The Birth-Order Effect on Child Work and School Attendance in Peru

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Abstract

In this paper, we investigate the potential birth order effect on child work and school attendance using data for Peru and a bivariate probit model. Our findings suggest that (i) parents usually send their later-born kids to school and their earlier-born children to perform either productive or domestic work. These results are robust across different model specifications and sample restriction. (ii) There are differences between sons and daughters and difference across area of residence only for females. (iii) Birth order effects turn out to be nonlinear for urban and rural boys. (iv) Birth order effects are sharpen by the number of younger sisters and younger brothers, on the one hand, and by the average birth spacing, on the other hand. (v) There is no trade-off between domestic work and schooling, but there is a trade-off between working and schooling except for rural girls. Finally, results also indicate that the econometric approach applied in this paper is suitable for modelling child work and school attendance for boys and girls in urban areas. However, in rural areas, it seems to be appropiate only for modelling child participation in productive work and schooling.

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1 Introduction

The fact that human capital accumulation plays a mayor role in economic growth is predicted by theoretical models and reported by empirical research. One of the main public policies to increase human capital in developing countries has been the implementation of conditional cash transfer programs (Dammert, 2010). JUNTOS is the Peru's conditional cash transfer program. One of the objectives of JUNTOS is to increase primary school attendance and decrease drop-out rates and child work. The program achieves this goal by providing all eligible households with the same monthly fixed payment of S./ 100 soles[1] and parents in exchange have to send kids aged 6 to 14 years and with incomplete primary to school at least 85% of the year (Perova and Vakis, 2010). However, using a non-experimental evaluation Perova and Vakis (2010) find that JUNTOS has had limited impacts on school enrollment and attendance. This result can be improved by including a birth order criterion (de Janvry and Sadoulet, 2005) and/or by considering household composition (Dammert, 2010; Edmonds, 2006) in the design of JUNTOS. According to de Janvry and Sadoulet (2005), households should receive higher cash transfer for sending the first-born to school, and less for the second-born and so on. Besides, omitting household composition might underestimate the amount of the lump-sum payment to incentivize parents to send their kids to school[2].

To use the birth order as a criterion for conditional cash transfer allocation requires first to understand whether parents distinguish between earlier-borns, middle-borns and last-borns within Peruvian families. If parents do so, birth order might determine whether a kid attends school or participates in productive and/or domestic work. Moreover, parental decision about which kid should be sent to work instead of/or in addition to school might affect current and future kids' well-being. Hence, it is important to carry out an study to understand potential birth order effects.

Using a bivariate probit model, we first investigate whether birth order effects on child work and schooling are present in Peruvian families. Second, we explore whether nonlinearities in birth order are important in the relationship among siblings. Third, we study whether birth order effects differ by gender and by area of residence. Fourth,

[1] Around 25 euros.

[2] This omision may also overestimate the cash transfer amount, but its effect would be positive on school attendance rates.

we examine whether birth order effects are more pronounced with birth spacing. Are there differences, in term of schooling and child work, among siblings slightly or widely separated? Finally, we explore whether birth order effects are sharpen by the number of younger brother and younger sisters.

We use the 2007 Peru National Child Labour Survey (NCLS). The NCLS is a cross-sectional and nationally representative household survey that identifies three types of activities in which the 5 to 17 year-old population may be involved: school attendance, participation in productive work, and participation in domestic work. The sample used for the empirical analysis includes 5,281 kids aged 6-17 years.

We use the term "kids" or "children" indistinctively, and it refers to the population group aged 6-17 years which encompasses children and adolescents. We use the term "domestic work" referring to household chores. Likewise, we use the term "productive work" referring to at least one hour of work in an economic activity during the reference week. Here economic activity embraces productive activities undertaken by children including unpaid, illegal, informal and part time work, production of goods for own use, and excluding household chores and schooling tasks (Deb and Rosati, 2004; Haile and Haile, 2008). This definition differs from the concept of "child labour"[3] used by the International Labour Organization (ILO). Unless explicitly stated, we will treat both terms "productive work" and "domestic work" indistinctively as "work".

This paper does not deal with individual unobserved fixed-effects and does not explicitly control for household unobserved fixed-effects. However, we make the attempt to control for unobserved household heterogeneity by excluding from our sample kids living in single-parent households, households with parents that are adolescents, households with twins among its members, households with only one kid and households where not all kids speak spanish.

Our results suggest the existence of significant birth order effects among Peruvian families. Parents usually send their later-born kids to school and their earlier-born children to perform either productive or domestic work. Moreover, birth order effects differ across

[3]The term "child labour" refers to work that is mentally, physically, socially or morally dangerous and harmful to children and interferes with their schooling by: depriving them of the opportunity to attend school; obliging them to leave school prematurely; or requiring them to attempt to combine school attendance with excessively long and heavy work. In its most extreme forms, child labour involves children being enslaved, separated from their families, exposed to serious hazards and illnesses and/or left to fend for themselves on the streets of large cities – often at a very early age (in: http://www.ilo.org/ipec/facts/lang--en/index.htm).

gender and across area of residence only for females. This suggest that parental time allocation of girls and boys (and urban and rural females) might come from different decision-making processes. We also examine nonlinearities and find that birth order effects turn out to be nonlinear for urban and rural boys. Furthermore, we find that birth order effects are sharpen by the number of younger sisters and younger brothers, on the one hand, and by the average birth spacing, on the other hand. These findings suggest that Peru's conditional cash transfer program, JUNTOS, could replace the kids' age by the kids' birth order criterion and that cash grants should not be homogeneous across households. On the other hand, findings suggest that there is no trade-off between domestic work and schooling, but there is a trade-off between working and schooling except for rural girls. Results indicate that the econometric approach applied in this paper is suitable for modelling child work and school attendance for boys and girls in urban areas. However, in rural areas, it seems to be appropiate only for modelling child participation in productive work and schooling.

The remainder of this study is organized as follows. In the next section, a review of the related literature is summarized. In Section 3, data and sample are described. Section 4 presents the bivariate probit model to be estimated. In Section 5, the estimation results are discussed and sensitivity analysis is performed. Section 6 concludes with a summary of the main findings and some recommendations.

2 Literature Review

In this chapter we mainly discuss literature from economics, especially studies that display econometric analysis. However, there is also a stream of literature about birth-order from other disciplines such as psychology and sociology that will not be discussed here.

The theoretical literature is focused on developing models to capture the effect of birth order on schooling and child work. For instance, Ejrnaes and Portner (2004) develop a model to explain the relationship between birth order and household investment in kids' human capital. This model assumes endogenous fertility because parents are allowed to choose whether to have a kid based on their budget and the genetic endowment of their born and unborn kids. The key assumption here is that parents are able to know the genetic endowment of their unborn kids. Under these assumptions, the model predicts that less averse parents to inequality among children invest more in later borns' education.[4] This occurs because later borns tend to have a higher genetic endowment.[5] Therefore, the criterion parents follow to decide the number of kids generates a birth order effect where the last borns are more favored. Edmonds (2006) presents a model with household production in which kids differ in their return to school and labour productivity. This model assumes exogenous fertility[6] and predicts that siblings' age and gender composition have an impact on their labor supply in household production.

Chesnokova and Vaithianathan (2008) and Tenikue and Verheyden (2010) provide a model with exogenous fertility[7] that predicts that the absence of credit markets makes earlier borns more likely to work and less likely to attend school than later borns in household with liquidity constraints. In addition, Chesnokova and Vaithianathan (2008)'s model predicts that poorly implemented policies aimed to prevent kids from working can decrease the stock of human capital in society and increase the number of kids working in the long-run, especially if earlier borns' income is allocated to finance the later borns' school-

[4]The model provides two other scenarios depending on parent's inequality aversion between kids. In those scenarios either parents have only one single kid or parents evenly invest on kids' education.

