenvalues from random data sets that parallel the actual data set with regard to the number of observations and variables. For example, if the original data set consists of  $n$  observations for each one of  $m$  variables, then a series of random data matrices of size  $n \times m$  are generated, and eigenvalues are computed for the correlation matrices for the original data and for each of the random data sets. The eigenvalues derived from the actual data are then compared to the eigenvalues derived from the random data. Factors are retained as long as the  $i$ -th eigenvalue from the actual data is greater than the  $i$ -th eigenvalue from the random data.

### C.1.2 Results

Appendix Table 1 reports how many factors each method suggests we should extract from all the measures we have available to measure child’s development at follow-up and at baseline, parental investments, mother’s skills and household’s wealth. Most methods indicate that two factors should be extracted from the measures of child’s development at follow-up. Between 1 and 3 factors should be extracted from the measures of child’s development at baseline. Most methods also suggest that two factors should be extracted from the measures of parental investments and from the measures of maternal skills. Finally, only one factor seem underlie the measures of household wealth,

according to all methods.

Table A1: Exploratory factor analysis to determining the number of factors

<i>Dimensions to measure:</i>	<i>Number of factors according to the following methods:</i>			
	Kaiser's eigenvalue rule	Cattell's scree plot	Velicer's MAP rule	Horn's parallel analysis
Child's skills at $t+1$	2	2	2	3
Child's skills at $t$	1	2	1	3
Parental investments at $t+1$	2	2	2	3
Mother's skills	2	2	2	4
Wealth	1	1	1	3

The results from this first step of the EFA suggests that the data we work with may be rich enough to support the model we set out in Section 3, which assumes two dimensions for the child's skills, two dimensions for the mother's skills, and two dimensions for parental investments. We now need to estimate factor loadings to allocate groups of measures to different factors and identify measures that do not proxy one factor in order to finalise the configuration of measurement system and interpret each factor with precision. This is what we do in the second step of the EFA, which we describe now.

## C.2 Specifying the dedicated measurement system

Once we have a strong indication how many factors should be retained from the data, we search for dedicated measures for each factor by implementing an exploratory factor analysis with *quartimin* rotation. We first estimate the factor loadings in a measurement system for each of the elements we want to measure. We then rotate the factor loadings so as to identify measures that

heavily load on one factor and are therefore good candidates for the dedicated measurement system.<sup>1</sup>

The aim of the *quartimin* rotation is to re-weight the factor loadings obtained from the EFA in a way that leads to a structure of factor loadings such that measures only heavily load on one factor. This helps in identifying good candidate measures for our system of dedicated measures. In contrast, if a measure does not load heavily on a factor or if it is not clearly related to only one factor, it cannot serve as a dedicated measure. In this case, we exclude it from our measurement system.

Table A2 reports rotated factor loadings for each measure. Note that we have assumed two factors for the measures of child development at baseline and at follow-up, two factors for the measures of mother’s skills, two factors for the measures of parental investments and one factor for the measures of household wealth. Below we comment on these results and how they informed the final configuration of our measurement system.

**Measures of child’s development at  $t$  and  $t + 1$**  The factor loadings on the measures of child’s skills at follow-up ( $t + 1$ ) clearly suggest two groupings of measures. The Bayley measures and the Mac Arthur measures heavily load on a first factor, which we call cognitive skill. Some of the Bates measures and some of the Rothbart measures heavily loads on a second factor, which we call socio-emotional skill. Note that the measures “Bates unadaptable”

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<sup>1</sup>Several methods are available to rotate the factors. We focus on the results of a *quartimin* rotation because it is an oblique rotation and hence allows factors to be correlated. We also performed the same exercise using *geomim* rotation, since it is another type of oblique rotation, and reached similar conclusions with respect to the final measurement system.

and “Rothbart Sociable” load slightly more heavily on the first factor than on the second, but overall have two very small loadings of each of these factors (below 0.3) and do not clearly load on one of the two factors. As a result, we discard these two measures from the final measurement system. Based on these groupings, we interpret the first factor as measuring the child’s cognitive skill at follow-up and the second factor as measuring the child’s socio-emotional skill at follow-up.

