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Gustavo Yamada
Pablo Lavado
Guadalupe Montenegro

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Gustavo Yamada
Universidad del Pacífico and IZA

Pablo Lavado
Universidad del Pacífico

Guadalupe Montenegro
Group for the Analysis of Development

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IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

The Effect of One Laptop per Child on Teachers' Pedagogical Practices and Students' Use of Time at Home

This document investigates the effect that the delivery of XO laptops in Peru has had on teachers' pedagogical practices and students' use of time in the home based on information from a randomized control trial. The results show that the delivery of XO laptops reduces the probability that teachers will use a student-centered method with cooperative characteristics between 6 and 13 pp while this type of pedagogical practice has a positive impact on student performance in the area of language (between 1.5 and 2sd). We found two contrary effects in the home. XO laptops reduce the probability that a student will do homework at home by 4 pp despite the fact that doing so increases language performance 4 standard deviations. Additionally, XO laptops increase the probability of watching television by 8 pp although said activity reduces performance 2 sd. XO laptops also reduce the probability that students will perform household chores between 9 and 40 pp while said activity increases language performance between 0.2 and 1.6 standard deviations for language. We did not find effects on language and the majority of results refer to students in fourth grade of primary. The variety and overlapping of effects may explain the null effect of the program for the sample of 2nd to 6th grade of primary and the negative effect for fourth of primary.

JEL Classification: C13, C93, I21, I28

Keywords: education, technology, teacher, teaching methods, pedagogical practices, academic performance, laptop, OLPC, time, activities, household

Corresponding author:
Gustavo Yamada
Department of Economics
Universidad del Pacífico
Av. Salaverry 2020
Lima 11
Peru

E-mail: yamada_ga@up.edu.pe

1. Introduction

In 2008, Peru joined the global initiative "One Laptop per Child" (OLPC). OLPC's objective is to improve children's academic performance by delivering low-cost laptops in areas of extreme poverty[1]. Peru's adherence to OLPC led it to invest 172 million dollars, which made it the largest purchaser of XO laptops in the world[2] (see table 1).

International experience shows that OLPC has a positive impact on academic performance (Uruguay and Afghanistan) and on school attendance (Ethiopia) among others (see table 2). This situation did not occur in Peru, according to the experimental assessment conducted by the Inter-American Development Bank (IDB). Cristia et al. (2012) found that XO laptop delivery, statistically speaking, had no significant effects on performance in mathematics or on students' reading comprehension.

Currently, there is no evidence that demonstrates why XO laptops failed to have an impact in Peru. Consequently, the objective of this document is to explore the way that XO laptops affected performance through two mechanisms: a change in teachers' pedagogical practices and in the students' use of time in the home[3].

We used the database from the randomized control trial (RCT) conducted by IDB on a sample of 319 schools. Additionally, we gathered information from students, teachers, the school principal and the child's family for students in the second, fourth and sixth grades of primary. Our study includes information on activities inside the classroom given that two examiners observed both language and mathematics classes at different moments in time in 317 fourth grade of primary classes. The student survey includes detailed information on the activities that took place in the home and the amount of time that was dedicated to each.

To measure pedagogical practices, we used Latent Class Analysis (LCA) to analyze the information from the classroom observation guide. This method identifies patterns of occurrence in the activities that take place in the classroom. Specifically, it classifies classroom activities into two groups: method A and method B. Method A is characterized by cooperative work that is guided by the teacher (work is distributed in class to pairs or groups; there is cooperative work and supervision from the teacher). According to the literature, this method approximates the student-centered method. On the contrary, Method B is characterized by the instructor's individualized and traditional lecture approach to teaching (distribution of work on an individual basis with little interaction between peers or with the teacher). This method approximates the teacher-centered approach.

To measure the impact on the student's use of time at home, we used a broader set of variables than that used by the study on pedagogical practices. In this case, we chose to classify them into two groups: (i) activities in home and (ii) household chores. The first group finds the time spent or if help was requested from an adult to complete homework in the home and if the child reads, watches television or plays at home. The second group includes the time spent taking care of siblings or animals, collecting wood, working on the family farm, helping sell or produce products or cooking, sweeping, cleaning, etc.

The objective of this document is to determine how XO laptops affected the student's performance through the instructor's pedagogical practices and time use at home. Consequently,

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1 The unit cost of a laptop forseen by the OLPC foundation is 172 dollars.

2 The XO is a low-cost laptop that was developed by a group of experts from the program "Una Laptop por Niño". It includes educational programs, digital books among others (Thompson and Cueto, 2010).

3 It is important to note that the majority of the student's laptop use takes place during class hours (see figure).

by using 2-stage least squared estimation (2sls), we found that XO laptop delivery reduces the probability that the instructor will use a student-centered method with cooperative characteristics by 6-13 pp although this type of pedagogical practice has a positive impact on the student's language development (between 1.5 y 2.1 sd).

We also found contrasting effects in the home. For instance, XO laptops reduced the probability of doing homework at home by 4 pp despite the fact that this activity increased the standard deviation of performance in language 4 standard deviations. Additionally, XO laptops increased the probability of watching television 8 pp whereas said activity reduces performance by 2 sd. XO laptops also reduces the domestic chores that children perform between 9 and 40 pp. whereas the same increase language performance between 0.2 and 1.6 standard deviations.

The results found are associated with the language course in fourth grade of primary. No conclusive results were found in the sub-samples for 2nd to 6th grade of primary.

We found that XO laptops affect each of the channels in different directions. The variety and overlapping of effects could explain the null effect of the program for the sample from 2nd to 6th of primary and the negative effect for fourth of primary.

As such, this document contributes empirical evidence to the literature on the relation between technology and student performance and its relation with the instructors' pedagogical practices and the student's use of time at home in particular. Given that both are little-explored channels, research along these lines could be decisive in future policies that seek to incorporate new information and communications technologies (ICT) in education.

Section 2 presents a literature review while section 2 presents the empirical estimation and the date, stylized facts and methodology used. Section 4 describes the results found while section 5 presents final conclusions.

2. Literature Review

The focus proposed by Hanushek, 1995 is cited frequently in literature. This focus purports that school performance is the final result of a process driven by diverse school inputs (i.e. the characteristics of the instructor, school, and home, among others) that are related through a production function. Although this focus permits a more ordered understanding of the process behind school performance, consensus has yet to be reached at a literature level in terms of the identification of relevant inputs (Coleman (1968), Hanushek (1997), Hedges et al. (1994), Hanushek (1995)). One of the inputs that is acquiring greater importance in this area of study is the role that technology plays in performance[4].

Current literature makes it possible to argue that technology is playing an increasingly important role in school education. Nevertheless, there is no conclusive evidence regarding the direction of its impact. On the contrary, given the vast heterogeneousness that is hidden behind what we consider technology, it appears that its effect depends on many factors, including, for example, if the technology is applied in a developed or emerging country or how the concept of technology is applied. Rivera and Rice (2002) and Brallier et al. (2007) show that technology has no effect on academic performance if we compare virtual and traditional education. Fried (2008) and Hembrooke and Gay (2003) go a step further, arguing that the use of laptops may even have a negative effect on students' performance due to the fact that children may engage in other

[4] The definition of technology within the classroom is broad. The use of calculators, devices, laptops, mobile devices among others can be considered technology (Norris et al. (2003); Park and Hannum (2001); Hanushek (1971); Wurst et al. (2008)).

activities and become distracted[5]. On the contrary, Wurst et al. (2008), Rodríguez et al. (2010) and Grasha (1994) contend that technology has a positive effect on students' academic results. For example, Banerjee et al. (2007), using an experimental assessment of an education program in India, shows that the delivery of laptops and advisory services in schools generated an improvement of 0.25 standard deviations in student performance.

One of the crucial inputs of the education production function (Hanushek, 1995) is relative to teachers' characteristics. Unfortunately, the literature in not conclusive regarding the teacher's impact on the student's school performance. For example, it is logical to think that better educated and more experienced teachers generate better academic results in their students. Although there is evidence that a positive relation exists with the teacher's level of education, there is no empirical consensus of the importance of experience (Hanushek, 1995). The lack of conclusive results could be due to the fact that the observable characteristics that are used fail to allow us to differentiate between elements of this situation with certainty. For example, in many countries, teachers are paid a standard rate that is not dependent on quality. Accordingly, this characteristic is no longer relevant in the analysis. As shown in various studies, teachers' salaries do not have a significant impact on students' academic results (Hedges et al. (1994); Hanushek (1995); Hanushek (1997)).

If we look beyond a teacher's education and experience, one of the most relevant aspects of an instructor in his or her relation with student learning reflects organizational and pedagogical factors, as mentioned by Hanushek (1995). Including these factors allows us to complement observable characteristics that when examined alone, fail to completely explain differences in performance. As such, the present study incorporates the teacher's teaching method as an important pedagogical factor that allows us to differentiate between instructors and explain differences in students' academic performance based on the same.

Defining the teaching method is always a difficult task given that there is no consensus on what each method actually includes, which depends on a series of factors that the teacher chooses. For example, Bennett and Jordan (1975) identify six factors that characterize the teaching method: mode of assessment, work in groups, physical control over the classroom, content selection, classroom management and the students' level of decision making. Given that the combination of the choices in each factor defines the teaching method, it is better to speak of a spectrum of methods where the extremes constitute opposing categories. Nevertheless, literature generally simplifies this focus by defining teaching methods as global dichotomies according to the method's proximity to the spectrum's extreme. This research adopts this simplification to facilitate the correct reading and interpretation of results[6].