[5]The model assumes that parents are more likely to stop having children if the unborn kid turns out to have higher genetic endowment than expected.

[6]According to Edmonds (2006), "this exercise can be viewed as the second stage of a problem faced by the household decision maker, who chooses the number of children in the household in the fist stage" (pp. 797).

[7]The number of kids in the household is exogenous.

ing. On the other hand, Tenikue and Verheyden (2010)'s model predicts that households invest more in earlier borns' education once they surpasses certain wealth threshold, but household below the threshold would invest more in later borns' education. In contrast to Ejrnaes and Portner (2004) or Edmonds (2006), these models assume that kids are identical except for their age. Thus, parents care equally about them and any asymmetry between kids is due to a birth order effect. In general, all the theoretical models show that a birth order effect may arise without assumptions on parental preferences for certain birth order.

Empirical papers have also been carried out to explore potential birth order effects on child work and schooling.[8] In general, all these studies find that earlier borns are more likely to perform productive or domestic work and less likely to attend school than later borns. Using data from Nicaragua and Guatemala, Dammert (2010) finds that first-born kids are more likely to perform household chores, and only last-born males are less likely to be engaged in productive work. Ejrnaes and Portner (2004) use a small sample from Philippines and find that parents invest more in education of last-born kids as predicted by their theoretical model. Edmonds (2006) works with data from Nepal and finds that earlier born girls tend to work more than their later born brothers. Using a multinomimal logit model and data from Bangladesh, Khanam and Rahman (2005) find that first-born kids are more likely to spend their time engaged exclusively in working activities. Tenikue and Verheyden (2010) use information from twelve Sub-Saharan countries[9] and find that last-borns living in poor households tend to have higher educational levels as predicted by their theoretical model. Using a bivariate probit model, Emerson and Souza (2008) analyze a sample of Brazilian kids and find that first-born kids are less likely to attend school, and only last-born boys are less likely to work.

Empirical studies provide the following explanations for the reported birth order effects on child work and school attendance. Emerson and Souza (2008) and Tenikue and Verheyden (2010) argue that the lack of access to capital markets may force parents to send the earlier born siblings to the labour market to finance the education of the younger kids. This is consistent with the theoretical prediction of Chesnokova and Vaithianathan (2008)'s model. In addition, Emerson and Souza (2008) assert that earlier borns are

[8] The outcomes variables used by the empirical papers are listed in Table 2.1 (see Appendix).

[9] Benin, Burkina faso, Cameroon, Ghana, Kenya, Mali, Niger, Senegal, Tanzania, Uganda, Zambia and Zimbabwe.

more likely to be sent to work because they can earn higher wages. Dammert (2010) and Khanam and Rahman (2005) indicate that first-born may be financially unfavored because young parents may have lower resources as they are at the beginning of their careers, therefore later-borns' education might be easier to afford. Edmonds (2006), Dammert (2010) and Khanam and Rahman (2005) suggest that siblings comparative advantages may also benefit particular birth orders. In fact, Edmonds (2006) and Dammert (2010) state that older girls are more likely to perform household chores because they have comparative advantage in domestic work and household production. As mentioned above, Ejrnaes and Portner (2004) state that later-borns receive more education because they have higher genetic endowments.

Nevertheless, the literature also suggests that earlier borns may receive more education than later borns. Ejrnaes and Portner (2004) and Emerson and Souza (2008) argue that first-borns may be favored with more parental time and resources since those factors do not have to be shared among many siblings. Dammert (2010), Lampi and Nordblom (2009) and Khanam and Rahman (2005) document the so-called resource dilution theory. According to this theory, parental resources are diluted as the numbers of kids increases in the family. Therefore, higher birth orders and larger number of siblings may have a negative impact on educational investments of the kid (Lampi and Nordblom, 2009).[10] Likewise, future financial constraint or "old-age security parents' motivation" (Khanam and Rahman, 2005) may induce parents to address more resources towards the first-borns because they become economically active first. Ejrnaes and Portner (2004) and Khanam and Rahman (2005) argue that parents may have preferences for the first-born. For instance, in some cultures the first-born male has a special treatment in the household. Emerson and Souza (2008) state that if earlier borns have higher abilities,[11] they might not only be more likely to get more education because of their higher return to education, but also they may be more likely to be sent to work because they can earn higher wages due to their higher ability, productivity or reliability. Dammert (2010) and Khanam and Rahman (2005) assert that earlier borns may have more abilities since parents' youthfulness might have a positive impact on the kid's birth weight, which is correlated with ability. Thus,

[10] However, Birdsall (1991) shows that mothers can spend more time with later-borns since older siblings are the first leaving from the house.

[11] Black et al. (2007) find that earlier born kids have higher IQ's and Minnett et al. (1983) states that "firstborns have been characterized as more intelligent, verbal, and dominant than later borns" (pp. 1065).

parents might invest more on earlier borns' education.

Which all of these effects dominates among Peruvian families is not clear cut *a priori*. There is only one empirical paper applied to Peru that investigates indirectly the potential birth-order effect on productive or domestic work and schooling. Ilahi (2001) finds that earlier-born urban girls are less likely to attend school and more likely to do housework. On the other hand, earlier-born rural girls are more likely to have a better score in the grade-for-age[12] index and less likely to do household chores. Moreover, earlier-born urban boys are more likely to perform productive and domestic work.

The rest of the literature applied to Peru is focused on whether productive work is detrimental to schooling or schooling progress (Patrinos and Psacharopoulos, 1997; Alcazar et al., 2002; Rodriguez and Vargas, 2009), or it is focused on finding the determinants of child labour and school attendance (Alcazar et al., 2002; Rodriguez and Vargas, 2009; Levison and Moe, 1998; Rodriguez and Abler, 1998; Ray, 2000; Ersado, 2005). Most of these studies treat separately schooling and working decision processes. For instance, Patrinos and Psacharopoulos (1997) and Rodriguez and Abler (1998) use univariate logit models to study the effect of the number of siblings and household income on child work and schooling, respectively. Levison and Moe (1998) use a generalized tobit model to examine the determinants of hours spent in domestic work and in school only for adolescent girls. Ray (2000) uses a two-step procedure to estimate the effect of the household poverty status and children wages on child work and schooling. Only Alcazar et al. (2002),Ersado (2005) and Rodriguez and Vargas (2009) jointly model schooling and working using a bivariate probit model. While Alcazar et al. (2002) study rural adolescents from several Latin American countries, Ersado (2005) and Rodriguez and Vargas (2009) analyze urban and rural children and adolescents in Peru.

Findings from this literature are mixed. Alcazar et al. (2002) and Rodriguez and Vargas (2009) find that there is a trade-off between schooling and child labour, whilst Patrinos and Psacharopoulos (1997) indicate that child labour is not a significant deterrent to schooling progress.[13] In fact, Patrinos and Psacharopoulos (1997) find that child labour

[12] It is defined by: Years of schooling / (Age - E), where E is the official elementary school entry age.

