Reshaping the gender gap in child time use: unintended effects of a program expanding economic opportunities in the Peruvian Andes

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Abstract

In the last decades, a variety of public policies and programs across the developing world have helped narrow the historical gender gap in access to education and employment. Yet, the gender gap in higher education, labor income and power relations within families -and the rural society in general- is still substantial in most developing countries. Peru is no exception. As previous studies show, the most promising poverty alleviation programs in terms of gender and inter-generational equality are those that combine conditional cash transfer programs and economic opportunities for poor families. Despite their success in poverty alleviation without jeopardizing children school attendance, we know very little about the changes in children time use (study, leisure, domestic chores and economic activities) that these programs may bring about. In this study we analyze the effect of a public productive program, Haku-Wiñay, on time use differences between girls and boys distinguishing between economic activities, domestic work, study, leisure and rest. We use information collected as part of a randomized impact evaluation to assess the effect of the program on rural household welfare.

Haku Wiñay aims at increasing economic opportunities of extremely poor households. The evaluation compares 2013 pre-intervention and 2016 post-intervention conditions for a treatment and control groups. It found a positive impact of Haku-Wiñay on household welfare (income and food security), through its role enhancing household's agricultural activities and opening opportunities for new businesses. Despite these promising results, if such improvements in economic activities required a higher involvement of adult women, the gender gap in children's time allocated to domestic, leisure and study activities would likely increase. We study whether this was the case. We find positive effects of the program on the cohort of girls aged 10-13y (increasing study time, decreasing domestic and working time), while the cohort of girls aged 14-17y was negatively affected (increasing time allocated to domestic tasks). In addition, we find preliminary evidence of a delay of older girls' departure from the family house (early migration for work or education, or early marriage) as a result of the program. This effect could reduce vulnerability of girls that would otherwise leave their family house early in life. These results show unintended consequences of well-intended interventions and highlight the importance of considering intra-household shifting of responsibilities and the need to introduce measures that protect older girls and induce a more balanced distribution of responsibilities across family members.

Keywords: children, gender differences, time use, programs to foster economic opportunities, rural, extreme poverty, Andean region, Peru.

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1. Introduction

Access to primary and secondary education in Peru has substantially improved in the last decades. The historically prevalent urban-rural gaps and gender gaps in educational attainment have substantially diminished. Despite this progress, important gaps remain between urban and rural areas, especially in the secondary level of education. Gender gaps also remain especially for children living in extreme poverty and children belonging to indigenous or native peoples (MIMP 2012, Mena 2016).

Furthermore, neither the division of work nor the power relations within the rural society show the same gender gap reductions that access to education has. Hernandez Asensio (2012) emphasizes that young women's expectations, explained by similar educational achievement and similar skills to use information and communication technologies as their male peers, contrast with gender disparities in the labor market and participation in the public space as well as with household power asymmetries in the private space. This study discusses one of the most evident representations of the gender system in rural societies with regards to young generations: time use differences between girls and boys living in rural extremely poor households and early departure from the family house.

We focus on the effect of a program expanding economic opportunities for rural households on children time use. The program under analysis is Haku Wiñay, a public program that targets extremely poor households who benefit from a -also public- conditional transfers program (Juntos). Therefore, this evaluation identifies the additional effects that Haku Wiñay has on Juntos beneficiaries. A key feature of this study is the focus on gender differences among young beneficiaries. We acknowledge that time allocation and gender roles change as children grow, particularly among rural poor households whose children usually play an active role in income generating strategies, and thus analyze separately cohorts of young children aged between 6 and 9 years old, older children between 10 and 13 and adolescents between 14 and 17 years. The information used in the this study includes the 2013 baseline of the randomized control trial conducted for the main impact evaluation of the program (Escobal and Ponce, 2016) and a revisit conducted by Diaz in 2016 to study the effect of the program on adult women empowerment (Diaz, 2017).

The document is divided in six sections including this introduction. Section 2 briefly discusses the literature on the effects of programs and policies on children time use and mobility and section 3 describes the intervention. Section 4 describes the data and methods, section 5 presents the results and section 6 discusses the findings and the questions these raise for future research.

2. Literature review (this section requires completing translation)

The indirect impact of social and economic policies and programs (including economic opportunities fostering programs for poor households) on the intrahousehold allocation of time has been extensively studied. Several authors acknowledge that policies and programs can have positive and negative unintended effects on children and adolescents. For example, Edmonds and Pavcnik (2005) show that commercial liberalization can have positive or negative impacts on child work depending on the relative importance of the income effect and the substitution effects (opportunity cost of child work) that such liberalization causes.

Another example, this time for the Peruvian case, is the study by Escobal and Ponce (2007), who estimate first order effects of a commercial liberalization in a general equilibrium model, linking import tariffs derived from the free trade agreement with the United States of America with household's welfare and with changes in key decisions on work and study. In this ex-ante evaluation study, they find that, in spite of the average positive effects, negative unexpected effects could be experienced by some subpopulations. For example, the study suggests that increasing work opportunities for rural women, due to the new commercial agreement, could affect the time distribution of work within the household and increase the domestic burden on girls.

Concerns about unanticipated impacts of interventions on the distribution of tasks within households have also been studied within the framework of the conditional cash transfer (CCT) programs that have become popular over the past two decades. Since its appearance in 1997 in Mexico (Progresa), CCT programs have sought to break the intergenerational transmission of poverty. Skoufias et al. (2001) show positive impacts of CCT programs on school enrollment. However, the same study showed that the total hours spent on work of those who attending school were not reduced. Ravallion and Wodon (2000) confirm that the effects can be heterogeneous and that an increase in schooling enrollment can occur without further reductions in child work.