The starting point that will be used to define dichotomies in classrooms with regard to the teaching method are the different forms that students acquire knowledge, as stipulated by O'Neill and Mc-Mahon (2005). The authors define two types of teaching: the student-centered method and the teacher-centered method. Under the first focus, students build their own knowledge with the support of the teacher, who acts simply as a mediator. In this sense, the student-centered focus tends to entail activities where the student puts lessons into practice and the teacher participates

[5] It is important to note that the effect of technology, as is the case with any other school input, depends on the frequency of use in the classroom. In this regard, Norris et al. (2003) and Muir-Herzig (2004) showed that the limited effect of technology in the United States is due to the fact that students had little access to the same. Other authors indicate that there is a process of gradual adaptation to technology that limits teachers' use of the same (Cuban et al. (2001); Hu et al. (2003); Davis et al. (1989)).

[6] The validity of this supposition has been proven through a latent class analysis (LCA), which is explained in greater depth in the methodology section. The results obtained lead to the conclusion that it is possible to contend that there are two groups of teaching methods based on the activities conducted by teachers in the classes observed.

solely in a supervisory capacity and corrects work.[7] In contrast, the teacher-centered method mainly describes a mechanism of information transmission from teacher to student. Some studies exist on this point that show that the student-centered method reaps better results, such as the study conducted Guloba et al. (2010) with children in primary school in Uganda.

Additionally, literature recognizes another type of teaching: collaborative learning. Under its broadest definition, this type of learning refers to a situation in which two or more students learn or attempt to learn something in a group (Dillenbourg, 1999). According to this definition, teaching methods entail collaborative learning if they roll out activities that require students to interact. As is show by empirical literature, collaborative learning leads to better academic results. For example, Hsiung (2012) compared the academic results of mechanical engineering students in Taiwan who were randomly assigned to individual or collaborative activities[8]. After adequately controlling for the context in which each of these activities occur, the author concluded that cooperative learning does in fact generate better academic results than individual learning. These results can be explained by using work by Vygotsky (1978), who argues that social interactions are the very situations that develop children's practical and abstract intelligence.

If the aforementioned is true, the method that has more impact on students' academic performance should be a combination of the student-centered method and activities that promote collaborative learning, which runs contrary to the teacher-centered approach. In this study, the first method will be denominated method A and, according to the information available, will include cooperative activities in which the student applies lessons and the teacher acts solely as a mediator. Method B runs opposite to method A and entails both the teacher-centered method and individual activities.

One of the objectives of this document is to analyze the interaction between the aforementioned inputs in general and how technology affects the instructor's teaching method and its subsequent impact on school performance in particular. Accordingly, this study seeks to analyze if XO laptop delivery generates a change in the instructor's teaching method that can explain the null effect found for the One Laptop per Child program.

Although related literature is not abundant, there are some studies that study this point. We have Grasha and Yangarber-Hicks (2000), who indicate that no significant changes were identified in the instructor's teaching method when evaluating the effect of introducing different forms of technology in the classroom. Nevertheless, authors indicate that the use of technology may reinforce the process. This means that instructors that use a teacher-centered method would have to use technology as a new means of information transmission that accentuates the students' passivity and, at the same time, instructors that use the student-centered method would have to use technology through applicative and cooperative applications.

However, some studies indicate that the use of technology in the classroom can generate a change both in the way in which the instructor teaches and in the way in which the student learns. In this regard, Norris et al. (2003) contend that the presence of technology leads to less personal contact

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7 It is important to note that the student-centered method sets no guidelines for work between peers. Moreover, some critics of the student-centered method argue that there is an excessive individualization of work and that it is important to recognize that the needs of each student and his or her pace of learning are unique (O'Neill and McMahon, 2005).

8 The concepts of 'collaborative' and 'cooperative' are not precisely interchangeable. The first refers to activities in which students work together with no option to divide the work. Under the second, students can divide labor. Nevertheless, for the purposes of this study, these words will be used as synonyms.

between teacher and student although this interaction is an important predictor of the student's ability to learn. Schacter and Fagnano (1999) argue that technology individualizes the education process. This means that teachers fail to promote collaborative learning.

On the contrary, there is evidence that technology facilitates the development of skills for cooperation. The studies conducted by Wurst et al. (2008) and Rodriguez et al. (2010) show that the introduction of technological devices can generate a cooperative environment, which tends to generate better academic results.

Technology leads students to develop better levels of reflection and problem-solving skills. This in turn leads to better academic performance (Lowther et al. (2001); Fowler et al. (1996); Rodriguez et al. (2010)). Manlunas (2011) conducted an experimental assessment in the Philippines that compares classrooms that use ITC in which the only defining difference is the teaching method used by the instructor.

The results of this research indicate that the set of classrooms in which the instructor applied a student-centered method performed two points above average in mathematics.

The second objective of this document is to analyze how the introduction of laptops modifies the student's behavior inside the home and its effect on school performance. In particular, it seeks to identify the way in which laptop delivery changes the use of time relative to different activities that children perform in the home. For example, the introduction of laptops can reduce the time that the student dedicates to homework or increase the hours spent watching television, which may explain the null effect found for the One Laptop per Child program.

Currently, the literature that focuses on analyzing the relation between different activities that children engage in within the home and their school performance is not abundant. For example, Leone and Richards (1989) found that, as expected, the time that students spend on homework has a positive correlation with academic performance. Carpenter et al. (1989) found that children who spend more time in front of the television or in disorganized activities in the home have lower cognitive capacities, which runs contrary to time the result obtained for time spent on reading. Guarcello et al. (2005) analyze how the time that students work, whether on chores or at the family business, impacts inputs in the education process (i.e. attendance, fatigue at school, etc.). Curiously, the authors found that although time spent working affects the inputs of the education process (e.g. attendance, fatigue at school), there are no significant differences in terms of performance. Some studies even suggest that household chores have a positive effect on school performance (and on other social variables) given that they promote responsibility in children and improve their sense of self-mastery and self-sufficiency (Rossman (2002)).

The number of studies that examine the role of technology within the framework of students' use of time within the home is still limited. Nevertheless, an interesting study was conducted in Peru by Beuermann et al. (2013). The authors found that children who had received an XO laptop in the framework of a One Laptop per Child program end up spending more time on household chores and less time reading. They argue that students spent more time in the house, which increased the probability that their parents would ask them to perform chores.

After reviewing the literature at hand, we feel that it is important to note that technology's effectiveness is directly related to the teacher's methodological design (Dellit and Director, 2001) and to how the student's behavior in the home changes. Nevertheless, this point has not been studied enough to reach conclusive opinions regarding technology's effect on academic performance. Along these lines, this research will seek to shed light on the relation between technology and performance by studying two channels of transmission: the instructor's teaching method and the child's use of time in the home.

3. Empirical Estimation

3.1. Sources of Information

We use the randomized controlled trial (RCT) conducted by the Inter-American Development Bank (IDB) in 2009 under the framework of One Laptop per Child program (Cristia et al., 2012). The RCT consisted of randomly delivering XO Laptops to a sample of 319 schools, 209 from the treatment group and 110 from the control group. The sample was selected through a randomized stratification process by region, proportion of students who were behind in the curriculum and school size[9]. The criteria used to determine the eligibility of schools were as follows: schools must be public, rural, multi-grade, have electricity and be found in the poorest districts of each region[10].

The RCT conducted by IDB did not gather information *ex-ante* to the intervention; on the contrary, it used the administrative data that is available as a baseline, particularly the Student Census from 2008.[11] Fifteen (15) months after implementing the program, between the months of October and November 2010, IDB gathered information on student performance in mathematics and language through a standardized assessment. The exit survey was given to five students who were chosen randomly from three groups: (i) second of primary, (ii) students that took the ECE in 2008; and (iii) students in sixth of primary[12]. In this way, it was possible to find the students that took the ECE in 2008 in fourth of primary if they had not repeated a year and in third of primary if they had repeated at least once.

The experiment also gathered characteristics of different ambits that could potentially affect the child's school performance. First, demographic information on the school director and instructor was collected. Second, information on the household and on the children's parents, as well as their education level, socio-demographic characteristics and home-type, among others, were collected. A third ambit that was covered by the survey entailed the school's characteristics in terms of infrastructure, access to basic services and connectivity.

The survey placed particular emphasis on student information. This included socio-demographic information as well as information on activities at home (e.g. cooking, sweeping, playing, etc.); interactions with the teacher and between peers and others. It also entailed looking at the amount of time that the student spends on each of the activities.

The experimental assessment conducted direct observations, which consisted primarily of a 30-minute visit by an external examiner, only in language and mathematics classes in fourth grade of primary. The examiner was asked to fill out a form to indicate if a series of activities related to indicators for the modality of work, class distribution and teacher attendance, among others, were conducted. Every two minutes, the examiner indicated on the observation form if a given activity took place. For example, if group work was conducted during the entire class, the guide had fifteen observations of this activity. Each class was observed by a different examiner and in total, two observations were conducted by two independent examiners in each class. This information allowed us to test the robustness of results while reducing the potential effects of subjectivity.

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9 Students with delays refers to students that are older than the typical age found in this grade.

10 The survey does not include single teacher schools whose language of instruction is not Spanish or schools that belong to treatment groups with less than 80% coverage of XO laptops.

11 The Student Census Assessment is a standardized test of mathematics and reading comprehension applied in second of primary throughout Peru.

12 In the exit survey, the group of students with ECE information in 2008: 80% were in fourth of primary, 19% in third of primary, and 1% in second of primary).

The experimental assessment used specialized instruments in each of these ambits. There were five instruments in total: the teach questionnaire, director's questionnaire, student questionnaire, parent questionnaire and the classroom observation guide. The classroom observation guide and the student questionnaire are the main sources of information used to build the variables related to the instructor's pedagogical practices, the student's use of time at home and school performance.