Turning to the measures on the child’s skills at baseline ( $t$ ), we again obtain a pattern of factor loadings that clearly support two groupings of measures. On the one hand, all the Bayley measures (cognitive, language reception, language expression and motor fine) heavily load on a first factor, which we interpret as measuring the child’s cognitive skill at baseline. The Mac Arthur-Bates measures of number of words understood has two very small loadings and does not clearly load on one of the two factors. As a result, we discard this measure as an unfit candidate for our dedicated measurement system. The Mac Arthur-Bates measures of number of spoken shows a s clearer pattern, with a heavier loading on factor 1 than factor 2. Although this pattern is not as clear as the Bayley measures, we do retain Mac Arthur-Bates measure of the number of words spoken by the child in our final measurement system, so as to have a measure of the child’s vocabulary measuring cognitive skill both at baseline and at follow-up. Finally, the Bates measures of the child’s temperament at baseline clearly load on the second factor. In the final measurement system, we retain these four measures to proxy the factor that we call socio-emotional skill of the child at baseline.

**Measures of parental investments** The measures of parental investments from the follow-up survey indicate two clear groupings. On the one hand, the variables measuring the variety of play materials and the number of different types of play material, for the most part, load on a first factor. On the other hand, the variable measuring the variety of play activities and most of the variables measuring the frequency of each of these activities in the three days preceding the interview load on a second factor. A few of the variables do not clearly load on one the factors, and for this reason, we exclude from our system of dedicated measures. In particular, we exclude “Number of picture books”, “Number of home-made toys”, and “Times the mother went outside with the child in the last 3 days” from our final measurement system.

**Measure of maternal skills** The measures of maternal skills that we have at our disposal in the survey indicate two clear groupings of measure. On the one hand, the mother’s years of education, vocabulary and IQ score, along with two items from the FCI (the number of books in the house and the number of magazines and newspapers) seem to be highly correlated to each other, as they clearly load on a first factor (Factor 2 in the table). On the other hand, most items of the CES-D scale heavily load on a second factor. The only exception is the third measure asking the mother “Did you feel hopeful about the future?”, and we exclude this measure from our final measurement system since it is not clearly dedicated to one of the two factors measuring maternal skills.

**Measure of household wealth** The baseline survey contains a multitude of measures that could provide information about the household's underlying wealth level. This includes measures of the household's assets (dwelling, car, cellphone, etc.), along with characteristics of the household's dwelling (dirt floors, solid walls) and a measure of the dwelling crowding. The rotated factor loadings for all these measures indicate that most relate strongly to the underlying factor. However, there are a few exceptions and we rid the final measurement system of the measures that have a rotated factor loading below 0.25.

Table A2: Exploratory factor analysis - Estimates of rotated factor loadings

<b>Rotated factor loadings on measures of child's skills at <math>t+1</math></b>		
	<i>Factor 1</i>	<i>Factor 2</i>
Bayley Cognitive	0.755	0.021
Bayley Receptive Language	0.730	0.055
Bayley Expressive Language	0.752	0.039
Bayley Fine Motor	0.611	0.036
Mac Arthur-Bates Vocabulary	0.628	0.169
Mac Arthur-Bates Complex Sentences	0.529	0.176
Bates Unsociable sub-scale (-)	0.233	0.299
Bates Difficult sub-scale (-)	0.165	0.662
Bates Unadaptable sub-scale (-)	0.224	0.179
Bates Unstoppable sub-scale (-)	0.074	0.662
Rothbart Inhibitory Control	0.154	0.678
Rothbart Attention	0.124	0.340
Rothbart Sociable	0.236	0.117

  

<b>Rotated factor loadings on measures of child's skills at <math>t</math></b>		
	<i>Factor 1</i>	<i>Factor 2</i>
Bayley Cognitive	0.680	0.080
Bayley Receptive Language	0.739	-0.015
Bayley Expressive Language	0.723	0.048
Bayley Fine Motor	0.716	-0.041
Mac Arthur-Bates Vocabulary	0.243	0.148
Mac Arthur-Bates Comprehension	0.049	0.117
Bates Difficult sub-scale (-)	0.113	0.533
Bates Unadaptable sub-scale (-)	0.157	0.413
Bates Unstoppable sub-scale (-)	-0.153	0.393
Bates Unsociable sub-scale (-)	0.212	0.344

  

<b>Rotated factor loadings on measures of parental investments</b>		
	<i>Factor 1</i>	<i>Factor 2</i>
Number of different play materials	0.830	0.271
Number of picture books	0.336	0.166
Number of paint books	0.420	0.120
Number of home-made toys	0.140	0.117
Number of toys bought	0.582	0.108
Number of toys to move	0.607	0.160
Number of toys to learn shapes	0.571	0.184
Number of different play activities in the last 3 days	0.299	0.828
Times told a story to child in last 3 days	0.124	0.538
Times read to child in last 3 days	0.144	0.546
Times went outside with the child in the last 3 days	0.170	0.310
Time played with toys and child in last 3 days	0.200	0.522
Time named things to child in last 3 days	0.154	0.525