Evidence for Latin America suggests that CCT are effective in increasing schooling (especially for girls) but their impact on cognitive skills is rather uncertain (Baird et al., 2014). One hypothesis behind these results is that enrollments is not accompanied with investment aimed at improving schooling quality, so that higher schooling can translate into greater opportunities to improve cognitive abilities. Although CCT are effective in eliminating potential liquidity constraints in poor households, if the rate of return to education does not increases, significant increases in household investment in education should not be expected, beyond school attendance (to comply with the conditionality of the transfer program).

On the other hand, several studies have highlighted that these transfers can have direct and indirect effects that may not be anticipated. For example, the distribution of CCT directly to mothers can affect intrahousehold resource allocation and power relations (Rawlings and Rubio, 2005).

Ellis and Chaffin (2015) develop a systematic assessment of the impacts on children´s well-being of a broad set of interventions. The studies reviewed by these authors include a total of 46 randomized impact assessments of NGO interventions in developing countries and include 12 CCT programs, 12 non-conditional cash transfer programs, 7 vocational skills training programs, 11 savings incentive schemes (individual or group), 11 microcredit and 6 non-monetary asset transfers that combine more than one intervention. It is important to note here that Ellis and Chaffin (2015) identify unanticipated negative effects in 20% of the studies reviewed.

Unanticipated effects could, in principle be anticipated. CIDA (2007), for example, recognizes that in environments where there are few resources available to families, children and adolescents are typically active participants in family businesses, so policies aimed at strengthening the economic capacities of poor households can affect the distribution of adult and child time at home. Similarly, Augsburg et al. (2015) shows that interventions aimed at increasing access to microcredit can energize family businesses and through this way increase the work of children.

Regarding the impact of child work on the acquisition of verbal and mathematical skills, Ponce (2012) contrasts the case of Peruvian adolescents between 14 and 15 years of age in urban areas with that of rural areas. In rural areas, Ponce finds that increases in adolescent time devoted to domestic work at home have significant negative effects on verbal and math skills, but not on overage. On the other hand, unlike urban areas, the study finds no significant negative effects of work on economic activities on skills accumulation or overage.

Time use in children and adolescents

Several studies have shown that time use varies strongly between boys and girls throughout the life cycle from childhood to adolescence (Olds et al., 2009; Hilbrecht et al., 2008). The number of hours spent on household chores, for example, not only varies between girls and boys, but the types of activities are different. As children get older, the segregation of tasks between boys and girls approaches the segregation of tasks by sex of adults (Blair, 1992). At an early age (6 to 9 years) sex differences in household tasks do exist, but would be less pronounced (White and Brinkerhoff, 1981).

In addition, several studies have reported significant increases in the number of hours allocated to girls' domestic work when mothers take on income-generating tasks. This highlights the fact that when the mother faces time constraints, she shows a preference for reassigning part of household chores to girls, reproducing the segregation of tasks by sex (Cogle and Tasker, 1982). Why would mothers opt for girls to take on household chores that they have difficulty doing in a context where they engage in additional income-generating work? Crouter et al. (2001) suggest that this is the case both because of prevailing gender roles and because the mother-daughter relationship is closer than the mother-son relationship.

In the Peruvian case Levison and Karine (1998) show, at a time where the CCT program was not operating, that domestic work was a critical factor inhibiting girls' school attendance. Although this effect has almost vanished, as CCT would have had a significant greater impact on girls versus boys' schooling attendance, as documented by Perova and Vakis (2009), it is important to recognize[3]that it has not been analysed in detail what other impacts CCT may have on children's time use. Using information from the Young Lives longitudinal sample, Escobal and Benites (2012) suggest that the Peruvian CCT program would have affected children's study and leisure time allocations by having to engage in additional household chores, as the mother took advantage of the monetary transfers to expand her income-generating opportunities.

In the light of this literature, one may wonder what effects on time use should a productive program like Haku Wiñay will have as it seeks to expand adult income-generating opportunities. It will be interesting to find out if the reallocation of chores to other household members is different for boys and girls and for children of different ages. To the extent that the impact is indeed heterogeneous by age and by sex it will be necessary to discuss what kind of complementary interventions may be necessary to minimize negative impacts and enhance the positive impacts that this type of interventions bring to rural families. Understanding what effects are generated is critical to designing complementary interventions that take these time reallocations into account.

Time use in heterogeneous educational contexts

Jordan and Nettles (1999) recognize that different school contexts interact with individual and family characteristics of children, affecting the distribution of work and study time outside of school. These authors characterize the school environment according to whether it is in an urban or rural area, the size of the populated center where it is located, how poor is the location where the school is located, and its racial or ethnic composition. The study shows that the interaction between school context variables and personal and family characteristics affect educational outcomes through the higher or lower likelihood of occurrence of extra-curricular structured activities. Similar results have been identified by Morris and Kalil (2006).

One of the causal channels through which the quality of the school affects the time-use allocation of children and adolescents is that of the effect it has on the higher profitability of investing resources (money or time) in education. Economic returns on investment in education have been extensively studied in specialized literature since Mincer's pioneering work (1974). Some of this literature assesses the impact that improvements in school quality have on returns to education. Schultz (1988), Card and Krueger (1992), Bedi and Edwards (2002), Dearden et al. (2002), Psacharopoulos and Patrinos (2004), among others, show how improvements in the quality of educational supplies lead to increases in the public and private rates of return on investment in education. In addition, improvements in the school context (either improvements in educational infrastructure, improvement of the quality of learning, improvements in human resources linked

[3] International evidence also suggests that the impact on school attendance is greater on girls than on boys. Baird et al. (2014)

to the school - teachers, managers and administrative personnel-; or improvements in school management may make the school more attractive to parents by suggesting that returns to education for their children are higher. In this regard, there is ample evidence that parents have less interest in investing in their children's education when the quality of the school is low (Fors, 2012).