In total, the study collected information on 951 teachers, 2 676 students from second to sixth grade of primary and 317 directors as well as information from parents of 2 623 students from second, third, fourth and sixth of primary[13]. Language and mathematics classes were observed at 315 schools. The sample used in this study included 3 982 students from 315 schools; 35% of the students were from second of primary, 7% from third, 25% from fourth of primary and 33% from sixth.[14]

Information on the classroom teacher and on the school's director is available for each student. Nevertheless, baseline information (from ECE 2008) and data from classroom observation are only available for students in fourth of primary. Due to the distribution of the sample and the available information, we decided to work with three sub-samples: (i) students from second and third of primary (1 686 observations), (ii) students in fourth of primary (989 observations); and (iii) students in sixth of primary (1 307 observations). It is important to note that the controls used are not based on complete information for all students. Consequently, the sample in each group can vary depending on the estimate made.

3.2. Descriptive Analysis

With the information collected from IDB, we conducted a descriptive analysis of both mechanisms: the instructor's teaching method and the distribution of time use at home. First, to develop a preliminary idea of how laptop delivery changed the instructors' teaching method, we analyzed the percentage of time spent on each activity included in the classroom observation guide applied by two examiners (see tables 3 and 4).

According to examiner 1, 69.4% of the students' time in the treatment group implied the use of an individual modality while in the control group, this figure was 59%. Both proportions are statistically different. Along the same lines, the treatment group invested 45.5% of class time working individually in the classroom while the control group spent only 25.9% of its time on the same activity. It was observed that the control group spent a higher percentage of its time doing group work and the class was distributed in pairs or group. Both differences have a significance level of 1%. This situation is corroborated by data gathered by examiner 2. As such, it is possible to infer that a change occurred in the teaching method used with the treatment group. In particular, it is feasible to conclude that the treatment group increased the proportion of class time used under method B in exchange for reducing the time invested in method A.

To find a potential effect on performance due to a change in the teaching method, we analyzed the standardized average score in language and mathematics according to each of the activities conducted in the class and by examiner (see tables 5 and 6). Table 5 shows that, according to examiner 1 and for the language course, if the instructor uses an individual modality, the treatment group obtains a standardized average score of 0.03 standard deviations. If we compare this group's average score with that of the control group, the control group posts a higher score, which is more than likely due to a situation, as can be inferred from the previous table, in which said

[13] 88% of the data corresponds to students in fourth and sixth of primary.

[14] We sought to work with schools that have complete information on the instructor, director parents, and most importantly, students. Schools that do not fulfill this requirement. A total of four schools were removed.

group spends a larger percentage of time learning through a student-centered method with cooperative characteristics. This situation is also reflected in the scores obtained in the mathematics course. As such, if instructors use a student-centered method with cooperative techniques (Method A), better academic results can be achieved in comparison to those garnered under Method B, the teacher-centered method.

Second, the same analysis was conducted on activities related to the distribution of time use at home. In this case, household activities were divided into two groups: (i) those related to interactions inside the home and (ii) household chores. In the first group, we found the proportion of students that read a story, asked an adult about homework, did homework in the house and the number of hours that they played in the house. For the second group, we found the proportion of students that performed household chores; took care of siblings; collected wood; sold items outside of the home; or the number of hours spent on all the aforementioned activities. Table 7 shows the results of the means test for the treatment and control groups according to the grades in the sample. We found that a larger proportion of children in the treatment group did homework at home than in the control group and a smaller proportion of the students in the treatment group spent more time doing household chores than in the control group. These results may indicate that the distribution of time at home could have changed. It is possible that parents believed that the laptop can be used in lieu of performing certain tasks within the homes and this generated a subsequent impact on performance.

3.3. Methodology

Based on the evidence shown in the previous section, this document proposes to evaluate the impact that the introduction of XO laptops has on instructors' pedagogical practices and the students' use of time in the home and determine the subsequent impact of both on performance. To accomplish this, we used an instrumental variables approach through 2-Stage Least Squares Regression (MC2E), where our instrument is the random assignment of laptops that took place under the experimental assessment conducted by IDB. Nevertheless, prior to explaining the estimation process, we will describe how we built the variables related to the teaching method and activities within the home.

3.3.1. Building the Teaching Method

For the purposes of this study, we will assume that two types of teaching methods exist that have an impact on student performance as gathered from related literature. As such, we will distinguish between the student-centered method, which promotes collaborative learning (method A), and the teacher-centered method (method B).

In this study, we will distinguish between the methods applied by each teacher by using five dichotomous variables: (i) if the student works in a group, (ii) if the student requests help from classmates during class (iii) if the student provides support to his or her classmates, (iv) if the student engages in cooperative work in class and (v) if the teacher conducts group work.[15]

Additionally, we used the average probability that a teacher will use method A (proxy of the student-centered method), estimated through the Latent Class Analysis (LCA), as an additional way of obtaining the teaching method applied by the teacher. LCA, as a methodology, characterizes an unobserved variable (latent) through an analysis of the relation of the multiple categorical variables that are observed (McCutcheon, 1987). In others words, based on the occurrence of nominal or categorical data, the LCA identifies patterns of occurrence and classifies

[15] We categorize something as cooperative work if the student fulfills the first three options: teamwork; request help from classmates; helps classmates.

them into groups where each group is characterized by the series of the variables that comprise the same. As such, LCA is capable of grouping together a set of categorical or nominal variables (i.e. groups) without the need to impose ordinality.

In this case, the instructor's teaching method is a unobservable characteristic (latent variable) that can only be approximated through the activities that take place and the teacher's performance during the class (Vermunt and Magidson (2004); Hagenaars and McCutcheon (2002)). Using the classroom observation guide for fourth grade students, which registers the teachers' activities during class, we characterized the pedagogical practices using LCA. We grouped the observation data of the classroom, which was collected by the examiners, and looked at the occurrence of different activities in parallel without imposing an order of importance.

The classroom observation conducted by the examiners provided information on the class for intervals of 2 minutes for the period of 30 minutes that the examiner's visit lasted. In other words, we have 15 datums for each observed class from each examiner. We applied the LCA to each minute of observation and next, we found the average of the results obtained.

The LCA results showed that the pedagogical practices observed in the fourth grade of primary classrooms can be separated into two different groups. Table 8 shows which activities observed in the classroom characterize each of the two methods. It is observable that a method is characterized by its modality and distribution of work in pairs and/or groups along with the teacher's role as a mediator or supervisor, similar to the student-centered and cooperative method (method A). On the contrary, the second method is characterized by its modality and distribution of individual work, similar to the traditional classroom lecture or teacher-centered method (method B).[16]

Additionally, the LCA calculates the probability of occurrence of each of the groups identified for each of the observations. In our case, this means that we found the probability that each teacher will apply the student-centered method (method A) and the teacher-centered method (method B). Given that we found the probability for each minute of observation, we can build the probability that a teacher will apply method A as an average of the possibilities obtained in each minute of observation.

Table 9 shows that significant differences exist in the average probability of applying each method between those who received a laptop (treatment group) and those that did not (control group). In effect, the classes that did not receive laptops showed a higher probability that the teacher would use method A in comparison with the probability found for the treatment group. This difference is significant at a 1% level. This suggests that laptop delivery has, in effect, generated a change in the instructor's pedagogical practices.

3.3.2. Building household variables

To measure the impact on the student's use of time in the home, we used a broader set of variables than that used for pedagogical practices. In this case, we opted to classify these variables into two groups: (i) activities in the home and (ii) household chores. Within the first group, we

[16] The relative entropy of information regarding the adjustment of the groups proposed. Values higher than 0.8 indicate an adequate separation between the components of each group that makes them systematically different (Svenja et al. (2012);Wang et al. (2004); 201 (2010); Collins and Lanza (2013); Jung and Wickrama (2008)) Using a specification of 2 groups, the relative entropy obtained on average was 0.89 for both examiner 1 and examiner 2. With specifications of a larger number of groups, the entropy slightly increases. Nevertheless, the classification into two groups was maintained given that its theoretical foundation is considered more solid.

analyzed different activities such as if the student asked an adult for information; had read a book the day before; did homework in the house; and how much time is spent on these tasks among others. The second group includes activities within the home, including, for example, if a child helped with chores around the house, collected wood, helped sell products outside the home and took care of siblings among others.

Table 10 shows, in summary form, all of the variables used to measure pedagogical practices and the time use in the home. It is important to remember that each of these variables was evaluated as channels that may have been affected by the inclusion of laptops and which may have had an impact on student performance.

3.3.3. Estimation Method

To identify the effect of XO laptops on the variables associated with pedagogical practices or the use of time in the home and determine how these impact student performance, we use the 2-Stage Least Squares method (2SLS). The instrument that we will use will be the random delivery of laptop within the framework of the experimental study conducted by IDB.

The fundamental idea behind using this methodology is to facilitate the analysis of two effects: (i) on one hand the effect of XO laptop delivery in each channel in terms of pedagogical practices or use of time in the home and (ii) the effect of each channel analyzed on student performance (both in mathematics and in language).[17] The first stage allows us to capture the effect of technology on the channel of interest while the second stage estimates the subsequent impact on school performance.

One of the advantages of using this estimation approach instead of others, for example Ordinary Least Squares (OLS), is that it allows us to identify the different channels of transmission that the introduction of laptops may follow to generate an impact on performance. For example, if the channel analyzed is the probability that the teacher will apply method A, by applying 2SLS we can estimate the effect of the laptops on performance that is generated solely by the transmission mechanism relative to a change in the instructor's teaching method. In effect, the first stage captures how the instructor's teaching methodology changes due to laptops and uses this variation, which is induced by technology, to calculate the impact on performance in the second stage. In this way, the effect obtained can be solely attributed to the teaching method channel.