[13] Schooling progress is measured with a dummy variable. This variable is equal to 1 if the ratio: $\frac{S}{A-E}$ is equal or larger than 1, and it is equal to 0 otherwise; where S=years of schooling, E=official school entry age, and A=current age. This ratio capture whether or not the students are attending the school

has a positive impact on schooling progress. Likewise, Rodriguez and Vargas (2008) reports that "Alarcon (1991) does not find strong evidence to support the idea that child labour has adverse consequences on schooling performance, while Verdera (1995) does" (pp. 16). Rodriguez and Abler (1998) find that family size is not a determinant of school attendance, in contrast to what Patrinos and Psacharopoulos (1997) and Alcazar et al. (2002) report. Nonetheless, it is possible to find a consensus on the main determinants of school attendance and child labour such as parents' schooling (Alcazar et al., 2002; Levison and Moe, 1998; Ray, 2000; Rodriguez and Abler, 1998; Rodriguez and Vargas, 2009; Ersado, 2005), number of kids (Alcazar et al., 2002; Patrinos and Psacharopoulos, 1997; Rodriguez and Abler, 1998; Rodriguez and Vargas, 2009; Ray, 2000), age and gender of the kids (Alcazar et al., 2002; Levison and Moe, 1998; Patrinos and Psacharopoulos, 1997; Ray, 2000; Rodriguez and Abler, 1998; Rodriguez and Vargas, 2009) area of residence (Ray, 2000; Patrinos and Psacharopoulos, 1997; Rodriguez and Abler, 1998) and household income[14] (Rodriguez and Vargas, 2009; Levison and Moe, 1998; Ersado, 2005; Ray, 2000) among others.

A particular issue related to birth order studies is how to measure the birth position of the kid. Dammert (2010),Ilahi (2001), Edmonds (2006) and Ejrnaes and Portner (2004) use an absolute measure of birth order where the oldest kid is ranked 1, the second oldest is ranked 2, and so on. Ejrnaes and Portner (2004), Tenikue and Verheyden (2010) and Dammert (2010) define a relative birth order as the ratio $\frac{p-1}{n-1}$ where p is the absolute birth order (or age rank) and n refers to the number of kids in the household. Hence, the oldest kid will always have the value zero and the youngest kid the value one. Tenikue and Verheyden (2008) interpret this ratio as the share of elder siblings a kid has. Khanam and Rahman (2005) and Dammert (2010) use dummy variables for each birth order (i.e. one dummy variable for the first-born, another for the second-born, and so on.).[15] Emerson and Souza (2008) use a dummy for the first-born and last-Born, whereas Edmonds (2006)

grade that corresponds to their age. Values less than 1 for this ratio means that there is some delay in the schooling attaintment.

[14] Ray (2000) reports that the association between peruvian household poverty status, based on a poverty line set at 50% of median household income, and child labour or child schooling is statistically insignificant. Rodriguez and Abler (1998) also find that household income does not have a significant impact on schooling and the effect over child labour is very small. Ersado (2005) finds that poverty is the principal cause of child labour in rural areas, but access to capital markets can prevent children from work.

[15] However, Dammert (2010) does not respot estimation results using this variable.

and Tenikue and Verheyden (2010) use only a dummy for the oldest kid. Emerson and Souza (2008) also use the variable age difference with respect to the first-born and the last-born as a measure of birth order.

Another crucial element in birth order estimations is the treatment of unobserved household fixed-effects, endogeneity due to fertility[16] or family size[17] and unobserved individual heterogeneity.[18] Dammert (2010) and Edmonds (2006) control for unobserved household fixed-effects including a dummy variable per each household in their OLS regression.[19] Tenikue and Verheyden (2010) use a fixed-effects model to deal with unobserved household heterogeneity common to all kids, whereas Ilahi (2001) uses a random-effects model. Using a censored ordered conditional logit model, Ejrnaes and Portner (2004) also control for household fixed-effects following Chamberlain (1980)'s approach. To control for family size and fertility, Emerson and Souza (2008) and Khanam and Rahman (2005) restrict their sample to only kids from households where mother are aged 40 or more. Additionally, Emerson and Souza (2008) restrict the sample to consider only households with three kids[20] and include the residuals of a fertility regression[21] as an explanatory variable. Ejrnaes and Portner (2004) assume that fertility is correlated to unobserved household fixed-effects and, therefore, it is enough to control for the latter. Dammert (2010) and Tenikue and Verheyden (2010) argue that a relative definition of birth order deals with any family size effect because it is uncorrelated with the number of kids, in contrast to the age rank that is sensitive to the number of siblings in the household.[22] However, this may not work for middle-borns in households with completed fertility cy-

[16] According to Patrinos and Psacharopoulos (1997); Ejrnaes and Portner (2004); Emerson and Souza (2008), results can be biased because the birth order allocated to one kid can be modified if kids are yet to be born (i.e. parents have not yet finished having children).

[17] Emerson and Souza (2007) state that larger families are more likely to run out of resources and therefore they are more likely to send kids to work instead of studying, but it can also be the case that families increase the number of kids they bear to use them as sources of income by sending them to work instead of studying. Ejrnaes and Portner (2004) shows that the larger the family the less resources invested in the last-borns. This may wrongly suggest that last-borns receive less education if there is no control for family size.

[18] As mentioned earlier, unobserved individual fixed-effects such as kid's ability, productivity, relialiability or responsability might drive the correlation between birth order and child work or school attendance.

[19] Despite the binary nature of the dependent variables, Dammert (2010) only estimates for a linear probability model are presented.

[20] In case past fertility is correlated with current family size.

[21] This can be obtained by regression number of kids in the household on parents' characteristics.

[22] Since higher age ranks only exist in larger households, most of the variation is explained by larger families (Edmonds, 2006; Dammert, 2010; Ejrnaes and Portner, 2004).

cles. Only first-borns and fast-borns are equally treated independent of the size of the household. On the other hand, this relative measure will be biased if fertility cycles are incomplete because the last-born might not be the last kid (Khanam and Rahman, 2005; Ejrnaes and Portner, 2004). Finally, none of the empirical papers has been able to control for unobserved individual fixed-effects due to data limitations.

3 Data and Sample

3.1 Data

We use the 2007 Peru National Child Labour Survey (NCLS). The NCLS was carried out during September and November 2007,[23] by the Peruvian National Statistics Institute (INEI, for the acronym in Spanish) in agreement with the Statistical Information and Monitoring Programme on Child Labour (SIMPOC), which is part of the ILO's International Programme on the Elimination of Child Labour (IPEC).

The NCLS is a cross-sectional and nationally representative[24] household survey that identifies three types of activities in which the 5 to 17 year-old population may be involved: school attendance, participation in productive work, and participation in domestic work (i.e. household chores). Productive work includes information about conditions under which kids work, working hours during the week of reference, reasons for working, and health and safety issues about working. Domestic work is related to household chores such as washing, cooking, caring, cleaning, fetching water and firewood, and the like. Information about the number of hours allocated to household chores is also available. Schooling refers to educational attaintment and attendance, reasons for students absentism, among others. The NCLS only reports information on hours spent in economic and domestic activities, but not on educational activities.[25] The period of reference for productive work is the week before the interview, whereas it is only the two days previous the survey for domestic work. For schooling it is implicit that the reference period is the 2007 school year.[26]

The NCLS includes three questionnaires: Housing and all household members characteristics, Children (aged 5-9 years) and Adolescents (aged 10-17 years). The first questionnaire was addressed to the "indirect respondent" (i.e. the most knowledgeable adult member of the household, usually the mother) and the remaining two questionnaires to the "direct respondent" (i.e. the child or adolescent). The questions about educational

[23] However, it became publicly available in the first semester of 2010. No more waves of the survey were carried out.

[24] It is representative in both urban and rural areas.

[25] For instance, it does not report information about the time spent in homeworks or assignments.