The quality of available rural infrastructure and the labor and educational context at the community level significantly affect the work and study decisions of all countries included in the Ersado (2005) study, including Peru. Providing better schools changes the perception of returns to education by reducing the time allocated to labor activities - domestic or paid - and increasing the time allocated to education.

In general, it is reasonable to contend that if returns to education rise, parents adjust their preferences and change their investment decisions in education, as well as the time their daughters and sons allocate to study and work. Psacharopoulos and Patrinos (2004) suggest, for example, that policies that improve the quality of the school generate incentives for families to increase their investments in education. Similarly, Song et al. (2006) and Population Council (2016) show that poor quality of education can affect inter-temporal decisions, causing households to under-invest in education. On the other hand, Verwimp (1996) shows that, even when investing in education is profitable, households can under-invest if they have liquidity or credit constraints.

Spatial mobility ofr children and adolescents

The recognition that children and especially adolescents migrate in search of educational or employment opportunities is not new. Contrary to what many assume, this spatial mobility does not begin in late adolescence, but is prevalent since early adolescence (12 years) This is so because many rural towns only have direct access to an elementary school (Punch, 2007). Gender differences in these migration decisions have been documented. Valentine et al. (2017), explores the case of rural children in Mexico and shows that education and migration decisions are different among girls and boys and that the likelihood of migration is higher in adolescent girls than in adolescent men. Similar finding is identified by Heckert (2015). Complementarily, Hashim (2007) shows how rural-urban migration is often linked to the search for formal and non-formal educational and training opportunities and that the effects are more complex (and less positive) than some literature suggests.

An important part of recent literature has emphasized the risks and vulnerabilities that young children and adolescents face when migrating. Huijsmans (2006) summarizes international experience on the subject. Khoudour-Castéras (2009) explores the Colombian case by showing the risks and vulnerabilities associated with autonomous migration, highlighting the greater vulnerabilities faced by girls. However, literature has placed little emphasis on the conditions in the place of origin that may trigger these migration strategies. In particular, the absence of

employment opportunities for adolescent women could be a factor in increasing the likelihood of migration for this segment (Punch, 2007).

In short, the literature clearly shows that interventions aimed at improving adult income-generating opportunities can have unanticipated impacts on study time allocation and non-school responsibilities (domestic work and work in economic activities) between young children. These interventions can also affect young children's spatial mobility strategies as they can affect migration opportunities to study or work. These impacts are not the same between boys and girls and may also vary between age groups. Finally, the context in which these interventions occur matters and, as we will show in this study, heterogeneous educational contexts can have different impacts on how the time allocation of boys, girls, male and female adolescents is adjusted in response to such interventions or how migration decisions are made.

Households' decision regarding study and work, and on the time use allocation of children or adolescents, depends, among other factors, on the household's assessment of school "value". This assessment is, at least partly, associated with the comparison between the expected rate of return to schooling and the returns generated by keeping children at home and carrying out work activities (learning a skill) or assisting in tasks that will allow the family to pursue its livelihood (engaging in domestic tasks or income generation activities); or even the profitability that may be generated when entering the labor market. We have seen in this section that different school contexts can affect these relative returns having different effects on the use of time for girls, boys or adolescents as well as on their migration decisions.

3. The intervention

The program Haku Wiñay (also known as Noa Jayatai in the Rainforest region) was originally conceived as a set of interventions aimed developing productive and entrepreneurial skills among rural households that live in extreme poverty and run subsistence family production systems. The program focused on areas already assisted by the conditional cash transfers program Juntos, aiming for synergies between the two projects. The joint intervention is to some extent similar to graduation programs implemented in other countries (Baanerjee et al. 2015).

The program aims to strengthen the family production system, improving food security and achieving sustainable income generating strategies that allow households economic autonomy from Juntos transfers. Four components are implemented throughout three years to achieve specific goals[4]:

[4] For further details about the program, see http://www.foncodes.gob.pe/portal/index.php/proyectos/haku-winay-noa-jayatai. Also, for more detail on the scaling up of the intervention and impacts at household level, see Escobal and Ponce (2015, 2016).

i. Strengthen the family production system by providing technical assistance to implement simple, low cost technological innovations. Ten basic technologies are implemented and adapted to local economic and cultural contexts (e.g. irrigation, organic fertilization; guinea pig production).
ii. Develop and maintain healthy housing, such as safe kitchens, water and solid waste management.
iii. Promote inclusive rural businesses by helping farmers organize into business associations, prepare business plans and pursue grants by participating in competitions (CLARs); and
iv. Build financial capabilities by helping to develop savings plans.

4. Data and methods

4.1. Data

We used a panel dataset that compiles information gathered in 2013 – the baseline survey conducted as part of the impact evaluation of the program Haku Wiñay (Escobal and Ponce, 2016)- and information gathered in 2016 -to study the effects of the program on women empowerment (Diaz, 2017)-[5]. As it is explained by Escobal and Ponce (2016), the baseline survey was conducted as part of a randomized control trial (RCT) that selected control and treatment villages. The Ministry of Development and Social Inclusion, in charge of the program implementation, agreed upon this randomly assigned schedule with the Group for the Analysis of Development, the institution in charge of the external impact evaluation. The surveys gathered information on household livelihoods and income generating strategies, food security and household members characteristics, including time use, among other family features.
In the baseline survey, 388 households had children aged between 6 and 17 in 2013[6]. 311 of these households were found in 2016 (83%). These 311 households had reported having 730 young members aged between 6 and 17 years in the baseline survey, but only 594 of them were found in 2016 (81%). That is, 136 children moved out of their family house between 2013 and 2016.