Table A2: Exploratory factor analysis - Estimates of rotated factor loadings (continued)

<b>Rotated factor loadings on measures of mother's skills</b>		
	<i>Factor 1</i>	<i>Factor 2</i>
Mothers' years of education*	0.042	0.666
Mother's vocabulary	0.106	0.707
Number of books in the house	0.011	0.456
Number of magazines and newspapers	-0.012	0.305
Raven's score ("IQ") **	0.075	0.661
Were you bothered by things that usually don't bother you?	0.509	0.016
Had you trouble keeping your mind on what you were doing?	0.493	0.078
Did you feel hopeful about the future	0.074	0.207
Did you feel depressed?	0.611	0.159
Did you feel everything you did was an effort?	0.513	0.118
Did you feel fearful?	0.510	-0.027
Was your sleep restless?	0.514	-0.047
Did you feel happy?	0.360	0.164
How often did you feel lonely in the last 7 days?	0.527	0.027
Did you feel you couldn't get going?	0.610	0.051

  

<b>Rotated factor loadings on measures of household wealth at <i>t</i></b>	
	<i>Factor 1</i>
Owns dwelling?	0.299
Dwelling has dirt floors?	-0.219
Dwelling has solid walls?	0.200
Number of people in the dwelling	0.290
Dwelling has sewage system?	0.191
Owns a car?	0.303
Owns a cellphone?	0.349
Owns a computer?	0.265
Owns a fridge?	0.601
Owns a washing machine?	0.409
Owns a blender?	0.495
Owns a TV?	0.392
Owns a radio?	0.338
Owns a fan?	0.172



### **C.3 Estimates of the measurement system**

The following tables report the estimates of the measurement system. Appendix Table 3 reports the estimates of the factor loadings in each measurement equation. Appendix Table 4 reports the estimates of the means of the latent factor distributions for the treated households relative to the means of the latent factor distributions for the control households (which is normalized to 0). Appendix Table 5 reports the estimates of the variance of and correlation between the latent factors for the treated and control households separately

Table A3: Estimates of factor loadings in the measurement system

	Latent factors								
	Child's cognitive skills (+1)	Child's cognitive Skill (t)	Child's socio-emotional skill (+1)	Child's socio-emotional skill (t)	Material investment	Time investment	Mother's cognitive skill	Mother's socio-emotional skill	Wealth (t)
<u>Measures:</u>									
Bayley Cognitive	1.000	0	0	0	0	0	0	0	0
Bayley Receptive Language	0.920	0	0	0	0	0	0	0	0
Bayley Expressive Language	1.048	0	0	0	0	0	0	0	0
Bayley Fine Motor	0.768	0	0	0	0	0	0	0	0
Mac Arthur-Bates Vocabulary	0.735	0	0	0	0	0	0	0	0
Mac Arthur-Bates Complex Sentences	0.569	0	0	0	0	0	0	0	0
Bayley Cognitive	0	1.000	0	0	0	0	0	0	0
Bayley Receptive Language	0	1.031	0	0	0	0	0	0	0
Bayley Expressive Language	0	1.056	0	0	0	0	0	0	0
Bayley Fine Motor	0	0.953	0	0	0	0	0	0	0
Mac Arthur-Bates Vocabulary	0	0.576	0	0	0	0	0	0	0
Bates Difficult sub-scale (-)	0	0	1.000	0	0	0	0	0	0
Bates Unsocialable sub-scale (-)	0	0	0.444	0	0	0	0	0	0
Bates Unstoppable sub-scale (-)	0	0	0.948	0	0	0	0	0	0
Rothbart Inhibitory Control sub-scale	0	0	1.007	0	0	0	0	0	0
Rothbart Attention sub-scale	0	0	0.505	0	0	0	0	0	0
Bates Difficult factor (-)	0	0	0	1.000	0	0	0	0	0
Bates Unsocialable factor (-)	0	0	0	0.439	0	0	0	0	0
Bates Unadaptable (-)	0	0	0	0.639	0	0	0	0	0
Bates Unstoppable (-)	0	0	0	0.511	0	0	0	0	0
Number of different play materials	0	0	0	0	1.000	0	0	0	0
Number of colouring books	0	0	0	0	0.368	0	0	0	0
Number of toys bought	0	0	0	0	0.582	0	0	0	0
Number of toys that require movement	0	0	0	0	0.651	0	0	0	0
Number of toys to learn shapes	0	0	0	0	0.749	0	0	0	0
Number of different play activities	0	0	0	0	0	1.000	0	0	0
Times told a story to child in last 3 days	0	0	0	0	0	0.627	0	0	0
Times read to child in last 3 days	0	0	0	0	0	0.707	0	0	0
Times played with child and toys in last 3 days	0	0	0	0	0	0.597	0	0	0
Times labelled things to child in last 3 days	0	0	0	0	0	0.606	0	0	0
Mothers' years of education	0	0	0	0	0	0	1.000	0	0
Mother's vocabulary	0	0	0	0	0	0	1.049	0	0
Number of books for adults in the house	0	0	0	0	0	0	0.737	0	0
Number of magazines and newspapers	0	0	0	0	0	0	0.461	0	0
Raven's score ("IQ")	0	0	0	0	0	0	0.890	0	0
Did you feel depressed? (-)	0	0	0	0	0	0	0	1.000	0
Bothered by what usually don't bother you? (-)	0	0	0	0	0	0	0	0.842	0
Had trouble keeping mind on doing? (-)	0	0	0	0	0	0	0	0.917	0
Felt everything you did was an effort? (-)	0	0	0	0	0	0	0	0.823	0
Did you feel fearful? (-)	0	0	0	0	0	0	0	0.695	0
Did you sleep was restless? (-)	0	0	0	0	0	0	0	0.798	0
Did you feel happy? (-)	0	0	0	0	0	0	0	0.497	0
How often did you feel lonely last week? (-)	0	0	0	0	0	0	0	0.825	0
Did you feel you couldn't get going? (-)	0	0	0	0	0	0	0	0.961	0
Owens a fridge	0	0	0	0	0	0	0	0	1
Owens a car	0	0	0	0	0	0	0	0	0.378
Owens a computer	0	0	0	0	0	0	0	0	0.945
Owens a blender	0	0	0	0	0	0	0	0	0.836
Owens a washing machine	0	0	0	0	0	0	0	0	0.420
Owens dwelling	0	0	0	0	0	0	0	0	0.515
Owens a radio	0	0	0	0	0	0	0	0	0.535
Owens a TV	0	0	0	0	0	0	0	0	0.919