[26] Since the survey was conducted during September and November and the Peruvian school year goes from March to December, results may not present sample selection bias due to school holidays during the period of interview.

attaintment, economic activities and household chores are quite similar across the questionnaires. However, Rodriguez and Vargas (2009) report some differences between the answers given by the indirect and direct respondents. These differences are associated to the children's and adolescents' age and their working status. Rodriguez and Vargas (2009) suggest that these differences might be explained by differences in perception about economic activities between parents and kids, and by systematic underreports of kids' working status by their parents. Despite this findings, the present study use the information of the adult questionnaire. As Rodriguez and Vargas (2009) state, it is very likely that especially children between 5 and 9 years may not have a clear understanding of economic activities.

A total of 12,509 children and adolescents aged 5-17 years were reported by the indirect respondent as members of the household. However, the sample used for the empirical analysis includes only 5,281 kids. The reduction in the sample size, as we can observe in detail in Table 3.1, is due to the fact that this study is considering only kids aged 6-17 years who live in two-parent household and without the presence of twins, who have at least one sibling, who speak Spanish and his/her siblings as well, and whose parents are not adolescents. We also disregard the individuals with missing values in the relevant variables: school attendance and participation in productive and domestic work.

Following Emerson and Souza (2008), the main reason for excluding single-parent households, households with parents that are adolescents, households with twins among its members, households with only one kid, households where not all kids speak spanish is to avoid household unobserved heterogeneity which might bias our results.[27] Another reason for excluding households with single kids or without kids, and household with the presence of twins is because we are interested in the interaction and the birth order effect among siblings.[28] Likewise, the sample is restricted to kids between 6 and 17 years because it is the range of age in which schooling, economic activities and domestic work may be overlapped.[29] Despite of the sample restriction, the national proportions between

[27] According to Table 2.2, 19.8% of the sample lives in a single-parent household, 12.7% lives with at least one adolescent parent, 2.9% lives in households where twins are present, 11.2% is an only-child, 1.2% live in households where siblings do not share the same mother tongue, and 17.2% do not speak spanish.

[28] The birth order effect cannot be distinguished between twins because they share the same birth order.

[29] The educational system in Peru consists of three compulsory levels: pre-school with 3 grades, primary/elementary school with six grades and secondary school with five grades. In this study, pre-school (i.e. the educational level for kids aged 3-5 years) is not considered "schooling" because a kid that fails

rural and urban areas, and between males and females are preserved. According to Table 3.2, approximately 51% of the 5,281 kids are male and 70% live in urban areas.

3.2 Sample Characteristics

Table 3.3 reports the percentage distribution of kids that perform only one activity (i.e. school attendance or participation in productive work or domestic work), combine two or three of them, or do not perform any of them. The percentage of kids who allocate their time to exclusively one activity is very low.[30] In fact, more than 82% of this population combines two or three activities. The most frequent combination are school attendance and domestic work (44%) and paticipation in all the three activities (30%). Those who perform only one actitvity are mainly dedicated to attend school.

Table 3.3 shows also differences across residence area and gender. Both girls and boys living in rural areas are more prone to allocate their time to productive work. The percentage of kids who participate in productive work either exclusively or in combination with the other activities is always larger in rural areas. In urban areas it is more common to only attend school (17% vs. 6%) and combine school with household chores (52% vs 26%) without gender distinction, whereas in rural areas it is more frequent to take part in all the activities (51% vs 22%). With respect to gender, males and females are more productive and domestic oriented, respectively. Males are also somewhat more likely to allocate their time only to school than girls (15% vs. 13%).

Table 3.4 and Table 3.5 display school attendance rates and productive and domestic work participation rates for two different cohorts. According to Table 3.4 school attendance rates are always higher among 6- to 13-year-olds than among 14- to 17-year-olds. Likewise, the percentage of kids that perform productive work is always higher in the older cohort. These results hold across gender and area of residence and suggest the presence of a strong "age effect" for school attendance and productive work (i.e. kids go to school

this educational level is still allowed to go to elementary school. This is the main reason to select six-year-old kids or older as part of the sample. At the age of six elementary school is compulsory for kids according to Peruvian legislation. It is important to notice that kids cannot start elementary school if they have not pass through pre-school. However, in the practice professors never fails kids in pre-school. Professors can recommend the kid to do pre-school again, but if the kid's parents do not want to follow the recommendation, the kid can go to elementary school.

[30] This pattern is observed at the national level and across area of residence and gender.

and work basically because they are younger and older, respectively). On the other hand, Table 3.5 shows that patterns for domestic work differ across gender and residence area. While the older is more prone to do household chores among urban females, the younger rural males and females are more likely to do domestic work. Urban males help in the household irrespective of their age. Similar conclusions arise from Table 3.6 and Table 3.7 where the rates are calculated for each age.

Table 3.8 and Table 3.9 also present school attendance rates and productive and domestic work participation rates, but they are reported for each birth order.[31] Earlier borns are more likely to do household chores and later borns are more prone to attend school irrespective of their area of residence and gender,[32] yet the birth order difference in school attendance is stronger for rural males (first born: 94% vs. last borns: 84%) and the birth order difference in domestic work rate is more intense for urban males (first born: 78% vs. last borns: 67%). Female second oldest siblings are more likely to participate in productive work in both urban and rural areas, albeit differences between the second oldest and the other siblings are sharper for girls in rural areas (66% vs. 57%) . In the case of males, the earlier borns do productive work with more frequency without distinction between urban and rural areas. However, this pattern is especially strong among rural males for whom the proportion of first borns performing productive work is almost 10 percentage points larger than the proportion of the last borns (77% vs. 67%). This patterns can also be observed in Table 3.10 and Table 3.11 where the last birth order category in Table 3.8 and Table 3.9 is decomposed in two groups.[33]

To summarize, more than 82% of kids aged 6 to 17 years do more than one activity. The most frequent combinations are schooling and housework, and participation in all the three activities (i.e. school, housework and productive work). Kids living in rural and urban areas are more productive- and school- (or school with housework) oriented, respectively. Girls are more likely to be engaged in domestic work, whereas boys are more

[31] In the column birth order, the value 1 indicates the oldest sibling (1,893 observations), 2 the second oldest (1,851 observations) and 3+ the third (957 observations), fourth (407 observations), fifth (121 observations), sixth (42 observations), seventh (7 observations) and eighth (3 observations) oldest sibling. In the restricted sample the variable birth order only takes eight values. However, in the unrestricted sample is possible to find households with a number of siblings up to ten.

[32] Note that for females living eirther in urban or rural areas, school attendance rates are quite similar between the first and second borns. This rate increases as of the third born.

[33] Conclusions from the last category in Tables 3.10 and 3.11 must be taken only as a reference due to the lack of observations.

prone to perform productive work. There is a strong “age-effect” in school attendance and participation in productive work. The second-born girls and first-born boys are more likely to be engaged in productive work specially in rural areas. Finally, birth order might play a role in the probability of performing household chores for urban males and in the likelihood of attending school for rural males.

4 Econometric Model

In this Section we describe a bivariate discrete response model to investigate the potential birth order effect on child work and school attendance.

Decisions about kid's school attendance and participation in domestic and productive work are typically made by parents, not by the kid (Ray, 2000; Ersado, 2005). All these activities involve the use of a single input such as time and can be seen as competing for the kid's time. Hence, we assume that this parental time allocation decisions are closely related and interdependent (see Garcia, 2006; Ersado, 2005, Appendix A., where the authors provides a conceptual framework for this interdependency.). Furthermore, allowing for correlation between parental decisions is appropiate if unobserved household and individual factors increase the probability of sending kids to school and decrease kids' likelihood to work, or viceversa. For instance, as stated in Section 2, the correlation can be negative if kids' with high productivity (and therefore more likely to earn higher wages) are more prone to be sent to work than to school. The Bivariate Probit Model (henceforth BPM) is an econometric framework that explicitly accounts for this interdependency. Additionally, this model enables us to test the suitability of this interdependency assumption.