4.2. Methods

As it was previously mentioned, we used data that was collected as part of an experimental evaluation of the impact of Haku Wiñay on a variety of household outcomes. As Escobal and Ponce (2016) explain, due to the small sample size, the randomly selected treatment and control groups were not perfectly balanced. To adjust these small differences, Escobal and Ponce used entropic balance weights for the control group (Hainmueller 2012). Once the balance was restored, they proceeded with the Difference in Difference estimate of changes in the outcomes of interest

[5] The impact evaluation gathered information before (baseline) and after the program. However, the latter could not be used in this study because it was gathered in August and September, when the preparation and sowing season starts in the Andean region. These months are usually very busy for rural households and children time allocation profile may differ from their typical school-day time profile. The information gathered by Diaz (2017), on the other hand, was gathered in a more typical month and can thus be compared with the baseline information.
[6] The number of households in the baseline survey was 447.

(to identify the Intention to Treat and the Average Treatment Effect on the Treated). We adapted this methodological approach to overcome challenges involved in dealing with individual outcomes (as opposed to household outcomes).

4.2.1. The estimation of the treatment effect

Following the literature on average treatment effect estimators (Duflo, Glennerster and Kremer, 2008; Lechner, 2010; Rubin 1974 as referred by Escobal and Ponce), we aim at measure the change in child time use derived from the participation of her family in Haku Wiñay. Using the same notation as Escobal and Ponce (2016), we are interested in the difference -*D*- in the child's outcome -*Y*- (e.g. hours allocated to study) between two scenarios, one in which her household participates in the program and another in which her household does not [7]:

$$D = E\left[Y_1^P - Y_1^{NP} \mid T \right] \qquad (1)$$

T indicates that the child belongs to a treated village, *1* indicates the current period, *P* indicates the observed (real) scenario in which the child's family participates in the program, and *NP* indicates the hypothetical (counterfactual) scenario in which the child's family does not participate in the program.

Given that we cannot observe Y_1^{NP} among treated children, we use the control group to estimate this parameter. Under the assumption of conditional independence on observables (exogeneity), we minimize potential selection bias by using information gathered before and after the program implementation (time invariant covariates potentially inducing bias are eliminated by the first difference). We estimate D using the difference in difference estimator [8]:

$$\widehat{DD} = \left(\hat{E}\left[Y_1^P \mid T \right] - \hat{E}\left[Y_0^{NP} \mid T \right] \right) - \left(\hat{E}\left[Y_1^{NP} \mid C \right] - \hat{E}\left[Y_0^{NP} \mid C \right] \right) \quad (2)$$

4.2.2. Adjustments and precisions on the estimation of $\widehat{DD}$

Two adjustments were required to minimize potential bias in the estimation of $\widehat{DD}$. After discussing these precisions, we specify the three topics we focused on.

i. Small sample adjustment (for the RCT household data)

As previously mentioned, following the impact evaluation methodological strategy, we used entropic weights to ensure the balance of the treatment and control groups. Since we are interested in households that had children aged between 6 and 17 years in 2013 (baseline) only, and we are

[7] Equation (1) in Escobal and Ponce (2016).
[8] Equation (3) in Escobal and Ponce (2016). The book derives and discusses the potential sources of bias.

working with a different re-visit dataset (gathered by Diaz in 2016), we needed to estimate a new set of weights to ensure the balance between the control and the treatment groups of households. 311 households that had children in that age group were found in 2016; that is, 80% of the households with children that were originally visited.

As shown in Table A1 (Appendix), these weights ensure the balance in the majority of household characteristics between the treatment and control groups (in 2013, before the intervention). Characteristics such as the number of household members, household head age, ethnicity and sex, as well as number of plots in the family farm -which have been found to be key for household decisions on children time use- are statistically similar between treatment and control groups. Nonetheless, the indicator of education attainment of the household head remains statistically different, with household heads in the treated group having 1.4 less years of education in average than their peers in the control group.

In addition, we explored whether the pre-intervention local educational context was different between children in treated and control groups (using the entropic weights). Table A1 (Appendix) shows that all these indicators are similar between the two groups. In particular, we explored two quality proxy indicators: (i) performance of the local schools in the 2012 national evaluations in reading comprehension and mathematics for students in grade 2 of elementary school, (ii) infrastructure quality proxied by the presence of toilets and clean water within the school facilities. Finally, we explored how effective the weights were to balance children time use profiles in the treatment and control groups. Table 1 shows that differences remain, with children in the treatment group working more and studying less before the project was implemented. Following Wooldridge (2014), in order to control for differences that could affect the outcomes and remain unbalanced between the treatment and control groups, we introduced time variant covariates in the estimation equation for $\widehat{DD}$.

Table 1. Difference in time use profile between treated and control children in 2013 (pre-intervention)

Activity	**Girls**		**Boys**	
	Difference	Statistical significance	Difference	Statistical significance
Study	-0.7	**	-1	**
Domestic work (i)	0.46	~	0.81	**
Economic work (ii)	0.58	**	0.1	
Work (i + ii)	1.04	**	0.92	*
Leisure	-0.42		0.21	
Rest	0.08		-0.13	

<*** p<0.01, ** p<0.05, * p<0.1

Notes. Domestic work includes taking care of other household members (elderly, infants, sick members, other children) and performing domestic chores such as cooking, cleaning, among others. Rest refers to sleeping time. The test of means difference adjusts for simple design and the entropic weight that ensure that households characteristics are balanced between control and treatment samples.

ii. The Difference in Difference estimator

Following Wooldridge (2014), we estimated the following equation:

$$h_{it}^{r} = \beta_0^r + \delta_0^r t_{it}^{2016} + \beta_1^r T_i + \delta_1^r t_{it}^{2016} \cdot T_i + \gamma^{rk} X_i^k \qquad (3)$$

h_{it}^{r} represents the number of hours that child *i* allocates to performing activity *r* in the period *t* (*t*=2013, 2016); such activities include study, domestic work (care for other members of the household, domestic chores such as cooking, cleaning, among others), economic activities (husbandry, harvesting activities, among others), leisure and rest. The sum of h_{it}^{r} across activities adds up to 24. t^{2016} is a dummy variable (0=2013, 1=2016). *T* indicates whether the village where the child lives was treated by the program (1=treated, 0=control). X^k represents *k* covariates that could affect the child's time allocation but remain unbalanced between the treated and control groups. These factors include child characteristics such as sex, age and mother tongue, household characteristics such as household head age and years of schooling and number of household members, the local educational context (average score in the mathematics national evaluation for grade 2 students in 2012, and access to clean water, and other cultural or idiosyncratic factors common to the department where the village is located (dummy variables for Cajamarca, Huancavelica, Huánuco).