Table A4: Estimates of the difference in means of the latent factors between treated and controls

Latent factor	Mean	Standard deviation	90% Confidence Internal
Child's cognitive skills at $t+1$	0.108	(0.055)	[0.015,0.186]
Child's cognitive skills at $t$	-0.031	(0.074)	[-0.159,0.084]
Child's socio-emotional skills at $t+1$	0.082	(0.044)	[0.008,0.149]
Child's socio-emotional skills at $t$	0.037	(0.068)	[-0.077,0.148]
Material investments at $t+1$	0.200	(0.072)	[0.072,0.303]
Time investments at $t+1$	0.345	(0.071)	[0.221,0.449]
Mother's cognitive skills	-0.026	(0.046)	[-0.104,0.047]
Mother's socio-emotional skills	0.007	(0.038)	[-0.063,0.063]

Notes: Standard errors in parentheses and 90% confidence intervals in brackets based on 1000 bootstraps.

Table A5: Estimates of the correlation matrix of the latent factors for treated and controls

	Child's cognitive skills (t+1)	Child's cognitive Skill (t)	Child's socio-emotional skill (t+1)	Child's socio-emotional skill (t)	Material investment	Time investment	Mother's cognitive skill	Mother's socio-emotional skill	Wealth (t)
<i>Control group</i>									
Child's cognitive skills at t+1	1.00	0.64	0.35	0.30	0.40	0.28	0.50	0.13	0.24
Child's cognitive skills at t	0.64	1.00	0.27	0.26	0.28	0.24	0.35	0.08	0.17
Child's socio-emotional skills at t+1	0.35	0.27	1.00	0.62	0.36	0.28	0.29	0.14	0.12
Child's socio-emotional skills at t	0.30	0.26	0.62	1.00	0.32	0.26	0.44	0.16	0.24
Material investments at t+1	0.40	0.28	0.36	0.32	1.00	0.62	0.61	0.07	0.32
Time investments at t+1	0.28	0.24	0.28	0.26	0.62	1.00	0.41	-0.02	0.18
Mother's cognitive skills	0.50	0.35	0.29	0.44	0.61	0.41	1.00	0.19	0.44
Mother's socio-emotional skills	0.13	0.08	0.14	0.16	0.07	-0.02	0.19	1.00	0.02
Wealth at t	0.24	0.17	0.12	0.24	0.32	0.18	0.44	0.02	1.00
<i>Treated group</i>									
Child's cognitive skills at t+1	1.00	0.68	0.32	0.21	0.30	0.17	0.27	0.12	0.14
Child's cognitive skills at t	0.68	1.00	0.26	0.22	0.24	0.14	0.21	0.08	0.09
Child's socio-emotional skills at t+1	0.32	0.26	1.00	0.43	0.29	0.28	0.24	0.13	0.08
Child's socio-emotional skills at t	0.21	0.22	0.43	1.00	0.10	0.05	0.29	0.15	0.24
Material investments at t+1	0.30	0.24	0.29	0.10	1.00	0.45	0.48	0.03	0.26
Time investments at t+1	0.17	0.14	0.28	0.05	0.45	1.00	0.29	-0.14	0.02
Mother's cognitive skills	0.27	0.21	0.24	0.29	0.48	0.29	1.00	0.12	0.40
Mother's socio-emotional skills	0.12	0.08	0.13	0.15	0.03	-0.14	0.12	1.00	0.18
Wealth at t	0.14	0.09	0.08	0.24	0.26	0.02	0.40	0.18	1.00