The following model is estimated:

First Stage

$$Y_i = \beta_0 + \beta_1 L_1 + P_i^1 B_1 + A_{ii}^1 B_2 + F_i^1 B_3 + In_i^1 B_4 + C_i^1 B_5 \quad (1)$$

Second Stage

$$A_i = \propto_0 + \propto_1 \hat{Y}_1 + A_{ii}^1 . D_2 + F_i^1 D_3 + P_i^1 D_4 + In_i^1 B_5 + C_i^1 B_6 \quad (2)$$

The equation (1) indicates how the transmission channel analyzed (Y_i) depends on whether the class of student *i* was chosen to receive laptops (L_i). Relevant characteristics that can affect the

[17] The list of transmission channels is summarized in table 10.

channel in question are also included. In this way, we control for characteristics of the student *i*'s instructor (A_{ii}.), which are available only for students in fourth of primary through the ECE 2008 survey, the vector of inputs of the student i's family (F_i), characteristics that are related to infrastructure of student *i*'s school (In_i), and characteristics of the community in which student *i* resides (Ci).[18] Coefficient β_1 shows how the introduction of laptops affects each of the variables that approximate the instructor's pedagogical practices and the student's use of time in the home. Through this equation, we obtain the predicted value for each transmission channel $\hat{Y}_i$.

The equation (2) shows how the student *i*'s academic results (A_i) are affected by the introduction of laptops for each channel of transmission analyzed ($\hat{Y}_i$). In this stage, we included the same controls as in the first. As such, characteristics related to the student *i*'s teacher, family, infrastructure and community, as well as his or her baseline performance, were considered. The parameter of interest is α_1, given that it shows how the change induced by the laptops on the channel analyzed (i.e. pedagogical practices or the use of time at home) affects student performance.

4. Results

This section presents the results of the empirical estimation for each of the three sub-samples: (i) students in second grade of primary, (ii) students in fourth grade of primary and, (iii) students in sixth of primary. First, we show how that laptops affect the instructor's pedagogical practices and how it impacts student performance. Next, we show the effect on the use of time in the home and how the same affects academic results.

4.1. Effect on student performance

It is important to recall that Cristia et al. (2012) did not find effects on student performance in the sample from 2nd to 6th of primary. We worked with three sub-samples; as such, it is valid to conduct the same exercise to measure the effect of XO laptops on performance. Table 11 shows that XO laptops do generate an effect. In fourth of primary, the laptop reduces performance in language. On the contrary, there is no effect on mathematics.

4.2. Effect on the instructor's pedagogical practices

The instructor's pedagogical practices are approximated through five dichotomous variables: (i) if the student works on a team, (ii) if the student asks classmates for help, (iii) if the student helps his or her classmates, (iv) if the student engages in cooperative work in class and (v) if the student works in groups. Additionally, we considered the probability that a teacher will use method A during his or her classes.

Tables 12 to 14 contain the results. We found that laptop delivery reduces the probability that the teacher will use pedagogical practices associated with the student-centered method or that the student will engage in cooperative activities in class in all of the sub-samples. At 1% significance, the probability that the student will work on a team in class falls between 6 and 13 pp while the probability that the student will engage in cooperative activities falls between 6 and 9 pp.

We analyzed how these changes affected performance. In language, we found that, with the exception of fourth of primary, the pedagogical practices associated with the student-centered

[18] A detailed description of the control variables can be found in Table 11.

method and focused on cooperation increased performance between 1.5 y 2.1 standard deviations. In mathematics, we did not find any effect for students from second or fourth of primary. In sixth of primary, however, we found that a student-centered focus or the use of cooperative activities reduces performance approximately 5 standard deviations.

4.3. Effect on the use of time

We present the results of the distribution of the student's use of time in the home in two sub-sections: (i) activities in the home and (ii) household chores.

4.3.1. Activities in the home

The results for the three grades can be found in Tables 15 to 17. In general, we found that laptop delivery generated diverse effects in each of the sub-samples. Laptops affect the amount of hours spent doing homework in the home. In second of primary, it reduces this time by 0.3 hours while in fourth and sixty of primary, it increases the amount of time between 0.16 and 0.15 hours respectively. Additionally, we found that the probability of doing homework at home the day before increased between 4 and 6 pp only in two sub-samples: fourth and sixth of primary. The sample from fourth of primary was the only sample in which we found that laptops reduced the probability of doing homework over the last week by 4 pp but increased the probability of watching television at home by 8 pp; the sample for sixth of primary is the only sample for which we found that laptops reduced the probability that the student will read at home and ask an adult for help with homework by 6 pp.

When we analyze how activities in the home affect performance, we found no impact in the sub-sample of second of primary. In contrast, in fourth and sixth of primary, effects are present yet different. In fourth of primary, watching television and the number of hours spent on homework fell between 1 and 2 standard deviations while doing homework over the last week increased 4 standard deviations (both at a 10% level of significance). In sixth of primary, doing homework at home increased performance in mathematics between 1.9 and 4.6 standard deviations while the probability of asking an adult for help or reading a book at home reduced performance 4.5 and 4.6 standard deviations respectively. No effects were found on language.

4.3.2. Household Chores

The results for activities related to household chores are summarized in Tables 18 to 20. We found that in all of the sub-samples, laptops reduced the probabilities of doing something involving taking care of siblings, performing household chores or working on the farm (or others) fell between 11 and 37 pp. A similar result was found for fourth of primary, where the introduction of laptops generated decreases in the probability of doing household chores between 9 and 40 pp.

5. Conclusions

The experimental assessment of the One Laptop per Child program in Peru concluded that laptop delivery did not have a significant effect on student performance (Cristia et al., 2012). We investigated why the program failed to meet the objectives proposed by the State[19]. Answering this question helps us understand the different mechanisms that occur within policies that seek to introduce ITC in education.

We used the database of IDB's experimental assessment for a sample of 319 schools to identify the impact of XO laptops on a series of variables that approximate the instructor's pedagogical practices and the student's use of time at home. We took advantage of various instruments provided by the evaluation: a classroom observation guide and the questionnaires applied to teachers, students, directors and parents.

To identify the effect on pedagogical practices or on the use of time at home we use the 2-Stage Least Squares (2SLS) for three sub-samples: students in 2nd of primary, fourth of primary and sixty of primary. Prior to estimating the 2SLS, we replicate the estimate presented by IDB for each of the sub-samples. We found no effect in the sample as a whole. Nevertheless, in fourth of primary, the laptop generated a negative effect on performance.

If we analyze the laptops' impact on each of the channels in question, whether related to the instructor's pedagogical practices or on the use of time at home, we found the following: in the channel relative to the instructor's pedagogical practices, XO laptops reduce the probability that the teacher will use a student-centered method between 6 and 13 pp although this type of pedagogical practice as a positive impact on the student's language performance (between1.5 and 2.1 sd).

In the channel for time use in the home, we found various opposite effects. XO laptops reduce the probability of doing homework at home by 4 pp when the same increases language performance 4 standard deviations. Additionally XO Laptops increase the probability of watching television whereas this activity reduces performance by 2 sd. XO laptops also reduce the probability of doing household chores although this activity increases language performance between 0.2 and 1.6 standard deviations for language in fourth of primary.

The majority of results were relative to fourth grade of primary; as such, this sub-sample has the most information in terms of both the pedagogical practices observed in the classroom and the baseline information or information ex-ante to the assessment.

It is possible to conclude that there may be an overlapping of effect within the use of time in the channel relative to use of time in the home and the channel for instructor's pedagogical practices that led to a null effect on the sample as a whole and a negative effect for the sub-sample for fourth of primary for the language course. It is important to note that the reason that the laptop generated a total negative effect on performance (reducing activities that increase performance) by generating a change in student-centered pedagogical practices and in the probability of performing household chores.

Accordingly, it is possible to conclude that, at least in the language course, the program has not been effective given that it has generated a change in the instructor's pedagogical practices and in the student's use of time in the home. As such, it is important to consider this mechanism when

19 The "One Laptop per Child" program in Peru purported the objective to improve primary public education by providing access to information technologies to studetns in areas marked by extreme poverty.

planning programs that seek to incorporate ITC in education. For example, it may be recommendable to train teachers to employ applicative and cooperative activities using laptops rather than replacing method A of teaching with method B of teaching. It would also be recommendable to include a mechanism of action in the home that seeks to prevent students from using laptops to totally avoid dedicating time to household chores. The stories behind each of these channels occur simultaneously. This is due to the fact that the total negative impact was originated by the opposing effects of the channels analyzed. It is important to note that the result observed (negative impact) for XO laptops was the product of a situation in which the change originated by the laptop affected performance more when one of the changes occurred in parallel. To analyze which of the effects was greater, it will be necessary to calculate the effects associated with each channel.

Finally, it is important to note that this research has focused on studying two of the mechanisms through which technology affects academic performance. Nevertheless, various mechanisms could be occurring in parallel to affect the program's final result. An analysis of other mechanisms could be a task for future research.