The parameters of interest are δ_1^r, which in absence of X^k are equivalent to the Difference in Difference estimator estimated in the program impact evaluation (Escobal and Ponce 2016). Table A2 of the Appendix shows the meaning of the parameters $\beta_0^r, \delta_0^r, \beta_1^r$ in (3). Given that the $\sum_{r=1}^{5} h_{it}^{r} = 24$ for each child, $\sum_{r=1}^{5} \delta_1^r = 0$. We also discuss the results aggregating domestic work and economic work in one category.

It is important to mention that participation in the program is voluntary. In the panel dataset, 88% of children in treated villages were members of participant households. Given that *T* indicates whether the child lives in a treated village, δ_1 measures the effect of belonging to a group that was given the possibility of participating in the program. This estimator is called Intention to Treat (ITT) in the impact evaluation literature. Given that the proportion of children living in treated villages that were not benefited by the program was relatively low, we expected δ_1 slightly underestimates the program impacts if considered as a proxy for the treatment effect on the treated. Therefore, the treatment effect we discuss in the following section could be considered as a lower bound for the actual treatment effect on treated children[9].

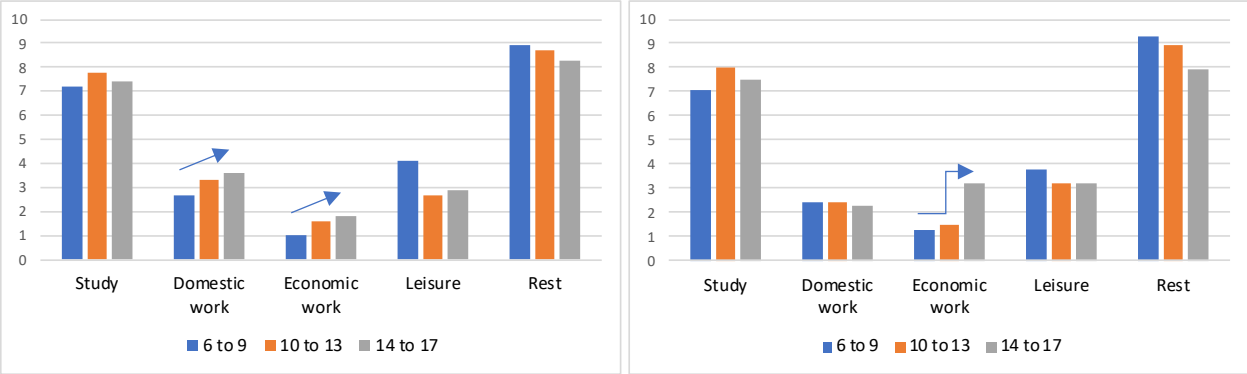
iii. Three topics of interest

To explore the impact in Haku Wiñay on children time use, with emphasis on gender differences, we focus on three questions:

[9] Further details on potential underestimation of effects when using ITT and impact heterogeneity due to different treatment intensity can be found in Escobal and Ponce (2016).

a. What is the effect of the program on children allocation of time between study, domestic work, economic work, leisure and rest?

Given that gender roles are shaped throughout life and tend to differentiate more as children grow (Graph 1), we analyzed the effects of the program dividing the children sample in three cohorts: 6 to 9 years, 10 to 13 years and 14 to 17 years. Children are assigned to the cohort they belong to in 2013, before the program was implemented.



Graph 1. Time allocation in 2013 (pre-intervention), by sex and cohort. The graph shows differences in time use as children grow up (based on observations on different cohorts in a given year). Girls time allocated to domestic work and economic work increases with age. For boys, their involvement in domestic work remains the same with age, whereas their dedication to economic work increase substantially after middle school.

We estimate the effect of the program on child time use using the Difference in Differences estimator of the ITT previously discussed.

b. Do these effects depend on local educational (schooling) conditions?

To explore these effects, we classified local educational (schooling) conditions in three categories from most favourable to least favourable, according to the scores that Grade 2 students in the village got in the reading comprehension and mathematics national evaluations. We contrasted the effect of the program for children living in villages that ranked highest vs lowest tercile in this evaluation. As previously mentioned, we used the Difference in Differences estimator of the ITT previously discussed.

c. Does the program affect the household decision about their children's early migration or early marriage?

This question was not originally part of the study. However, we found that a higher proportion of girls in the control group left their family house between 2013 and 2016 as compared to girls in the treatment group. (68% vs. 78%). Boys, on the other hand, did not show different trends between control and treatment groups. Furthermore, girls showed a higher rate of early migration

or marriage than boys in both groups of villages (26% vs 14%). Therefore, we explored whether the program played a role in delaying early migration or marriage (the main reasons for a child to leave her house before the age of 20).

Table 2. Proportion of children that left their family house between 2013 and 2016.

Group	Girls	Boys	Significance of the difference.
Control	68%	85%	**
Treated	78%	87%	**
All	74%	86%	***

<*** p<0.01, ** p<0.05, * p<0.1

The test of means difference incorporates the sample design and the entropic weights to balance both groups of households. The calculations include all children who lived in 2013 in households which are part of the panel 2013-2016.