4.1 Model specification

The following BPM especification will be used:[34]

$$y_{1i}^* = x_{1i}'\beta_1 + \varepsilon_{1i}, \qquad y_{1i} = 1[y_{1i}^* > 0] \qquad (1)$$

$$y_{2i}^* = x_{2i}'\beta_2 + \varepsilon_{2i}, \qquad y_{2i} = 1[y_{2i}^* > 0] \qquad (2)$$

$$\varepsilon_{ji}|x_{1i}, x_{2i} \sim N(0,1), \qquad \text{where } j = 1,2$$

$$Corr(\varepsilon_{1i}, \varepsilon_{2i}|x_{1i}, x_{2i}) = \rho$$

$$\text{or } \varepsilon_{1i}, \varepsilon_{2i}|x_{1i}, x_{2i} \sim BVN(0, \Sigma) \text{ where } \Sigma = \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix}$$

where BVN stands for Bivariate Normal distribution, y_{1i}^* and y_{2i}^* are the latent variables; $x_{1i}'$and x_{2i}' are sets of explanatory variables controlling for observed children's, parents' and households' heterogeneity including the birth order variable; and β_1 and β_2 are vectors of unknown parameters to be estimated in addition to ρ. The interdependency

[34] Household subscript is omitted.

of the latent variables is captured by the correlation between the error terms ε_{1i} and ε_{2i}. The indicator function $1[.]$ is equal to one if the statement in brackets is true, and zero otherwise. Finally, this BPM can be separated into two independent Probit models for y_{1i} and y_{2i} if $\rho = 0$.

In this paper we will focus on three parental decision processes: (i) whether or not to send the kid to school, to participate in productive work, or to perform domestic work. Therefore, we will estimate two BPM. In all of them y^*_{1i} represents the decision to send kid i to school, whereas y^*_{2i} changes across models. In the first model, it stands for the decision to engage kid i in productive work. In the second model, it represents the decision to engage kid i in domestic work. The observed outcome variables derived from these latent variables are: school ($y_{1i} = 1$ if kid i attends school, and 0 otherwise), productive work ($y_{2i} = 1$ if kid i participates only in productive work, and 0 otherwise) and domestic work ($y_{2i} = 1$ if kid i participates only in domestic work, and 0 otherwise).

For our purposes we can rewrite equation (1) and (2) as

$$y^*_{1i} = z'_{1i}\psi_1 + FB_{1i}\delta_1 + SB_{1i}\gamma_1 + TB_{1i}\kappa_1 + \varepsilon_{1i}, \quad y_{1i} = 1[y^*_{1i} > 0] \text{ and } \varepsilon_{1i} = \eta_h + \eta_i + \nu_{1i} \quad (3)$$

$$y^*_{2i} = z'_{2i}\psi_2 + FB_{2i}\delta_2 + SB_{2i}\gamma_2 + TB_{2i}\kappa_2 + \varepsilon_{2i}, \quad y_{2i} = 1[y^*_{2i} > 0] \text{ and } \varepsilon_{2i} = \eta_h + \eta_i + \nu_{2i} \quad (4)$$

where $x'_{ji} = (z'_{ji}, FB_{ji}, SB_{ji}, TB_{ji})$ and $\beta_j = (\psi_j, \delta_j, \gamma_j, \kappa_j)$ with $j = 1, 2$. FB is a dummy variable that identifies the first-born, SB corresponds to the second-born, and TB for the third-born.[35] We use the group compounded by the later borns (i.e. the $4^{th}, 5^{th}, 6^{th}$, 7^{th} and 8^{th} born)[36] as the reference category. Using h as a household subscript, the error term ε_{ji} could be rewritten as made up of a household component (η_h), a kid component (η_i) and a random term component (ν_{jih}). Thus, the error terms in each equation consist of a part (ν_{jih}) that is unique to that equation, and a second part (η_h and η_i) that is common to both equations. For instance, the household component might be cultural preferences for the first-born, which might jointly affect the probability that kid i (in this case the first-born) works and studies. Hence, the BPM explicitly accounts for this correlation between error terms.

Although this specification allows us to account for the correlation between parental decisions to send kids to work or to study, we will not be able to control for unobserved individual heterogenity as most of the empirical papers revised in Chapter 2. To reduce

[35] Birth order indentification takes into account all siblings in the family and not only siblings aged 6-17 years. This criterion is also applied when counting the number of sibling a kid has.

[36] Remember from Chapter 3 that households in the restricted sample have at most eight siblings.

potential bias due to unobserved household heterogeneity we exclude from the analysis single-parent households, households with parents that are adolescents, households with twins among its members, households with only one kid and households where not all kids speak spanish, for the reasons indicated in Chapter 3. Despite this effort, there still might be some unobserved household heterogeneity that we are not controlling for.

We use dummy variables for each birth order because this birth order measure is less sensitive to family size and incomplete parental fertility cycles,[37] in contrast to the absolute and relative birth order.[38] In addition, this measure of birth order enables us to check whether nonlinearities are important in the relationhip among siblings.[39] Therefore, we are specially interested in the sign and statistic significance of the parameters associated to the birth order variables: δ_j, γ_j and κ_j .

We consider the same set of explanatory variables in both equation. Thus, $x'_{1i} = x'_{2i}$. Apart from birth order dummy variables, we are including as regressors the following covariates:[40]

- Dummy variables for the cohort 11-13 years and the cohort 14-17 years, to distinguish birth order effects from cohort or age effects (i.e. kids might go to school and work basically because they are younger and older, respectively; and not because they are the first-born, second-born, etc.). We use as the reference category the cohort 6-10 years. Unfortunately, the inclusion of dummy variables for different cohorts will not allow us to control for improvement in the schooling system beacause we are working with a cross-section data. It may be the case that later-borns are more likely to attend school because the access and quality of schooling has enhanced.

- Enrollment in social program, to control for changes in probabilities to attend school or work due to incentives provided by government programs such as cash transfer

[37]To control for fertility issues, we will estimate again the model only for kids from households where mothers are aged 35 or more, under the assumption that women aged 35 or more have completed their fertility cycle. See the corresponding section to sensitivity analysis.

[38]Using the age difference with respect to the last-born as a measure of birth order may also bias the results. If parental fertility cycles are incomplete, then the last-born might not be the las kid in the family.

[39]Unlike age-rank, this measure does not impose to each change in a kid's absolute birth order to have the same impact on the outcome variables.

[40]See the sensitivity analysis section for additional variables such as household income.

programs. Parents might be more likely to send later-borns to school if they receive a cash transfer in exchange or if the kid can have breakfast and lunch at the school.

- Number of siblings, to control for family size. In a separate regression we also include the number of younger brothers and the number of younger sisters to control for household composition.
- Parents' schooling, to control for parental preferences for schooling. More educated parents might value more education and therefore more likely to send their kids to school instead of working. This variable could also indirectly capture income effects since parents with higher education are more likely to have better jobs and wages.
- Parents' age, to indirectly control for household resources. The older the parents up to some point, the more experience and the higher their income. However, older parents that are less attractive to the labor market may rely on the earlier borns to complement the household income.
- Biological parents living in the household, to control for parental preferences for certain kids. Children living with non-biological parents might be exposed to less opportunities to attend school.
- Region, to control for differences between coast areas and the other two regions: the highlands and the rainforest or jungle.

To examine whether birth order effects are more pronounced with birth spacing we interact in our model the birth order dummy variables with the average age gap between kid i and her inmediate younger sibling. There might be differences among siblings slightly or widely separated. Similarly, to explore whether birth order effects are sharper due to the presence of younger brother and younger sisters, we include interactions of these variables in the estimation.