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7. Annexes

7.1. Tables

Table 1: Ranking: XO laptop acquisition in the world

Ranking		
Country	**Laptops**	**Expenditure (USD)**
Peru	860,000	172,000,000
Uruguay	510,000	102,000,000
Rwanda	110,000	22,000,000
United States	95,100	19,020,000
Argentina	60,000	12,000,000
Mexico	53,700	10,740,000
Nicaragua	25,000	5,000,000
Colombia	22,300	4,460,000
Haiti	15,000	3,000,000
Mongolia	14,500	2,900,000
Iraq	9,150	1,830,000
Nigeria	6,100	1,220,000
Ethiopia	6,000	1,200,000
Gaza	6,000	1,200,000
Nepal	6,000	1,200,000
Nagorno-Karabakh	5,000	1,000,000
Afghanistan	5,000	1,000,000
Australia	4,400	880,000
Paraguay	4,000	800,000
West Bank	4,000	800,000
Guatemala	3,000	600,000
Brazil	2,600	520,000
Papua New Guinea	2,350	470,000
Cameroon	1,600	320,000
Costa Rica	1,500	300,000
Sri Lanka	1,350	270,000
Ghana	1,000	200,000
India	1,000	200,000
China	1,000	200,000
F.S. of Micro.	800	160,000
Filipinas	750	150,000
Italia	600	120,000
South Africa	500	100,000
Kenya	500	100,000
Pakistan	500	100,000
Thailand	500	100,000
Lebanon	450	90,000
Iran	343	68,600
Uganda	300	60,000
Mali	300	60,000
Solomon Islands	300	60,000
Mozambique	200	40,000
Cambodia	100	20,000
Malaysia	100	20,000

Source: Official One Laptop Per Child program
Developed in-house

Table 2: Comparative table of results for the OLPC laptop program worldwide

Country	Project Implementation	Financing	In change of the evaluation	Results
Ethiopia	Distribution of 6 000 laptops beginning in 2008.	General International Cooperation (GTZ), the Program to Develop Engineering Capacities in Ethiopia (ECBP) and BlankPage AG through the GIGI initiative	University of Groningen and the Program to Develop Engineering Capacities (ECBP)	Laptop introduction has generated changes in cultural values and has increased motivation among rural students to attend school. Additionally, it recognizes the importance of laptops as a learning instrument given that it is used primarily to write. (Hansen et al., 2009).
			Global e-Schools and Communities Initiative (GeSCI)	The key findings of this assessment include identifying changes in learning and teaching styles and the impact on the perceived usefulness of textbooks (Hooker & Bassi, 2008).
Afganistan	Distribution of 5 000 laptops beginning in 2009.	Financed by USAID, Roshan, the Ministry of Education and the Ministry of Communications and & IT. Paiwastoon network services cooperated with developing materials to adequately implement the project.	Personnel at OLPC Afghanistan and other invited parties	The results for language, mathematics and art tests show an average increase of 21.33% in the marks obtained before and after the project's implementation. Nevertheless, this assessment did not use a control group. As such, the increase in performance cannot be completely attributable to the laptops (Nugroho & Londsale, 2009).
Mongolia	Distribution of 14 500 laptops beginning in 2008.	Beneficiaries of the first implementation of the G1G1 initiative.	OLPC Team	Delivery appears to have improved the attendance levels and performance of student beneficiaries (Nugroho & Londsale, 2009).
Uruguay	Distribution of 510 000 laptops as of 2007 through an integrated program known as Plan Ceibal.	Plan Ceibal received support from the OLPC organization and obtain financing from BID.	The follow-up assessments are included in the Plan Ceibal	The inclusion of laptops in the classroom has led 78% of instructors to modify their teaching practices, which means that the integration level in the classroom is high. Nevertheless, the use of laptops by students has been mainly in class. Use to complete homework or to share with the family has been less frequent (Ceibal, 2011).
			Institute of Economics of the School of Economics and Administration of the Universidad de la República	The results obtained by estimating fixed effects in a data panel for students shows that the program has generated a positive and significant effect on academic performance through language and mathematics tests (Ferrando et al., 2011).

Note: The Initiative "Give One, Get One" (GIGI), conducted by the OLPC Foundation, promotes acquiring two laptops: one for the user and one to be donated to a developing country.

Table 3: Descriptive statistics and distribution of time for each activity

	Examiner 1	
	Treatment	**Control**
Number of Students Present	15	14.5
	(6.60)	(6.18)
Number of laptops available	11	0
	(7.87)	(2.48)
Use of laptop per instructor	74%	8%
	(0.442)	(0.267)
Distribution in class		
Individual	45.5%	25.9%
	(0.468)***	(0.413)***
In pairs	25.1%	38.4%
	(0.411)***	(0.465)***
In groups	27.7%	33.8%
	(0.422)**	(0.444)**
Modality of student work		
Individual work	69.4%	59.0%
	(0.390)***	(0.411)***
Work in pairs	8.9%	10.6%
	(0.241)	(0.264)
Work in groups	14.3%	18.4%
	(0.300)**	(0.327)**
Teacher in the classroom		
Supervises student work	41.1%	36.0%
	(0.314)**	(0.263)**
Corrects work or student activities	33.2%	30.7%
	(0.317)	(0.290)
Engages in activities in the classroom without interacting with students	5.2%	7.8%
	(0.110)***	(0.158)***
Students in the classroom		
Express doubts and concerns to teachers out loud in class	46.1%	38.7%
	(0.297)***	(0.286)***
Interact with classmates to help them with activities	35.4%	35.4%
	(0.314)	(0.310)
The majority are distracted while the teacher directs the activity	7.5%	8.9%
	(0.137)	(0.153)

Note: Standard deviations are in parentheses. * indicates that the difference in measurements is significant to 10% 10%, ** to 5% and *** to 1%.
Source: Developed in-house. IDB (2012)

Table 4: Descriptive statistics and time distribution for each activity

	Examiner 2	
	Treatment	**Control**
Number of students present	15	14.5
	(6.529)	(5.845)
Number of laptops available	10	0
	(7.852)	(2.915)
Use of laptop per instructor	73%	10%
	(0.446)	(0.296)
Class distribution		
Individual	41.0%	27.4%
	(0.455)***	(0.415)***
In pairs	27.0%	35.0%
	(0.425)***	(0.462)***
In groups	27.6%	36.4%
	(0.418)**	(0.454)**
Modality of student work		
Individual work	65.5%	60.3%
	(0.415)*	(0.420)*
Work in pairs	12.3%	10.1%
	(0.303)	(0.244)
Work in groups	12.9%	18.1%
	(0.284)**	(0.331)**
Teacher in the classroom		
Supervises students' work	39.7%	36.6%
	(0.302)	(0.290)**
Corrects student work or activities	33.6%	28.6%
	(0.301)**	(0.259)**
Engages in activities in the classroom without interacting with students	4.8%	7.8%
	(0.117)***	(0.176)***
Students in the classroom		
Express doubts and concerns to the teacher out loud in class	40.8%	37.7%
	(0.306)	(0.280)
Interact with classmates to help them with activities	38.4%	28.5%
	(0.340)***	(0.275)***
The majority are distracted with the teacher directs the activity	8.1%	8.3%
	(0.169)	(0.171)

Note: Standard deviations are in parentheses. * Indicates that the different in measurements is significant to 10%, ** to 5% and *** to 1%.
Source: In-house development. IDB (2012)

Table 5: Standardized average score on the language assessment

	Examiner 1		Examiner 1	
	Treatment	**Control**	**Treatment**	**Control**
Class distribution				
Individual	0.11	0.05	0.06	0.04
	(0.874)	(0.933)	(0.861)	(0.924)
In pairs	0.11	0.16	0.16	0.24
	(0.844)	(0.964)	(0.862)	(0.985)
In groups	0.03	0.27	0.05	0.25
	(0.951)**	(0.931)**	(0.937)**	(0.941)**
Modality of student work				
Individual work	0.03	0.20	0.06	0.14
	(0.890)**	(0.948)*	(0.886)*	(0.943)*
Work in pairs	0.09	-0.01	0.11	0.10
	(0.839)	(0.904)	(0.902)	(0.906)
Work in groups	0.03	0.25	0.02	0.30
	(0.964)**	(0.928)**	(0.931)***	(0.894)***
Teacher in the classroom				
Is working on contents	**0.06**	**0.24**	**0.06**	**0.22**
	(0.892)* **	**(0.939)*** **	**(0.897)** **	**(0.922)** **
Is supervising student work	0.09	0.23	0.11	0.26
	(0.872)**	(0.931)**	(0.890)**	(0.929)**
Is correcting student work or activities	0.15	0.28	0.10	0.28
	(0.875)**	(0.929)**	(0.890)**	(0.959)**
Is conducting activities in the classroom without interacting with students	025	012	0.16	0.12
	(0.857)	(0.786)	(0.875)	(0.873)
Is not in the classroom	0.25	0.12	0.16	0.16
	(0.786)	(0.857)	(0.875)	(0.840)
Students in the classroom				
Express doubts or concerns to the teacher out loud in class	0.09	0.23	0.09	0.27
	(0.895)**	(0.952)**	(0.892)***	(0.916)***
Interact with classmates to help them with activities	0.10	0.21	0.06	0.25
	(0.893)	(0.959)	(0.901)***	(0.925)***
The majority are distracted while the teacher directs the activity	0.10	0.10	0.15	0.07
	(0.855)	(0.957)	(0.871)	(0.963)
In the class session, students use				
Laptop	0.12	0.20	0.15	0.21
	(0.921)	(0.865)	(0.907)	(0.849)
Workbook	0.05	0.19	0.03	0.26
	(0.887)*	(0.924)*	(0.895)**	(0.958)*
Textbook	0.18	-0.01	0.23	0.20
	(0.886)	(0.947)	(0.922)	(1.027)
Flashcards developed by the teacher	0.05	0.13	0.01	0.16
	(0.915)	(0.894)	(0.884)	(0.877)
Educational or physical learning tools (abacus, blocks, stones, seeds, etc.)	0.15	0.32	0.14	0.07
	(0.879)	(0.949)	(0.913)	(0.872)

Source: IDB (2012)
In-house development
Note: Standard deviations are in parentheses. * indicates the difference between the treatment and control group is significant to 10%, ** to 5% and *** to 1%.