Given that this exploration requires modeling the effect of the program on the probability to remain in the family house (that is, the outcome is not a continuous variable but a binary variable), we could not use the Difference in Difference estimator. Instead, we estimated the effect of the program on the probability of staying in the family household with a Probit model, controlling for factors that could also affect such probability. Although this approach is not as robust as the Difference in Difference estimator, we consider it a first exploration of this important topic. The results are not only key to understand gender gaps in children lives as they approach adulthood but for the general discussion about the role of social protection and productive projects targeted to extreme poor populations to reduce certain children vulnerabilities that are not usually discussed in the public policy debate (early migration, early marriage).

5. Results

a. Effect of the program on children time use

As it is shown in Table 3, we found evidence that the program has an effect in child time use for girls older than 10, but no major effects for boys. The most important effect is found among girls in the cohort 10 to 13 years, who increase the time allocated to study and decrease the time allocated to work (domestic and economic) as a result of their household participation in the program. Also, girls in the older cohort show a decrease in study time and an increase in domestic work time. In the next section we discuss this result taking into consideration our findings about the effect of the program on the probability that a girl remains longer in her family house.

Table 3. ITT estimates of the effect of the program on the child allocation of time to each activity, by sex and cohort.

Activities	Cohort 6 to 9		Cohort 10 to 13		Cohort 14 to 17	
	Girls	Boys	Girls	Boys	Girls	Boys
Study	0.008	0.319	2.44 ***	0.293	-1.439 *	-0.945
Domestic work (i)	-0.363	-0.793 **	-1.212 **	-0.592	2.412 **	-0.26
Economic work (ii)	-0.218	0.235	-0.673 **	0.4	-1.739	0.362
Work (i + ii)	-0.58	-0.558	-1.885 ***	-0.192	0.673	0.101
Leisure	0.826	0.235	-0.13	-0.259	1.155	0.508
Rest	-0.254	0.004	-0.425	0.158	-0.388	0.336
N	264	248	232	228	80	136

<*** p<0.01, ** p<0.05, * p<0.1

Notes. Domestic work includes taking care of other household members (elderly, infants, sick members, other children) and performing domestic chores such as cooking, cleaning, among others. The "Work" category aggregates domestic and economic types of work. Rest refers to sleeping time. The estimates and standard errors are adjusted by sample design and entropic weights.

b. Heterogeneity of the effect across local educational contexts

We explored potential heterogeneities of the program effects on child time due to differences in the local educational context. We used a proxy for quality of school education that informs on specific outcomes of the educational service: reading comprehension and mathematics evaluation scores in the local primary school (national evaluation of grade 2 students). The higher the performance of local school students, the higher the expectations of parents about the returns to their children education. Although several studies show that parents in rural areas greatly value school (especially elementary) education, the opportunity cost of sending their children to school as they grow older and stronger increases rapidly for households in extreme poverty, and their expectations on the returns to such education may be key to determine the age when children stop attending school and substantially increase their work responsibilities.

We found evidence of heterogeneous effects of the program. As Table 4 shows, we found similar positive effects of the program, as in the average estimates, at reducing the work burden for girls in the cohort 10 to 13 years in both educational contexts. However, only in higher quality contexts

the positive effect on study is found. For the cohort of older girls, the increase in domestic work is found in higher quality context whereas an increase in economic work is found in lower quality contexts. An encouraging result for the youngest cohort is worth of mention. Girls between 6 and 9 years old show an increase in study time and a reduction in economic work time as a result of the program in higher education quality contexts.

Table 4. ITT estimates of the effect of the program on the child allocation of time to each activity, contrast between high quality vs low quality education context.

Sex		Cohort (age in 2013)		
		6 to 9	**10 to 13**	**14 to 17**
Higher quality local education context (schools in these villages ranked top 33% of the sample in the national evaluations on reading comprehension and mathematics of grade 2 students)				
Girls	i	Study (+) ***	Study (+) ***	
	ii			Domestic work (+) **
	iii	Economic work (-) ***	Economic work (-) **	Economic work (-) *
	ii+iii	Work (-) *	Work (-) ***	Work (+) **
	iv		Leisure (-) *	
	v		Rest (-) **	Rest (-) ***
Boys	i			Study (-) ***
	ii		Domestic work (+) ***	
	iii		Economic work (-) ***	Economic work (+) **
	ii+iii		Work (-) ***	Work (+) ***
	iv			
	v		Rest (+) ***	Rest (+) ***
Lower quality local education context (schools in these villages ranked bottom 33% of the sample in the national evaluations on reading comprehension and mathematics of grade 2 students)				
Girls	i			
	ii			
	iii		Economic work (-) *	Economic work (-) **
	ii+iii		Work (-) *	Work (-) **
	iv			Leisure (+) **
	v		Rest (-) *	
Boys	i			
	ii			Domestic work (-) **
	iii			
	ii+iii			
	iv			
	v	Rest (-) ***		