## D Specification and robustness checks

In this section of the appendix, we report results associated with specification and robustness checks we discuss in the main text.

Tables A6 and A7 report the estimates of the investment function and production functions when the investment function is fully interacted with the treatment indicator.

Tables A8 and A9 report the estimates of the CES production function for cognitive skills and socio-emotional skills, respectively, where all the share parameters (as well as the total productivity factor  $A$ ) is interacted with the treatment.

Tables A10 and A11 report the estimates of the CES production function for cognitive skills and socio-emotional skills, respectively where the child's age at follow-up is allowed to determine investments (in the investment functions) and to affect total-factor productivity.

Table A6: Estimates of the fully interacted log-linear investment function

	Log of material investment		Log of time investment	
	Main effect	Interaction with Treatment	Main effect	Interaction with Treatment
Constant	<b>-0.006</b> (0.020) [-0.03,0.035]	<b>-0.001</b> (0.027) [-0.033,0.053]	<b>0.257</b> (0.082) [0.113,0.389]	<b>0.343</b> (0.075) [0.202,0.445]
Log of child's cognitive skills at t	<b>0.083</b> (0.084) [-0.041,0.236]	<b>0.124</b> (0.061) [0.015,0.216]	<b>0.089</b> (0.122) [-0.13,0.249]	<b>-0.015</b> (0.106) [-0.186,0.16]
Log of child's socio-emotional skills at t	<b>0.068</b> (0.095) [-0.063,0.245]	<b>0.129</b> (0.100) [0.001,0.323]	<b>-0.158</b> (0.127) [-0.394,0.019]	<b>-0.163</b> (0.139) [-0.443,0.012]
Log of mother's cognitive skills	<b>0.753</b> (0.114) [0.563,0.92]	<b>0.364</b> (0.124) [0.155,0.567]	<b>-0.145</b> (0.156) [-0.247,0.246]	<b>0.076</b> (0.163) [-0.193,0.346]
Log of mother's socio-emotional skills	<b>-0.092</b> (0.123) [-0.343,0.053]	<b>-0.216</b> (0.116) [-0.419,-0.034]	<b>-0.089</b> (0.147) [-0.097,0.373]	<b>-0.130</b> (0.157) [-0.366,0.156]
Log of wealth at t	<b>0.043</b> (0.103) [-0.135,0.208]	<b>-0.053</b> (0.147) [-0.343,0.15]	<b>0.116</b> (0.147) [-0.097,0.373]	<b>-0.032</b> (0.186) [-0.266,0.337]
Mother is married at $t+1$	<b>0.113</b> (0.037) [0.053,0.174]	<b>0.082</b> (0.031) [0.027,0.132]	<b>0.015</b> (0.054) [-0.075,0.105]	<b>0.057</b> (0.053) [-0.028,0.147]
Log of number of children at $t+1$	<b>-0.058</b> (0.046) [-0.148,0]	<b>-0.143</b> (0.046) [-0.221,-0.071]	<b>-0.062</b> (0.073) [-0.16,0.078]	<b>0.074</b> (0.069) [-0.024,0.199]
Log of average male wages in village at $t+1$	<b>0.007</b> (0.073) [-0.131,0.105]	<b>0.087</b> (0.077) [-0.038,0.209]	<b>0.084</b> (0.097) [-0.071,0.245]	<b>-0.191</b> (0.100) [-0.368,-0.047]
Log of average female wages in village at $t+1$	<b>0.014</b> (0.066) [-0.079,0.136]	<b>-0.010</b> (0.072) [-0.145,0.094]	<b>-0.018</b> (0.084) [-0.191,0.091]	<b>0.079</b> (0.091) [-0.046,0.245]

Notes: Standard errors in parentheses and 90% confidence intervals in brackets based on 1000 bootstraps.