The estimation will distinguish by gender and area of residence. As discussed in Chapter 3, outcomes in schooling and child work are different for girls and boys living in rural and urban areas. For instance, girls and boys are more domestic and productive oriented, respectively. Similarly, kids in rural areas are more prone to engage in productive work, whereas urban areas are predominantly school-oriented. This may suggest that time allocation for males and females can come from different decision-making processes.

Therefore, it is important to separately analyze sons and daughters in urban and rural areas.

4.2 Maximun Likelihood Estimation (MLE)

The BPM is estimated using MLE. Let us assume that we are interested in the joint probability of y_{1i} and y_{2i} defined by $Pr(y_{1i} = 1, y_{2i} = 1|x_{1i}, x_{2i})$. If y_{1i} and y_{2i} were independent, their joint probability would be the product of their marginal probabilities.[41] In our case, it means that

$$Pr(y_{1i} = 1, y_{2i} = 1|x_{1i}, x_{2i}) = Pr(y_{1i} = 1|x_{1i}) \times Pr(y_{2i} = 1|x_{2i})$$

However, as we are assuming that $Corr(\varepsilon_{1i}, \varepsilon_{2i}|x_{1i}, x_{2i}) \neq 0$, then y_{1i} and $y_{2i}$are not independent. Therefore, we need a bivariate joint distribution. We use a standarized bivariate normal distribution since we assume that $\varepsilon_{ji}|x_{1i}, x_{2i} \sim N(0, 1)$. The density of a bivariate normal distribution is

$$\phi_{II}(z, s, \rho) = \frac{1}{2\pi\sigma_z\sigma_s\sqrt{1-\rho^2}} exp\left[-\frac{1}{2}\left(\frac{\epsilon_z^2+\epsilon_s^2-2\rho\epsilon_z\epsilon_s}{1-\rho^2}\right)\right]$$

$$\text{where } \epsilon_z = \frac{z-\mu_z}{\sigma_z} \text{ and } \epsilon_s = \frac{s-\mu_s}{\sigma_s}$$

In our case, the density of a standarized bivariate normal distribution is given by

$$\phi_{II}(\varepsilon_{1i}, \varepsilon_{2i}, \rho) = \frac{1}{2\pi\sqrt{1-\rho^2}} exp\left[-\frac{1}{2}\left(\frac{\varepsilon_{1i}^2+\varepsilon_{2i}^2-2\rho\varepsilon_{1i}\varepsilon_{2i}}{1-\rho^2}\right)\right]$$

Thus,

$$Pr(y_{1i} = 1, y_{2i} = 1|x_{1i}, x_{2i}) = \int_{-\infty}^{x'_{1i}\beta_1} \int_{-\infty}^{x'_{2i}\beta_2} \phi_{II}(q_1, q_2, \rho) dq_1 dq_2 = \Phi_{II}\left(x'_{1i}\beta_1, x'_{2i}\beta_2, \rho\right)$$

[41] Using the probability property $Pr(A \text{ and } B) = Pr(A|B) \times Pr(B)$ or $Pr(A) \times Pr(B|A)$

where Φ_{II} is the bivariate cumulative density function of the standarized bivariate normal distribution.

Following Cameron and Trivedi (2005) we can derive a general expression to include the other possible outcomes namely, $Pr(y_{1i} = 1, y_{2i} = 0)$, $Pr(y_{1i} = 0, y_{2i} = 1)$ and $Pr(y_{1i} = 0, y_{2i} = 0)$. This generalization is defined by

$$Pr(y_{1i} = j, y_{2i} = k|x_{1i}, x_{2i}) = \Phi_{II}\left(z_1 x'_{1i}\beta_1, z_2 x'_{2i}\beta_2, \rho\right)$$

where $z_l = 1$if $y_{li} = 1$ and $z_l = -1$if $y_{li} = 0$ for $j = 0, 1$; $k = 0, 1$ and $l = 1, 2$.

And the log-likelihood function is given by

$$L = \sum_{y_{1i}=1, y_{2i}=1} logPr_{11} + \sum_{y_{1i}=1, y_{2i}=0} logPr_{10} + \sum_{y_{1i}=0, y_{2i}=1} logPr_{01} + \sum_{y_{1i}=0, y_{2i}=0} logPr_{00}$$

Finally, the maximum likelihood estimates are calculated by setting the derivatives of the log-likelihood function with respect to the parameters (β_1, β_2 and ρ) to zero. The BHHH algorithm is used to maximize the log-likelihood function.

4.3 Marginal Effects

As in the univariate binary discrete model, the vector of estimate parameters $\widehat{\beta}_1$ and $\widehat{\beta}_2$ cannot be interpreted as partial or marginal effects. Since the estimates and the marginal effect have the same sign, $\widehat{\beta}_1$ and $\widehat{\beta}_2$ only provide the direction of the impacts, but not their magnitude.

Following the example in Section 4.2, the marginal effect of a certain explanatory variable $\tilde{x}$ on $Pr(y_{1i} = 1, y_{2i} = 1|x_{1i}, x_{2i})$ can be computed by

$$\frac{\partial \Phi_{II}\left(x'_{1i}\beta_1, x'_{2i}\beta_2, \rho\right)}{\partial \tilde{x}}$$

and the marginal effect of a dummy regressor is calculated by taking the difference between $\Phi_{II}\left(x'_{1i}\beta_1, x'_{2i}\beta_2, \rho\right)$ evaluated at the value one of the dummy variable and $\Phi_{II}\left(x'_{1i}\beta_1, x'_{2i}\beta_2, \rho\right)$ evaluated at the value zero of the dummy variable. Therefore, for independent dummy variables the marginal effect is the change in the joint probability of interest following a change in the dummy variable from 0 to 1.

For continuous independent variables the marginal effect is the change in the joint probability of interest following a one-unit increase at the mean[42] value of the continuous covariates. For more details about derivation of marginal effects for bivariate probit model see Greene (1996).

4.4 Testing for $H_0 : \rho = 0$

The value of ρ determines whether or not the assumption of correlation between the two modelled outcome variables is reasonable. Therefore, it would also confirm the suitability of using a bivariate probit model instead of two independent probit models as done many times in the literature (Amin et al., 2006; Ilahi, 2001; Jensen and Nielsen, 1997). Hence, it is important to have a convenient test statistic for assessing the presence of correlation among the error terms and consequently between the probabilities of the dependent variables. According to Greene (2008), there are three test statistics for this purpose: the lagrange multiplier statistic, the likelihood ratio test and the Wald test. We will only use the last one (i.e. Wald test) for their simplicity in calculation and interpretation.

The Wald test requires only the estimation fo the unrestricted model (i.e. the bivariate probit) and it is defined by

$$W = [\hat{\rho}/\widehat{Var(\hat{\rho})}] \overset{a}{\sim} \chi_1^2$$

where $\widehat{Var(\hat{\rho})}$ is the estimator of the asymptotic variance of ρ.

[42]Marginal effects can also be computed at other interesting values of the continuous covariates. However, in this study they will be computed at the mean values.

5 Estimation Results

In this section we present the estimation results of the bivariate probit model. As mentioned in Chapter 4, the estimation distinguish by gender and area of residence because descriptive statistics presented in Chapter 3 suggest that time allocation for girls and boys living in rural and urban areas might come from different decision-making processes. Additionally, standard errors are allowed to be correlated within families, but not across families[43] and the reference categories are the group compounded by the $4^{th}, 5^{th}, 6^{th}$ and 7^{th}born, the cohort of kids aged 6 to 10 years, and living in the highlands or rainforest region.