<*** p<0.01, ** p<0.05, * p<0.1

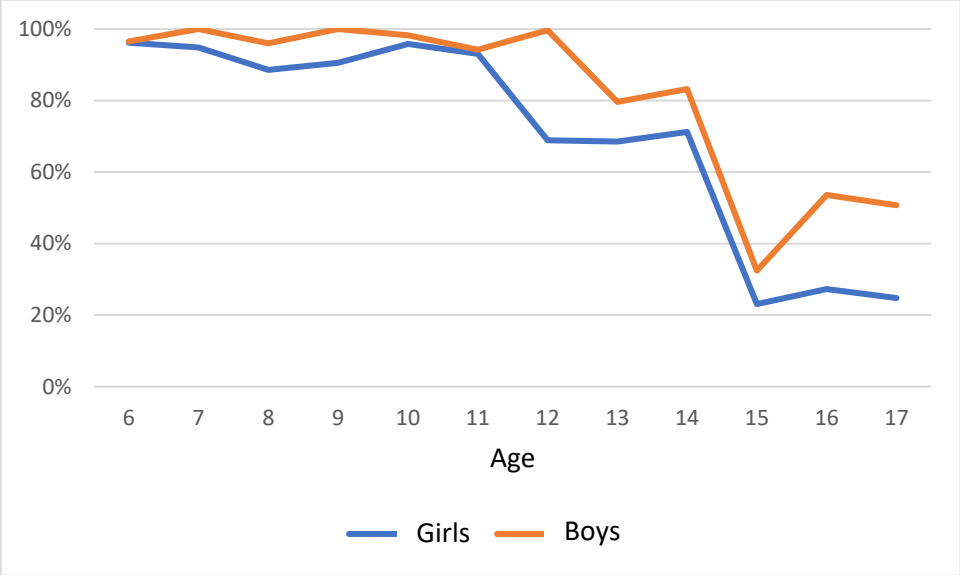
Notes. For simplicity, only activities with statistically significant ITT are mentioned in the table. Table A3 in the Appendix provides all the estimated parameters (value and significance). In red: estimates that were also significant in Table 3 (whole treated sample). Domestic work includes taking care of other household members (elderly, infants, sick members, other children) and performing domestic chores such as cooking, cleaning, among others. The "Work" category aggregates domestic and economic types of work. Rest refers to sleeping time. The estimates and standard errors are adjusted by sample design and entropic weights.

With regards to boys in higher quality contexts, we find that the program has no effect on study time and reallocates some work time from economic to domestic work, but in aggregate increases time to rest and reduces the total time allocated to work. No effect is found in the lower educational quality context, besides a reduction in domestic work time for the oldest cohort and a reduction of rest time for the youngest. It is worth mentioning that the number of hours adds up to 24, so for example a reduction in domestic work implies an increase in time allocated to other activities; this increase in other activities may not be statistically significant however (due to high variance or due to a split of small amount of time across activities).

c. Effect on the probability of staying in the family dwelling (preventing early migration or early marriage)

As previously mentioned, we studied the effect of the program on the probability that children in treated households leave their family house between 2013 and 2016 (while or after the program was implemented). Graph 2 shows the proportion of children that left their family house between these years. The proportion of children leaving their family house increases substantially in the cohorts older than 11 by 2013. This pattern was expected, since all households in the sample (control and treated by Haku Wiñay) participated in Juntos (transferes were conditioned on 85% school attendance by children 14 years old or younger[10]). The graph shows that in extremely poor families boys tend to stay in their family house longer than girls.

Graph 2. Proportion of children aged between 6 and 17 that stay in their family house between 2013 and 2016 (both control and treated).



Note. Percentages are calculated using the entropic weights to balance both groups of households.

[10] The Juntos program changed this condition later on, including children younger that 20 that had not finished secondary school.

Table 5 shows the Probit estimation results. According to this estimation, the program increases the probability that girls stay in their family house, but has no significant effect among boys. Consistent with Graph 2, the older the child is, the lower the probability that she lives in her family house.

Tabla 5. Effect of the program on the probability of staying in the family dwelling by 2016 (marginal effects)

	Girls		Boys		Girls and boys	
Treatment (1 if the child's household participated in the program)	0.1	**	0.04		0.07	*
Age of the child in 2013	-0.07	***	-0.04	***	-0.05	***
First language that the child learn (1 if mother tongue is Spanish, 0 if it is a native language)	0.09	*	0.09	*	0.1	*
Sex of the household head (1 if female, 0 if male)	-0.11		0.01		-0.04	
Household head education (number of years of formal education)	0.01		0.01	~	0.01	*
Number of household members	0.01		-0.03	***	-0.02	*
Second dwelling (1 if the household owns a second dwelling, 0 otherwise)	-0.04		-0.01		-0.03	
Altitude of the dwelling location (meters above the sea level/1000)	-0.03		0.08	*	0.04	
The child is a girl (1 if she is a girl, 0 if he is a boy)					0.15	***
N	370		360		730	
F	F(8,7)=42.8		F(8,7)=31.1		F(10,5)=48.1	
Prob > F	0		0.0001		0.0002	

*** p<0.01, ** p<0.05, * p<0.1, ~ p<.2

This estimation used the entropic weights and sample design mentioned in the methodological section.

6. Discussion

The findings of this study complement those of the main impact evaluation of the program (Escobal and Ponce, 2016). The main evaluation found positive impacts of Haku Wiñay on household income, food security, healthy housing, improved farm production systems, and improved farmers perception of their ability to generate income, run their businesses and negotiate in the markets. In addition, Diaz (2017) found that some measures of women economic

empowerment and indicators of satisfaction with their own lives improved. It is also important to note that this program facilitates women exposure in the public space through their participation in public business grants competitions and financial literacy training activities. All this is witnessed by children and may be having a positive effect on children's perception of gender roles and gender equality and thus may contribute to increase gender equality in rural society in the future.

In spite of these good news, in his study about adult women beneficiaries of the program, Diaz (2017) found that other measures of gender equality and women empowerment did not improve with the program. He found no improvement on gender roles (domestic responsibilities) within the household, neither did he on some measures of women rights and freedom. He did not find significant impact on depression, self-esteem or ambition (although the change in these indicators was favorable, it was not statistically significant). Moreover, he found a negative effect of the program on intimate partner violence and an increase in husbands controlling behavior (suspicion, distrust and behavior conducive to isolate their wives who were participating more in economic activities in the public space). Thus, the evidence about the effect of the program on gender equality was not clearly positive.