Table A7: Estimates of the CES production for cognitive and socio-emotional skills with a fully interacted log-linear investment function

	<i>Cognitive skills</i>	<i>Socio-emotional skills</i>
Child's cognitive skills at $t$	<b>0.567</b> (0.051) [0.499,0.667]	<b>0.104</b> (0.054) [0.012,0.189]
Child's socio-emotional skills at $t$	<b>0.037</b> (0.046) [-0.035,0.118]	<b>0.416</b> (0.057) [0.355,0.532]
Mother's cognitive skills	<b>0.053</b> (0.104) [-0.122,0.235]	<b>0.017</b> (0.120) [-0.254,0.136]
Mother's socio-emotional skills	<b>0.052</b> (0.047) [-0.023,0.123]	<b>0.155</b> (0.057) [0.043,0.229]
Material investments at $t+1$	<b>0.358</b> (0.141) [0.1,0.551]	<b>-0.155</b> (0.150) [-0.278,0.211]
Time investments at $t+1$	<b>-0.114</b> (0.107) [-0.292,0.061]	<b>0.384</b> (0.108) [0.158,0.511]
Number of children in household at $t+1$	<b>0.047</b> (0.029) [-0.002,0.092]	<b>0.078</b> (0.027) [0.028,0.119]
Control function for material investments	<b>-0.298</b> (0.160) [-0.532,-0.001]	<b>0.317</b> (0.161) [-0.051,0.459]
Control function for time investment	<b>0.137</b> (0.126) [-0.07,0.333]	<b>-0.3</b> (0.118) [-0.461,-0.079]
Complementarity parameter	<b>0.08</b> (0.065) [-0.031,0.179]	<b>0.011</b> (0.058) [-0.067,0.122]
Elasticity of substitution	<b>1.087</b> (0.077) [0.97,1.218]	<b>1.012</b> (0.065) [0.938,1.139]
Productivity parameter (A)	<b>0.991</b> (0.012) [0.968,1.007]	<b>0.993</b> (0.013) [0.974,1.015]
Productivity parameter interacted with treatment	<b>0.08</b> (0.066) [-0.009,0.206]	<b>-0.037</b> (0.053) [-0.13,0.041]

Notes: Standard errors in parentheses and 90% confidence intervals in brackets based on 1000 bootstraps.

Table A8: Estimates of the CES production for cognitive skills where all the share parameters are interacted with the treatment

	<i>Without control function</i>	<i>With control function</i>
Child's cognitive skills at $t$	<b>0.548</b> (0.063) [0.455,0.665]	<b>0.524</b> (0.071) [0.435,0.665]
Child's cognitive skills at $t$ * Treat	<b>0.072</b> 0.088 [-0.068,0.221]	<b>0.064</b> 0.088 [-0.078,0.211]
Child's socio-emotional skills at $t$	<b>0.02</b> (0.064) [-0.078,0.14]	<b>0.033</b> (0.071) [-0.068,0.164]
Child's socio-emotional skills at $t$ * Treat	<b>0</b> 0.084 [-0.142,0.128]	<b>-0.005</b> 0.085 [-0.147,0.128]
Mother's cognitive skills	<b>0.281</b> (0.085) [0.16,0.429]	<b>0.125</b> (0.173) [-0.151,0.416]
Mother's cognitive skills * Treat	<b>-0.172</b> 0.108 [-0.371,-0.023]	<b>-0.151</b> 0.112 [-0.351,0.011]
Mother's socio-emotional skills	<b>0.042</b> (0.079) [-0.111,0.142]	<b>0.042</b> (0.076) [-0.106,0.147]
Mother's socio-emotional skills * Treat	<b>0.054</b> 0.095 [-0.088,0.224]	<b>0.04</b> 0.094 [-0.103,0.21]
Material investments at $t+I$	<b>0.082</b> (0.063) [-0.023,0.19]	<b>0.375</b> (0.236) [0.039,0.782]
Material investments at $t+I$ *Treat	<b>0.011</b> 0.078 [-0.121,0.135]	<b>0.001</b> 0.08 [-0.137,0.125]
Time investments at $t+I$	<b>0</b> (0.062) [-0.12,0.082]	<b>-0.141</b> (0.153) [-0.454,0.031]
Time investments at $t+I$ * Treat	<b>0.015</b> 0.076 [-0.098,0.152]	<b>0.029</b> 0.077 [-0.082,0.17]
Number of children in household at $t+I$	<b>0.026</b> (0.042) [-0.045,0.094]	<b>0.041</b> (0.044) [-0.033,0.112]
Number of children in household at $t+I$ * Treat	<b>0.047</b> 0.033 [-0.008,0.094]	<b>0.062</b> 0.036 [-0.002,0.116]