Tables 5.1, 5.3 and 5.5 display the estimation results for kids living in urban areas and Tables 5.2, 5.4 and 5.6 for children living in rural areas. Tables 5.1 and 5.2 present results of the benchmark model in which only birth order dummy variable are considered. This model specification enables us to assess the presence of birth order effects among Peruvian families. Besides, Tables 5.3 and 5.4 show results of the model in which interactions between birth order dummy variables and the average birth spacing are included to examine whether birth order effects are more pronounced with birth spacing. To explore whether birth order effects are sharpen due to the presence of younger brothers or younger sisters, we interact those variables and report the results in Tables 5.5 and 5.6. In tables with interaction terms, we only focus our attention on parameters associated to the interactions and to the corresponding birth order dummy variables that are jointly significant as suggested by Wooldridge (2009). Colums (1) to (4) and columns (5) to (8) refer to males and females, respectively.

Tables 5.1 and Table 5.2 show that earlier-born boys, specially the first- and second-born, are less likely to attend school and more likely to do productive work. Moreover, those tables report that first- and second-born urban boys are more likely to participate in housework, whereas only first-born rural boys are more likely to do so. Hence, in general, birth order effects on boys living in urban and rural areas are very similar. On the other hand, Table 5.1 shows that it is not possible to find significant birth order effects on school attendance and productive work for urban girls.[44] Only first-born urban girls

[43]Observations are independent across clusters (i.e. families) but not necessarily within families (StataCorp, 2009). Standard error are reported in parenthesis in all the tables.

[44]This result is consistent with the findings in Edmonds (2006).

are more likely to do household chores. These findings are in constrast to the evidence provided in Table 5.2 which shows a significant birth order effect on schooling and any significant birth order effect on housework for rural girls. In addition, Table 5.2 report that only the second-born girls are more likely to do productive work. These differences between daughters living in rural and urban areas suggest that parental time allocation in each area of residence might come from different decision-making processes. Finally, both Table 5.1 and 5.2 report birth order effects independent of any age effect which is very strong and significative. Results controlling for age cohorts show that older boys and girls are more likely to work and less likely to go to school.[45] The rest of covariates included in the model have the expected sign. For instance, parent's schooling increases the probability that kids attend school.

Our findings that earlier-born kids are less likely to attend school and more likely to work support the theoretical prediction of Chesnokova and Vaithianathan (2008) and Tenikue and Verheyden (2010). Moreover, they are in line with empirical results in Emerson and Souza (2008); Dammert (2010); Ilahi (2001); Ejrnaes and Portner (2004); Tenikue and Verheyden (2010); Khanam and Rahman (2005) for different developing countries. Nonetheless, some of our results are not in line with the evidence reported for Peru by Ilahi (2001). For instance, Ilahi (2001) find a significant birth order effect on school attendance for urban girls and on domestic work for rural girls, while we do not.

Table 5.3 and Table 5.4 report that the average birth spacing significantly increases the probability of attending school for urban sons and for rural daughters[46] if the average age gap is larger than approximately eight and six years, respectively. This result is in line with the literature about parental time and resource constraints (Ejrnaes and Portner, 2004; Emerson and Souza, 2008). Since kids are widely separated on average, the first- and third-born may be favored with more parental time and resources because those factors do not have to be shared among many siblings simultaneously.[47] Besides, Table 5.3 reports that average birth spacing always increases the likelihood of working for the first-born urban boys, whilst this probability only increases for the second-born if the

[45]Only urban girls in the 11-13 years cohort are more likely to go to school than the youngest cohort in Table 5.1, and rural males in the 14-17 years cohort are less likely to do household chores in Table 5.4.

[46]Only for the first- and third-born urban sons and rural daughters.

[47]First-borns do not have to share those factors because there is no younger siblings in the family and third-borns neither because older siblings might have finish school or might be in their last years of school.

average age gap is approximately larger than two years. On the other hand, the average birth spacing seems to play no role in the likelihood of performing productive work and school attendance for urban girls in contrast to rural girls. According to Table 5.3, only the probability of being engaged in housework increases for first-born urban girls if the average age gap is larger than five years and for second-born urban daughters if siblings are spaced, on average, at least by four years apart.

In contrast to urban males, Table 5.4 reports that average birth spacing significantly decreases the likelihood of attending school for the first-, second- and third-born rural boy if the kids ares separated, on average, by more than two years. This result is also in concordance with predictions of Chesnokova and Vaithianathan (2008)'s and Tenikue and Verheyden (2010)'s model. Since rural household are more likely to be financially constraint and to have remote access to credit markets, the more separared siblings are on average, the more likely the earlier born siblings to drop out of school in order to work and contribute to household income. Furthermore, Table 5.4 shows that average birth spacing increases the probability of performing household chores for rural males if the average birth spacing is approximately less than eight years. Similar to urban males, the probability of participating in productive work always increases with the average birth spacing for rural boys.

Table 5.5 suggests that the number of younger brothers or sisters has no influence on the probability of working for urban males and females. In fact, it shows that the number of younger sisters only reduces the likelihood of attending school for the second- and third-born urban boys. In contrast to urban males, Table 5.6 shows that the number of younger siblings does not have an impact on the probability of attending school for sons living in rural areas. However, it has a significant impact on the probability of working. For instance, the number of younger brothers always increases the probability of performing productive and domestic work for the first-born and the likelihood of performing only productive work for the second- and third-born rural boy. Furthermore, the likelihood of being engaged in productive work decreases for the second- and third-born rural boy if they have two or more younger sisters. On the other hand, Table 5.6 reports that the number of younger sisters specially increases the probability of performing productive work for second-born rural girls.

Tables 5.1, 5.3 and 5.5 display that the joint estimation of school attendance and domestic work or school attendance and productive work using a bivariate probit model is appropriate in urban areas. The Wald tests provide us with enough evidence to reject the null hypothesis that $\rho = 0$ for both urban males and females.[48] In fact, ρ is significantly negative when modelling school and productive work and significantly positive when estimating school and domestic work. This suggests, on the one hand, that unobserved factors reduce kid i's likelihood of attending school, but they increase kid i's probability of performing productive work, or viceversa. Hence, there is a trade-off between schooling and productive work or they can be seen as competing activities specially for boys.[49] On the other hand, it implies that schooling and domestic work are complementary and there is no trade-off between them specially for girls.[50] In rural areas, the bivariate probit model is only suitable for modelling males' schooling and productive work. Tables 5.2, 5.4 and 5.6 show that ρ is also significantly negative when jointly estimating school and productive work.[51] These results are consistent with the findings of Alcazar et al. (2002) who use data collected by the Inter-American Development Bank and report a trade-off between school and productive work for urban and rural areas in Peru. Similarly, Ersado (2005) uses the 1994 Peru Living Standards Measurement Survey and finds a trade-off between productive work and schooling in urban areas, but not in rural areas where ρ was statistically insignificant.[52]

In summary, the evidence suggests that urban and rural Peruvian families distinguish between earlier-born, middle-born and later-born kids. In fact, Peruvian families usually send their later-born kids to school irrespective of the kid's gender and area of residence. Only urban females do not show a significant birth order effect on school attendance. On the other hand, Peruvian families tend to send earlier-born children to perform either productive or domestic work. However, parental allocation of kid's time to work is different for girls and boys living in urban or rural areas. For instance, the first-born urban girls are more likely to be engaged in domestic work and this probability increases if the average birth spacing is approximately less than five years. Hence, the more separated are sibling in their birth order, the more pressure on first-born girls to cook, clean, do the shopping for the household, care younger siblings and the like. Likewise, the second-born rural

[48] See tables 5.1, 5.2 and 5.3.