Table 6: Standardized average score on the mathematics assessment

	Examiner 1		Examiner 1	
	Treatment	**Control**	**Treatment**	**Control**
Class distribution				
Individual	0.25	0.01	0.24	-0.01
	(0.912)**	(0.955)**	(0.929)***	(0.936)***
In pairs	0.30	0.13	0.28	0.16
	(0.896)*	(1.022)*	(0.889)	(1.023)
In groups	0.18	0.21	0.18	0.24
	(1.000)**	(0.967)**	(0.982)	(0.985)
Modality of student work				
Individual work	0.14	0.10	0.13	0.12
	(0.890)	(0.984)	(0.904)*	(0.981)
Work in pairs	0.29	0.13	0.37	0.04
	(0.952)	(1.001)	(1.009)***	(0.838)***
Work in groups	0.19	0.21	0.19	0.32
	(0.991)	(0.902)	(0.977)	(1.001)
Teacher in the classroom				
Is working on contents	**0.16**	**0.17**	**0.16**	**0.18**
	(0.896)	(0.996)	(0.900)	(0.978)
Supervising work	0.18	0.20	0.20	0.17
	(0.871)	(1.008)	(0.895)	(1.016)
Correcting student work or activities	0.22	0.21	0.19	0.20
	(0.905)	(1.000)	(0.900)	(1.014)
Engaging in activities in the classroom without interacting with students	033	024	0.31	0.20
	(0.928)	(0.939)	(0.951)	(0.866)
Is not in the classroom	0.63	0.12	0.46	0.15
	(0.982)***	(0.876)***	(0.991)**	(0.748)**
Students in the classroom				
Express doubts or concerns to teacher out loud in the classroom	0.19	0.20	0.18	0.22
	(0.895)	(1.021)	(0.894)	(0.984)
Interact with classmates to help them with activities	0.22	0.17	0.20	0.20
	(0.893)	(1.017)	(0.908)	(1.008)
The majority are distracted while the teacher directs the activity	0.29	0.17	0.32	0.15
	(0.923)	(0.944)	(0.947)	(0.883)
In the class session, students use				
Laptop	0.22	0.32	0.20	0.26
	(0.919)	(0.907)	(0.913)	(0.924)
Workbook	0.21	0.20	0.17	0.20
	(0.921)	(1.076)*	(0.907)	(1.070)*
Textbook	0.43	0.17	0.55	0.22
	(0.956)**	(0.944)**	(0.970)**	(0.993)**
Flashcards made by the teacher	0.35	0.18	0.23	0.17
	(1.007)	(0.871)	(0.975)	(0.863)
Educational or physical material for learning (abacus, blocks, rocks, seeds, etc.)	0.33	0.11	0.31	0.15
	(1.024)	(0.941)	(0.980)	(0.929)

Source: IDB (2012)
In-house Development
Note: The standard deviations are in parentheses. * Indicate that the difference between treatment and control is significant to 10%, ** to 5% and *** to 1%.

Table 7: Activities inside the home vs laptop

		4 primary		2 to 6 primary		2 to 4 primary	
		Treatment	**Control**	**Treatment**	**Control**	**Treatment**	**Control**
Cooperative Variables	Team work	0.761	0.857	0.774	0.859	0.757	0.859
		(0.025)***	(0.019)	(0.015)***	(0.012)	(0.022)***	(0.017)
	Only help with comp	0.64	0.705	0.672	0.704	0.644	0.704
		(0.031)**	(0.025)	(0.019)*	(0.015)	(0.027)*	(0.022)
	Gave help wih comp	0.683	0.754	0.717	0.790	0.684	0.762
		(0.030)**	(0.023)	(0.018)***	(0.014)	(0.026)***	(0.020)
	Cooperative	0.066	0.936	0.878	0.946	0.864	0.942
		(0.019)***	(0.013)	(0.011)***	(0.008)	(0.016)***	(0.011)
Interaction variables in the home	Asked adult quest	0.841	0.857	0.542	0.568	0.402	0.423
		(0.024)	(0.019)	(0.017)	(0.013)	(0.020)	(0.016)
	Read a book	0.82	0.819	0.786	0.801	0.772	0.800
		(0.026)	(0.021)	(0.017)	(0.013)	(0.024)	(0.019)
	Did homework at home	0.828	0.804	0.843	0.807	0.828	0.803
		(0.026)	(0.021)	(0.016)**	(0.013)	(0.023)**	(0.019)
	Time playing inside	0.414	0.503	0.392	0.413	0.438	0.512
		(0.081)	(0.078)	(0.039)	(0.036)	(0.071)	(0.067)
Variables for household chores	Household chores	0.692	0.731	0.703	0.734	0.695	0.736
		(0.030)	(0.024)	(0.018)*	(0.015)	(0.026)	(0.021)
	Took care of siblings	0.475	0.506	0.521	0.513	0.465	0.521
		(0.033)	(0.027)	(0.021)**	(0.017)	(0.029)*	(0.024)
	Gathered wood	0.508	0.567	0.018	0.564	0.0522	0.595
		(0.033)*	(0.027)*	(0.007)**	(0.017)	(0.029)**	(0.023)
	Sold products outside of home	0.022	0.041	0.041	0.033	0.024	0.043
		(0.012)	(0.011)	(0.011)	(0.006)	(0.011)*	(0.010)
	Hours HC 2	3.287	4.050	4.050	3.931	3.3	4.114
		(0.269)***	(0.233)	(0.233)	(0.142)	(0.243)***	(0.208)

Note: Robust standard errors are found in parentheses, * indicate that the variable is significant to 10%, * to 5% and *** to 1%.

Table 8: Characterization of the instructor's pedagogical practices

	Examiner 1		Examiner 2	
	Method B	**Method A**	**Method B**	**Method A**
Work is distributed individually	15	0	15	0
Work is distributed in pairs	6	9	11	4
Work is distributed in groups	0	15	0	15
Students work individually	15	0	15	0
Students work in pairs	0	15	1	14
Students work in groups	0	15	0	15
Teacher supervises student work	8	7	12	3
Teacher corrects student work or activities	7	8	10	5
Teacher engages in activities in the classroom without interacting with students	3	12	7	8
Students express doubts or concerns to the teacher out loud in class	6	9	15	0
Students interact to help classmates work on activities	0	15	2	13
The majority are distracted while the teacher directs the activity	8	7	7	8
Level of average Enthropy	**0.89**	**0.89**	**0.89**	**0.89**

Note: (1) The latent class analysis generates the probability that the activity described belongs to Method A or B in each minute of observation in the classroom. The table shows the frequency in which the activity belonged to each method after obtaining the maximum probability between both options. For example, the distribution of individual work obtained the maximum probability of belonging to Method B in comparison to Method A in all possible minutes in the observed classroom (15 times). (2) The difference between the distribution of student work and the modality of effective work lies in the fact that the first indicates the mode in which the student is found when the task is assigned while the second effectively indicates how the task was performed. As such, it is possible that the student is seated in groups or in pairs but performs tasks in class individually.

Table 9: Average probability of applying each teaching method

	Examiner 1		Examiner 2	
	Control	**Treatment**	**Control**	**Treatment**
Method A	0.37	29	0.41	0.36
	(0.3846)***	(0.3649)***	(0.3638)**	(0.3595)**
Method B	0.63	0.71	0.59	0.64
	(0.3846)***	(0.3649)***	(0.3638)**	(0.3595)**

Note: The standard deviations are in parentheses. * indicates that the mean difference is statistically significant at 10%, ** at 5% and *** at 1%.
Source: In-house development. IDB (2012)

Table 10: Description of dependent variables: instructor's pedagogical practices and the student's use of time in the home

Instructor's pedagogical practices	Method A	Average probability of applying method A.
	teamwork	1 if the student works on a team or with classmates.
	req help	1 if the student requests help from classmates.
	gave help	1 if the student provides support to classmates.
	cooperative	1 if the student worked on a team and asked if he or she could help classmates.
	Instr_coop2	1 if the instructor organizes students in working groups at least once a month.
Characteristics inside the home	Homework last week	1 if homework was done last week
	ah asked adult	1 if the student asked an adult when information was sought.
	ah read a book	1 if the student read a story at home over the last week.
	ah homework	1 if homework was done at home yesterday
	ah hrs homework	Number of hours spent doing homework at home yesterday
	ah played inside	Indicates if the student played in the home yesterday
	ah hrs played	Indicates the total number of hours spent playing in the home yesterday
	ah tv	Indicates if the student watched television yesterday
	ah hours tv	Number of hours spent watching tv yesterday
Characteristics of household chores	hc household chores	Indicates if the student swept, cooked or cleaned yesterday.
	hc took care of siblings	Indicates if the student took care of siblings yesterday.
	hc wood	Indicates if the student gathered wood yesterday.
	hc took care of animals	Indicates if the student took care of animals yesterday.
	hc worked on the farm	Indicates if the student worked on the farm yesterday.
	hc helped sell	Indicates if the student help sell products yesterday.
	hc helped produce	Indicates if the student helped produce yesterday.
	hc street	Indicates 1 if the student worked outside the home yesterday.
	hc hours on hc	Number of hours spent on chores yesterday.
	hc hours siblings	Number of hours spent taking care of siblings yesterday
	hc hours wood	Number of hours gathering wood yesterday.
	hc hours anim	Number of hours spent taking care of animals yesterday.
	hc hours farm	Number of hours spent taking care of the farm yesterday.
	hc hours selling	Number of hours spent helping sell yesterday.
	hc hours prod	Number of hours spent producing yesterday.
	h hours street	Number of hours working outside the home yesterday.
	hc hc 1	Indicates if the student did household chores, took care of siblings or gathered wood yesterday
	hc hc 2	Indicates if the student did household chores, took care of siblings, gathered wood, took care of animals, worked on the farm, helped produce, sell or worked outside the home yesterday.
	hc s hc 1	Number of hours spent on household chores, taking care of siblings or gathering wood
	hc s hc 2	Number of hours spent yesterday on household chores, taking care of siblings, gathering wood, taking care of animals, working on the farm, helping produce, sell or work outside the home.
	hc s hc3	Number of hours spent on chores, taking care of siblings, gathering wood
	hc s hc4	Average number of hours spent on household chores, taking care of siblings, gathering wood, working on the farm, helping produce, sell or work outside the home.