Table A8 : Estimates of the CES production for cognitive skills where all the share parameters are interacted with the treatment (continued)

	<i>Without control function</i>	<i>With control function</i>
Control function for material investments	-	<b>-0.3</b> 0.229 [-0.692,0.02]
Control function for time investment	-	<b>0.14</b> 0.15 [-0.048,0.434]
Complementarity parameter	<b>0.143</b> 0.081 [-0.035,0.229]	<b>0.057</b> 0.061 [-0.018,0.169]
Elasticity of substitution	<b>1.166</b> 0.105 [0.966,1.297]	<b>1.061</b> 0.073 [0.982,1.203]
Productivity parameter (A)	<b>0.978</b> 0.012 [0.966,1.005]	<b>0.987</b> 0.011 [0.97,1.007]
Productivity parameter interacted with treatment	<b>0.097</b> 0.054 [0.016,0.189]	<b>0.08</b> 0.075 [-0.018,0.224]

Notes:

Standard errors in parentheses and 90% confidence intervals in brackets based on 1000 bootstraps.

Table A9: Estimates of the CES production for socio-emotional skills where all the share parameters are interacted with the treatment

	<i>Without control function</i>	<i>With control function</i>
Child's cognitive skills at $t$	<b>0.123</b> (0.067) [0.016,0.238]	<b>0.12</b> (0.079) [-0.002,0.256]
Child's cognitive skills at $t$ * Treat	<b>-0.013</b> 0.084 [-0.147,0.126]	<b>-0.011</b> 0.084 [-0.147,0.134]
Child's socio-emotional skills at $t$	<b>0.557</b> (0.090) [0.473,0.761]	<b>0.531</b> (0.092) [0.453,0.746]
Child's socio-emotional skills at $t$ * Treat	<b>-0.247</b> 0.096 [-0.449,-0.125]	<b>-0.239</b> 0.097 [-0.441,-0.121]
Mother's cognitive skills	<b>-0.144</b> (0.105) [-0.33,0.013]	<b>-0.032</b> (0.191) [-0.371,0.253]
Mother's cognitive skills * Treat	<b>0.16</b> 0.13 [-0.051,0.384]	<b>0.131</b> 0.136 [-0.087,0.362]
Mother's socio-emotional skills	<b>0.168</b> (0.086) [0.018,0.299]	<b>0.16</b> (0.084) [0.016,0.294]
Mother's socio-emotional skills * Treat	<b>0.01</b> 0.104 [-0.165,0.165]	<b>0.03</b> 0.105 [-0.151,0.175]
Material investments at $t+1$	<b>0.196</b> (0.075) [0.074,0.316]	<b>-0.172</b> (0.236) [-0.537,0.258]
Material investments at $t+1$ * Treat	<b>-0.082</b> 0.088 [-0.216,0.068]	<b>-0.077</b> 0.09 [-0.209,0.078]
Time investments at $t+1$	<b>0.048</b> (0.067) [-0.065,0.154]	<b>0.37</b> (0.156) [0.052,0.546]
Time investments at $t+1$ * Treat	<b>0.091</b> 0.083 [-0.033,0.241]	<b>0.084</b> 0.084 [-0.043,0.236]
Number of children in household at $t+1$	<b>0.052</b> (0.044) [-0.036,0.111]	<b>0.022</b> (0.044) [-0.052,0.091]
Number of children in household at $t+1$ * Treat	<b>0.133</b> 0.033 [0.082,0.19]	<b>0.104</b> 0.035 [0.059,0.17]

Table A9 (cont.): Estimates of the CES production for socio-emotional skills where all the share parameters are interacted with the treatment

	<i>Without control function</i>	<i>With control function</i>
Control function for material investments	-	<b>0.379</b> (0.223) [-0.038,0.724]
Control function for time investment	-	<b>-0.34</b> (0.145) [-0.496,-0.033]
-----		
Complementarity parameter	<b>-0.023</b> (0.069) [-0.118,0.102]	<b>-0.042</b> (0.051) [-0.101,0.06]
Elasticity of substitution	<b>0.977</b> (0.069) [0.895,1.114]	<b>0.959</b> (0.050) [0.908,1.064]
-----		
Productivity parameter (A)	<b>1.017</b> (0.012) [0.981,1.019]	<b>1.021</b> (0.009) [0.987,1.017]
Productivity parameter interacted with treatment	<b>-0.027</b> 0.039 [-0.082,0.046]	<b>-0.056</b> 0.057 [-0.118,0.061]

Notes: Standard errors in parentheses and 90% confidence intervals in brackets based on 1000 bootstraps.