In this context, what can we say about the impact of the program on gender differences among younger generations? The results presented in the previous section show clear effects of the program Haku Wiñay on children time use and on gender differences in time allocation, especially for older cohorts (who experience more substantial gender gaps). The first noteworthy finding is that girls experience the most significant impacts as compared to boys (Table 3). The cohort of girls aged 10 to 13 years before the program are the most benefited by the program, with more hours allocated to study and less working hours (both in economic and domestic activities). These effects are especially strong in contexts with higher quality of educational services (Table 4). Also importantly, boys in these contexts increase their contribution to domestic work and decrease their involvement in economic activities. Given that working hours in total decreases for these boys, it seems that the program reduces the typical gender differences in domestic responsibilities while increasing their general wellbeing. This is good news indeed, as it is the increase in study time and reduction of economic work for the youngest cohort of girls (6 to 9).

The positive effect of the program on study time among girls under 13 years is consistent with the mechanisms discussed in the vast literature on child education decisions (Section 2). As mentioned before, the decision of prolonging children formal education depends on the expected benefits and costs it entails. As children grow, the opportunity cost of sending them to school increases. The lower the quality of the education children receive, the lower the probability that families prolong their children's school attendance and study time. Given that the program increases household income and food security (by fostering farm production and income), one of the main mechanisms behind the increased study time in this cohort must be the income effect[11].

[11] Nevertheless, it is important to acknowledge that there is a substitution effect in place as well, as the mother tend to be more involved in economic work and must transfer some of her domestic responsibilities to younger members of the family.

More troublesome findings appear in the analysis of the oldest cohort (14 to 17 years of age in 2013). First, in average, girls in the oldest cohort reduce time allocated to study and increase time devoted to domestic responsibilities. This effect is not found among boys in the same cohort. When we explore potential heterogeneities across educational contexts, we find evidence that suggests that gender differences increase due to the program in the high-quality contexts: while girls increase time allocated to domestic work (and decrease economic work), boys increase their time allocated to economic work (and decrease study time). For both, girls and boys in this cohort the number of hours allocated to work increases as a result of the program. Although these results seem discouraging, it is important to note that the program also affects the probability of children departure from the family house (Table 5). We find preliminary evidence that the program delays such departure, that is, delays early marriage or early migration among girls, especially in the older cohort. Is this a positive effect for girls' wellbeing? Does this effect contribute to gender equality for younger generations living in extreme poverty? If early migration or early marriage were strategies to cope with family poverty (reducing the economic burden of raising children or increasing family income through transfers, e.g. sending the girl to work as a domestic worker in a city), postponing early departure would be a positive impact of the program, reducing exposure of girls to risk and exploitation. If, on the other hand, early migration was an investment decision, aimed at furthering children's education or at opening opportunities to work in higher quality jobs, the impact of the program would be negative, most likely caused by a higher involvement of the mother in economic endeavors leading to a higher demand for the girls' time at domestic tasks. It seems that the reduction in the probability of early migration or marriage is at least in part positive for girls, but we cannot provide a definite answer with the information in hand. Further research on this topic is needed.

7. References

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8. Appendix

Table A1. Difference between average indicators of treated and control households (households that had children aged between 6 and 17 years in 2013, only)

Indicator	Difference between treated and control group	Significance of the difference
Household indicator		
Number of household members	-0.1	
Household head - Age	0.7	
Household head – Years of formal education	-1.4	**
The household head is a woman	0.1	
The household head or her spouse report Quechua (native language) as her mother tongue	0.1	
Number of plots in the family farm	0.0	
Educational context (schools located in the village)		
Average score in the Reading Comprehension exam	4.2	
Average score in the Mathematics exam	21.7	
Average score in the Reading Comprehension exam - Boys	2.7	
Average score in the Reading Comprehension exam - Girls	5.8	
Average score in the Mathematics exam - Boys	9.0	
Average score in the Mathematics exam - Girls	34.3	
% of schools with clean drinking water	-0.1	
% of schools with toilet facilities	-0.1	
% de students with desks	-0.1	*
Number of schools with electricity	0.6	

Continues table A1

Indicators	Difference between treated and control group	Significance of the difference
% of households in areas with bottom third ranked schools in both Reading Comprehension and Mathematics (1)	0.0	
% of households in areas with top third ranked schools in both Reading Comprehension and Mathematics (2)	-0.1	
% of households in areas with schools with no clean drinking water (3)	.06728	
% of households in areas with schools with clean drinking water (3)	-.1263	
% of households in areas with schools ranked in the bottom third and with no clean drinking water (1) and (3)	-.07209	
% of households in areas with schools ranked in the top third and with clean drinking water (2) and (4)	-.1645	
% of households in areas with schools with no toilet facilities (5)	.1826	
% of households in areas with schools with toilet facilities (6)	-.1507	
% of households in areas with schools that have neither clean drinking water nor toilet facilities (3) (5)	-.2465	
% of households in areas with schools that have both clean drinking water and toilet facilities (4) (6)	-.02848	

*** p<0.01, ** p<0.05, * p<0.1

The means difference test used the entropic weights and sample design mentioned in the methodological section.

Table A2. Difference in Difference estimator for a specific activity (e.g. study)

Group	Pre-intervention (2013)	Post-intervention (2016)	Difference in the number of hours allocated to the activity between pre and post intervention
Control	β_0	$\beta_0 + \delta_o$	δ_0
Treated	$\beta_0 + \beta_1$	$\beta_0 + \delta_o + \beta_1 + \delta_1$	$\delta_o + \delta_1$
Difference between treated and control	β_1	$\beta_1 + \delta_1$	δ_1

Versión adaptada de la Tabla 13.3 de Wooldridge (2014: 441).