Note: Standard deviations are in parentheses, * indicates that the variable is significant at a 10% level * at a 5% level *** at a 1% level.

Table 11: Description of the control variables

Category	Variable	Registry
	Treated	Indicates 1 if the student belongs to the treatment group, 0 if he or she belongs to the control group.
Instructor's characteristics	i.Attitude instr	Dummys of the instructor's attitude toward the laptop (0 - 8). Where 8 indicates the most favorable attitude.
	Instr_perception	Indicates 1 if the instructor perceives that his or her students will reach higher education.
	Instr_satisfaction	Indicates 1if the instructor is satisfied or very satisfied with his or her life.
	Instr Experience	Number of years that the instructor has taught.
	Instr ycomp	Number of years that the instructor has had a computer in the home.
	Instr_language	Indicates 1 if the instructor's mother tongue is Spanish, 0 if not.
	Instr_only	Indicates 1 if the instructor only teaches in the IE (no administrative position).
	Instr_public	Indicates 1 if the instructor studied at a public school.
	Instr_sat st	Indicates 1 if the instructor is satisfied with his or her relation with students.
	Instr_sat_comm	Indicates 1 if the instructor is satisfied with his or her relation with members of the community
	Instr_sat_inf	Indicates 1 if the instructor is satisfied with the infrastructure of the IE.
	Instr_sat_mat	Indicates 1 if the instructor is satisfied with the education material at the IE.
	Instr_sat_equip	Indicates 1 if the instructor is satisfied with the equipment at the IE.
	Instru_sat_rules	Indicates 1 if the instructor is satisfied with rules and discipline at the IE.
	Instr_sat_salary	Indicates 1 if the instructor is satisfied with his or her salary.
Initial characteristics of the student	Bl_lang	Student's standardized baseline score (ECE) on the language assessment.
	Bl math	Student's standardized baseline score (ECE) on the math assessment.
	s_spanish	Indicates 1 if the student's mother tongue is Spanish
Characteristics of the family	Father_prim	Indicates 1 if the father has a higher education level than primary, 0 if not.
	Sewage house	Indicates 1 if the home with a sewage system, 0 if not.
	Cement	Indicates 1 if the home has cement floors, 0 if not.
	Kitchen	Indicates 1 if the home has a kitchen, 0 if not.
	Members_household	Indicates the number of members in the household.
	Both_parents	Indicates 1 if the student lives with both parents.
	Books_household	Indicates 1 if the household has books.
	Father_satisfied	Indicates 1 if the father is satisfied with his life.
Characteristics of the school	High perf	Indicates 1 if the school is high performance.
	School sewage	Indicates 1 if the school has a sewage system, 0 if not.
	Numer doc	Indicates the total number of teachers at the school.
	Yrs comp	Indicates the total number of years that the student has computers or laptops.
	Water school	Indicates 1 if the school has water.
	Light school	Indicates 1 if the school has electricity.
	Ratio instr student	Ratio teacher/student in the school.
	Schol comp	Number of computers (non laptops) working at the IE.
Characteristics of the community	Comm sewage	Indicates 1 if the community has sewage systems.
	Comm telephone	Indicates 1 if the community has a telephone.
	Comm internet	Indicates 1 if the community has internet.

Table 12: 2nd of primary – Instructor's pedagogical practices. 2SLS first and second stage

					Second	stage	
	First stage				Language	Mathematics	
	N	B	SE	R2	B	SE	B	SE
teamwork	260	-0.131	(0.060)**	0.165	0.744	(0.852)	0.382	(0.814)
asked for help	260	-0.075	(0.071)	0.160	1.296	(1.744)	0.665	(1.476)
Gave help	260	-0.033	(0.066)	0.221	2.936	(5.721)	1.502	(3.881
cooperative	260	-0.089	(0.040)**	0.191	1.094	(1.299)	0.562	(1.223)
instr_coop2	262	0.046	(0.076)	0.254	-2.070	(3.999)	-1.257	(3.097)

Note: Robust Standard Errors in parentheses. * indicates that the variable is statistically significant at the 10% level, ** 5% level and *** 1% level.

Table 13: 4th of primary – Instructor's pedagogical practices. 2SLS first and second stage

					Second	Stage	
	First stage				Language	Mathematics	
	N	B	SE	R2	B	SE	B	SE
method student	806	-0.099	(0.028)***	0.192	1.832	(0.801)**	0.948	(0.711)
teamwork	860	-0.078	(0.030)**	0.104	1.869	(1.029)*	0.361	(0.880)
asked for help	860	-0.038	(0.035)	0.160	3.793	(3.700)	0.733	(1.862)
gave help	860	-0.070	(0.035)**	0.151	2.065	(1.284)	0.399	(0.963)
cooperative	860	-0.068	(0.022)***	0.128	2.123	(1.135)*	0.410	(0.997)
instru_coop2	860	-0.093	(0.037)**	0.193	1.554	(0.906)*	0.300	(0.737)

Note: Robust Standard Errors in parentheses. * indicates that the variable is statistically significan at a level of 10%, ** 5% *** 1%.

Table 14: 6th of primary – Instructor's pedagogical practices. 2SLS first and second stage

					Second	Stage		
	First Stage				Language	Mathematics		
	N	B	SE	R2	B	SE	B	SE
lang group work	1.144	-6.8	(0.025)***	0.064	-0.987	-1.05	-4.551	(1.850)**
lang asked for help	1.144	-0.002	(0.03)	0.071	-43.396	(846.123)*	-200.163	(4.025.034)
lang gave help	1.144	-0.060	(0.028)**	0.074	-1.105	(1.170)	-5.098	(2.534)**
lang cooperative	1.144	-0.056	(0.018)***	0.075	-1.188	(1.192)	-5.481	(1.922)***
lang instr_coop2	1.144	-0.006	(0.032)**	0.166	-10.747	(60.329)*	-52.59	(292.563)

Note: Robust Standard Errors between parentheses. * indicates that the variable is statistically significant at a level of 10%, ** 5% and *** 1%.

Table 15: 2nd of primary – Use of time at home (1). 2SLS first and second stage

					Second Stage			
		First stage			Language		Mathematics	
	N	B	SE	R2	B	SE	B	SE
ah homework	259	0.055	(0.034)	0.131	-1.830	(2.249)	-1.176	(2.114)
ah asked adult	262	-0.057	(0.049)	0.217	1.665	(2.366)	1.012	(2.026)
ah read	260	-0.060	(0.065)	0.188	1.622	(2.374)	0.833	(2.047)
ah homework	262	-0.068	(0.062)	0.183	1.402	(1.904)	0.852	(1.662)
ah hours homework	261	-0.384	(0.218)*	0.179	0.267	(0.329)	0.179	(3.675)
ah_played inside	262	0.040	(0.083)	0.139	-2.398	(5.187)	-1.457	(0.970)
ah hours played	261	-0.144	(0.174)	0.150	0.714	(1.107)	0.479	(1.683)
ah watch tv	262	-0.070	(0.082)	0.187	1.357	(2.013)	0.824	(1.683)
Ah hours watching tv	261	-0.055	(0.136)	0.170	1.873	(4.777)	1.257	(3.443)

Note: Robust Standard Errors in parentheses. * indicates that the variable is statistically significant at a level of 10%, ** 5% and *** 1%.

Table 16: 4th of primary – Use of time in the home (1). 2SLS first and second stage

					Second Stage			
		First Etapa			Language		Mathematics	
	N	B	SE	R2	B	SE	B	SE
ah homework	856	-0.040	(0.017)	0.135	4.097	(2.272)*	0.635	(1.702)
ah asked adult	860	-0.027	(0.026)	0.111	6.042	(5.860)	1.046	(2.660)
ah read	860	-0.047	(0.030)	0.082	3.510	(2.437)	0.634	(1.582)
ah homework	860	0.036	(0.031)	0.100	-4.570	(4.282)	-0.761	(1.936)
ah hours homework	857	0.160	(0.068)**	0.066	-1.047	(0.580)*	-0.177	(0.429)
ah played inside	860	0.052	(0.039)	0.104	-3.201	(2.586)	-0.524	(1.289)
ah hours played inside	859	-0.043	(0.084)	0.060	3.807	(7.543)	0.669	(2.183)
ah tv watching	860	0.082	(0.039)**	0.091	-2.015	(1.208)*	-0.343	(0.841)
ah hours watching tv	857	0.067	(0.084)	0.068	-2.500	(3.318)	-0.409	(1.124)

Note: Robust Standard Errors in parentheses. * indicates that the variable is statistically significant at a level of 10%, ** 5% and*** 1%.