Table A10: Estimates of the CES production for cognitive skills, where age is allowed to affect total-factor productivity

	<i>Without control function</i>	<i>With control function</i>
Child's cognitive skills at $t$	<b>0.593</b> (0.044) [0.524,0.67]	<b>0.565</b> (0.057) [0.485,0.677]
Child's socio-emotional skills at $t$	<b>0.032</b> (0.043) [-0.037,0.106]	<b>0.038</b> (0.050) [-0.033,0.125]
Mother's cognitive skills	<b>0.179</b> (0.049) [0.103,0.263]	<b>0.018</b> (0.127) [-0.176,0.231]
Mother's socio-emotional skills	<b>0.066</b> (0.045) [-0.011,0.131]	<b>0.055</b> (0.049) [-0.026,0.125]
Material investments at $t+1$	<b>0.09</b> (0.033) [0.034,0.145]	<b>0.418</b> (0.207) [0.095,0.744]
Time investments at $t+1$	<b>0.006</b> (0.035) [-0.055,0.059]	<b>-0.145</b> (0.141) [-0.392,0.047]
Number of children in household at $t+1$	<b>0.034</b> (0.026) [-0.009,0.078]	<b>0.051</b> (0.030) [0.001,0.098]
Control function for material investments	-	<b>-0.344</b> (0.217) [-0.673,-0.006]
Control function for time investment	-	<b>0.16</b> (0.150) [-0.053,0.421]
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Complementarity parameter	<b>0.149</b> (0.079) [-0.031,0.229]	<b>0.056</b> (0.061) [-0.036,0.164]
Elasticity of substitution	<b>1.175</b> (0.101) [0.97,1.296]	<b>1.059</b> (0.071) [0.965,1.196]
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Productivity parameter (A)	<b>0.984</b> (0.018) [0.958,1.014]	<b>0.998</b> (0.016) [0.968,1.023]
Productivity parameter interacted with treatment	0.091 0.053 [0.029,0.201]	0.07 0.073 [-0.013,0.223]
Productivity parameter interacted with age	<b>0</b> (0.008) [-0.011,0.014]	<b>-0.005</b> (0.007) [-0.013,0.009]

Notes: Standard errors in parentheses and 90% confidence intervals in brackets based on 1000 bootstraps.

Table A11: Estimates of the CES production for socio-emotional skills, where age is allowed to affect total-factor productivity

	<i>Without control function</i>	<i>With control function</i>
Child's cognitive skills at $t$	<b>0.112</b> (0.044) [0.04,0.188]	<b>0.116</b> (0.059) [0.025,0.218]
Child's socio-emotional skills at $t$	<b>0.443</b> (0.054) [0.368,0.551]	<b>0.428</b> (0.057) [0.349,0.538]
Mother's cognitive skills	<b>-0.055</b> (0.065) [-0.166,0.046]	<b>0.057</b> (0.138) [-0.169,0.281]
Mother's socio-emotional skills	<b>0.146</b> (0.057) [0.05,0.23]	<b>0.155</b> (0.057) [0.046,0.231]
Material investments at $t+1$	<b>0.148</b> (0.042) [0.08,0.218]	<b>-0.22</b> (0.192) [-0.526,0.091]
Time investments at $t+1$	<b>0.112</b> (0.041) [0.046,0.181]	<b>0.398</b> (0.131) [0.174,0.597]
Number of children in household at $t+1$	<b>0.093</b> (0.026) [0.049,0.135]	<b>0.065</b> (0.027) [0.027,0.115]
Control function for material investments	-	<b>0.385</b> (0.198) [0.061,0.703]
Control function for time investment	-	<b>-0.31</b> (0.135) [-0.505,-0.064]
Complementarity parameter	<b>0.061</b> (0.075) [-0.084,0.151]	<b>0.029</b> (0.055) [-0.049,0.116]
Elasticity of substitution	<b>1.065</b> (0.086) [0.923,1.178]	<b>1.029</b> (0.060) [0.953,1.131]
Productivity parameter (A)	<b>0.992</b> (0.020) [0.965,1.031]	<b>0.996</b> (0.018) [0.963,1.022]
Productivity parameter interacted with treatment	-0.027 0.041 [-0.081,0.056]	-0.042 0.057 [-0.113,0.071]
Productivity parameter interacted with age	<b>-0.002</b> (0.007) [-0.013,0.009]	<b>0.004</b> (0.008) [-0.01,0.017]

Notes: Standard errors in parentheses and 90% confidence intervals in brackets based on 1000 bootstraps.

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