Table 17: 6th of primary- Use of time in the home (1). 2SLS first and second stage

					Second Stage			
	First stage				Language		Mathematics	
	N	B	SE	R2	B	SE	B	SE
ah homework	1.138	0.023	(0.016)	2.991	(3.584)	13.406	(9.679)	
ah asked adult	1.152	-0.065	(0.022)***	-0.937	(1.030)	-4.588	(1.748)***	
ah read	1.144	-0.066	(0.026)**	-1.007	(1.046)	-4.645	(1.995)**	
ah homework	1.149	0.065	(0.025)***	1.003	(1.042)	4.616	(1.964)**	
ah hours homework	1.149	0.150	(0.070)**	0.432	(0.474)	1.987	(1.022)*	
ah played inside	1.149	0.028	(0.034)	2.297	(3.362)	10.568	(12.535)	
ah hours played inside	1.149	0.015	(0.034)	4.203	(9.931)	19.338	(42.288)	
ah watched tv	1.149	-0.014	(0.034)	-4.577	(11.548)	-21.057	(48.743)	
ah hours watching tv	1.149	-0.020	(0.066)	-3.173	(10.421)	-14.596	(45.858)	

Note: Robust Standard Errors between parentheses. * indicates that the variable is statistically significant at a level of 10%, ** 5% and ***1%.

Table 18: 2nd of primary – Household Chores. 2SLS first and second stage

					Segunda Etapa			
	Primera Etapa				Lenguaje		Matemáticas	
	N	B	SE	R2	B	SE	B	SE
hc chores	262	-0.098	(0.068)	0.178	0.977	(1.214)	0.594	(1.205)
hc took care of siblings	262	-0.370	(0.070)***	0.316	0.258	(0.282)	0.157	(0.288)
hc firewood	262	-0.149	(0.076)*	0.205	0.642	(0.780)	0.390	(0.745)
hc took care of animals	262	-0.116	(0.082)	0.181	0.822	(1.112)	0.499	(0.981)
hc worked on farm	262	-0.144	(0.059)*	0.203	0.835	(0.947)	0.507	(0.966)
hc helped sell	262	0.024	(0.046)	0.107	-3.928	(8.453)	-2.386	(5.715)
hc helped produce	262	-0.018	(0.036)	0.148	5.196	(10.251)	3.156	(7.910)
hc worked outside of home	262	-0.001	(0.045)	0.152	78.219	(2.642.711)	47.512	(1.628.283)
hc hours chores	261	-0.647	(0.319)**	0.174	0.159	(0.182)	0.106	(0.178)
hc hours children	261	-0.744	(0.213)***	0.253	0.138	(0.144)	0.093	(0.146)
hc hours gathering wood	261	-0.229	(0.120)*	0.174	0.448	(0.536)	0.301	(0.530)
hc hours taking care of animals	261	-0.391	(0.176)**	0.176	0.263	(0.305)	0.176	(0.296)
hc hours on the farm	261	-0.304	(0.172)*	0.187	0.337	(0.382)	0.226	(0.385)
hc hours selling	261	-0.015	(0.122)	0.127	6.759	(49.700¨)	4.536	(34.968)
at home hours producing	262	-0.074	(0.084)	0.154	1.283	(1.820)	0.780	(1.622)
hc hours working outside of the home	261	0.031	(0.117)	0.158	-3.335	(11.727)	-2.238	(8.018)
hc hc 1	262	-0.076	(0.049)	0.173	1.252	(1.392)	0.761	(1.426)
hc ch 2	262	-0.071	(0.032)**	0.165	1.345	(1.572)	0.817	(1.506)
hc s ah1	261	-1.620	(0.460)***	0.254	0.063	(0.068)	0.043	(0.069)
hc s ah2	261	-2.369	(0.671)***	0.267	0.043	(0.046)	0.029	(0.048)
hc s ah3	261	-0.540	(0.153)***	0.254	0.190	(0.204)	0.128	(0.206)
hc s ah4	262	-0305	(0.084)***	0.265	0.313	(0.355)	0.190	(0.360)

Note: Robust Standard Errors in parentheses. * indicates that the variable is statistically significant at a level of 10%, ** 5% and ***1%.

Table 19: 4th of primary – Household Chores. 2SLS first and second stage

					Second	Stage		
	First stage				Language		Mathematics	
	N	B	SE	R2	B	SE	B	SE
hc chores	860	-0.057	(0.035)	0.088	2.892	(2.156)	0.489	(1.232)
hc took care of siblings	860	-0.057	(0.039)	0.099	2.908	(2.210)	0.485	(1.219)
hc firewood	860	-0.093	(0.038)**	0.100	1.766	(1.022)*	0.293	(0.716)
hc took care of animals	860	0.015	(0.038)	0.128	-11.281	(28.890)	-1.926	(6.958)
hc worked on the farm	860	-0.045	(0.033)	0.103	3.654	(2.882)	0.591	(1.477)
hc helped sell	860	-0.013	(0.025)	0.095	12.440	(23.360)	2.280	(7.210)
hc helped produce	860	0.004	(0.018)	0.088	-45.250	(218.912)	-8.361	(47.036)
hc worked outside the home	860	-0.008	(0.014)	0.113	19.405	(32.108)	3.261	(9.332)
hc hours chores	857	-0.401	(0.157)**	0.070	0.417	(0.228)*	0.070	(0.172)
hc hours siblings	858	-0.225	(0.127)*	0.072	0.745	(0.499)	0.12	(0.308)
hc hours firewood	857	-0.167	(0.101)*	0.060	1.000	(0.699)	0.168	(0.416)
hc hours taking care of animals	857	0.058	(0.093)	0.100	-2.8696	(4.556)	-0.442	(1.262)
hc hours working on farm	858	-0.106	(0.120)	0.053	1.574	(1.797)	0.253	(0.676)
hc hours selling	859	0.010	(0.059)	0.204	-16.135	(89.855)	-2.264	(11.713)
hc hours producing	858	0.038	(0.024)	0.080	-4.356	(3.085)	-0.748	(1.858)
hc hours working outside the home	859	-0.040	(0.033)	0.315	4.155	(3.650)	0.688	(1.685)
hc ah 1	860	-0.002	(0.025)	0.116	84.416	(1.038.758)	12.379	(133.813)
hc ah 2	860	-0.006	(0.019)	0.135	28.605	(91.801)	4.429	(16.261)
hc s ah 1	857	-0.792	(0.242)***	0.084	0.211	(0.103)**	0.035	(0.086)
hc s ah 2	857	-0.832	(0.304)***	0.125	0.201	(0.105)*	0.034	(0.082)
hc s ah3	858	-0.265	(0.081)***	0.084	0.632	(0.307)**	0.105	(0.258)
ah s ah4	860	-0.102	(0.038)***	0.125	1.617	(0.857)*	0.275	(0.671)

Note: Robust Standard Errors between parentheses. * indicates that the variable is statistically significant at a level of 10%, ** 5% and ***1%.

Table 20: 6th of primary- Household chores. 2SLS first and second stage

					Second Stage			
	First Stage				Language		Mathematics	
	N	B	SE	R2	B	SE	B	SE
hc chores	1.149	-0.035	(0.030)	0.062	-1.852	(2.449)	8.522	(7.355)
hc took care of siblings	1.149	-0.046	(0.033)	0.089	-1.424	(1.737)	-6.553	(4.806)
hc firewood	1.149	-0.016	(0.034)	0.088	-3.969	(8.962)	-18.259	(37.642)
hc took care of animals	1.149	0.031	(0.034)	0.112	2.076	(3.024)	9.552	(10.354)
hc worked on farm	1.149	-0.016	(0.029)	0.062	-4.170	(8.567)	-19.187	(35.688)
hc helped selling	1.149	-0.031	(0.023)	0.059	-2.103	(2.440)	-9.673	(7.229)
hc helped producing	1.149	-0.032	(0.015)**	0.046	-2.026	(2.126)	-9.323	(4.668)**
hc worked outside the home	1.149	-0.013	(0.008)	0.041	-5.064	(5.629)	-23.298	(14.746)
hc hours chores	1.149	-0.068	(0.118)	0.042	-0.954	(1.927)	-4.390	(7.546)
hc hours siblings	1.149	-0.075	(0.099)	0.058	-0.862	(1.412)	-3.962	(5.181)
hc hours firewood	1.149	-0.052	(0.074)	0.030	-1.245	(2.081)	-5.727	(7.961)
hc hours taking care of animals	1.149	0.054	(0.096)	0.087	1.192	(2.374)	5.483	(9.596)
hc hours on farm	1.149	-0.154	(0.115)	0.066	-0.421	(0.490)	-1.938	(1.443)
hc hours selling	1.149	0.050	(0.063)	0.034	1.310	(2.109)	6.028	(7.680)
hc hours producing	1.149	-0.035	(0.024)	0.044	-1.871	(2.093)	-8.610	(5.886)
hc hours working in the street	1.149	-0.018	(0.016)	0.060	-3.667	(4.699)	-16.870	(15.156)
hc ah 1	1.149	-0.012	(0.022)	0.060	-5.571	(11.489)	-25.630	(46.5925)
hc ah 2	1.149	-0.013	(0.016)	0.066	-4.906	(7.354)	-22.570	(26.718)
hc s ah1	1.148	-0.195	(0.183)	0.042	-0.332	(0.456)	-1.528	(1.436)
hc s ah2	1.148	-0.297	(0.283)	0.069	-0.219	(0.292)	-1.005	(0.951)
hc s ah3	1.149	-0.065	(0.061)	0.042	-0.995	(1.361)	-4.576	(4.287)
hc s ah4	1.149	-0.037	(0.035)	0.069	-1.740	(2.313)	-8.005	(7.533)

Note: Robust Standard Errors in parentheses. * indicates that the variable is statistically significant at a level of 10%, ** 5% and*** 1%.