[49] The size of the ρ coefficient is bigger for boys.

[50] The size of the ρ coefficient is bigger for girls.

[51] There is no enough evidence to reject the null hypothesis that $\rho = 0$ in the other cases.

[52] Rodriguez and Vargas, 2009 use the 2007 Peru National Child Labour Survey and also find a negative correlation between school and productive work. However, they do not distinguish between urban an rural ares.

females are more likely to participate in productive work and the number of younger sisters increases even more this likelihood. Also first-born rural males are more likely to perform housework and this likelihood increases with the number of younger brothers. This finding suggests that the absence of sisters in the family force the first-born boy to be in charge of household chores. Finally, results also indicate that the econometric approach applied in this paper is suitable for modelling child work and school attendance for boys and girls in urban areas. However, in rural areas, it seems to be appropiate only for modelling child participation in productive work and schooling. Wald tests suggest that parental decision about sending kids to school or to participate in household chores are independent processes. Therefore, they can be modelled with univariate probit models.

5.1 Marginal Effects

Marginal effects provide the relative importance of birth order effects on the joint probability of combining school with domestic or productive work, of attending school without domestic or productive work, and of being engage in productive or domestic work without school attendance. Tables 5.7 - 5.13 report marginal effects for boys and girls living in urban and rural areas.[53]

As discussed above, earlier-born boys are more likely to work and less likely to attend school in urban and rural areas. However, there are significative differences between birth orders. Table 5.7 shows that first-born urban boys are slightly more likely than second-borns to combine school and productive work [10.6 vs 10.2 percentage points] and to perform productive work without attending school [2.6 vs. 1.9 percentage points]. On the other hand, first-born urban boys are less likely to exclusively attend school without productive work than second-borns [15.4 vs. 13.5 percentage points]. Table 5.8 reports that first-born urban males are eigth and five percentage points less likely to attend school without participating in domestic work than third- and second-borns, respectively. Table 5.9 shows that first-born rural males are four percentage points less likely to attend school without performing productive work than the second- and third-borns and three percentage points more likely to perform exclusively productive work without attending school. Table 5.10 display marginal effects that suggest similar patterns between urban and rural boys. Thus, Tables 5.7 - 5.10 provide evidence of nonlinearities in birth order

[53] As mentioned in chapter 4, marginal effects for continuous independent variables are computed at their mean values.

effects for urban an rural boys.

We also found that first-born urban females are more likely to be engaged in housework. In fact, being the first-born among urban girls increases the likelihood of combining school and domestic work in approximately nine percentage points and decreases the probability of exclusively attending school in more than eleven percentage points (see Table 5.12). According to our estimations, second-born rural girls are more likely to perform productive work. Indeed, the probability of participating exclusively in productive work increases in more than six percentage points if the rural girl is the second-born. Moreover, being the second-born daughter decreases the likelihood of attending school without performing productive work in seventeen percentage points in rural areas (see Table 5.13).

Table 5.11 and Table 5.14 display statistically insignificant marginal effects for the birth order dummy variables when modelling school and productive work for urban girls and school and domestic work for rural daughters. This is in line with our findings above. We are not able to find birth order effects on schooling and productive work for urban girls nor birth order effects on domestic work for rural daughters.

Finally, reported bivariate predicted probabilities in Tables 5.7 - 5.13 confirm the information provided by descriptive statistics in chapter 3. In urban areas, the bivariate predicted probability of combining school and productive work is lower than the probability of exlusively attending school [0.704 vs. 0.28 for urban sons and 0.746 vs. 0.233 for urban daughters]. Conversely, in rural areas predicted probabilty of performing productive work while studying [0.7 for boys and 0.585 for girls] is higher than the probability of attending school without productive work [0.246 for males and 0.382 for females]. Hence, urban and rural kids are more school- and productive-oriented, respectively. Tables 5.7 - 5.13 also show that the bivariate predicted probability of combining domestic work with school is always higher than the probability of attending only school across areas and gender. Therefore, predicted probabilities suggest that there is no conflict between performing household chores and attending school in urban and rural areas, on the one hand, and that there is a trade-off between school and productive work for urban and rural areas, on the other hand. These results are consistent with our findings related to the coefficient ρ which shows that school and productive work can be seen as competing activities for kid's time in urban areas and only for boys in rural areas, and that school and housework are complementary activities.

5.2 Sensitivity Analysis

To study the robustness of our parameters estimates in Table 5.1 and Table 5.2 we perform three sensitivity analysis. As discussed in chapter 2, results can be biased because parents might have not finished having children and, therefore, the birth order allocated to one kid can be modified if kids are yet to be born. Under the assumption that women aged 35 or more are less likely to have more kids or have completed their fertility cycle, we estimate the original model, but only for kids that have mothers aged 35 or more. Results are displayed in Table 5.15 and Table 5.16. As we can observe, most of the identified birth order effects are robust to this sample restriction. However, results for the second- and third-born rural male lose their significance. Furthermore, being the first-born male in rural areas has not got anymore statistical significance on the probability of performing household chores, whilst being the first-born girl in rural areas has now a slightly significant effect on the probability of participating in domestic work.

The second sensitivity analysis aims to control for income effects. According to the literature, "parents only send their children to work if the additional labour is needed to supplement household income because consumption needs cannot be met from other resources" [54](Huebler, 2008, pp. 17). This is also in line with all the literature related to financial constrained households and lack of access to credit markets discussed in chapter 2. Table 5.17 and Table 5.18 report estimation results with the inclusion of income in logarithm.[55] In general, results from the benchmark model in Table 5.1 and Table 5.2 do not change by adding income as a regressor. Only the coefficient of schooling associated to the third-born boys lose their significance when modelling school attendance and domestic work in urban areas. Besides, the coefficient associated to income has the expected sign for urban and rural males and it only has a significant effect on the likelihood of being engaged in productive work. The higher the household income, the less likely the urban or rural male to perform productive work. This result is in line with findings in (Ray, 2000) and (Rodriguez and Abler, 1998) who do not report a significant impact of household income on schooling as well. Nevertheless, this result also contrast to the evidence provided by (Ray, 2000) and (Rodriguez and Abler, 1998) who suggest the

[54] This is the so-called poverty hypothesis.

[55] Income referst to monthly income compounded of all types of income from all household members. Note that this variable is endogenous to the kid's working status since it is compounded by the kid's income as well. Regressions with income by quintiles were also performed and results were very similar.

absence of a significant relationship between household income and child work. On the other hand, the negative and significant household income effect on rural girls' probability of schooling is unexpected, albeit Levison and Moe (1998) find the same result for Peruvian rural girls using 1985-1986 Peru Livings Standard Survery (PLSS). This result suggest that the richer the household, the less likely the rural girls to attend school, which seems counterintuitive. However, it might be the case that rural girls replace their working mothers in housework. Therefore, household income is higher because both parents work and girls are less likely to attend school because household chores deter schooling.

Finally, a trivariate probit model is presented for urban females.[56] Table 5.19 shows that original coefficient estimates are robust. The correlation between error terms when modelling school and domestic work or productive and domestic work are postive and significant. This result is consistent with the one presented in the benchmark model in Table 5.1. However, the correlation between the error terms is negative when modelling school and productive work, but it is not significant. This result differs from our benchmark model. Nevertheless, all the correlations are jointly statistically significant.

[56]The model could not be estimated for other groups because of lack of convergence.

6 Conclusions

This paper studies the potential birth order effect on child work and school attendance using data from Peru. We find significant birth order effects among Peruvian families. Parents usually send their later-born kids to school and their earlier-born children to perform either productive or domestic work. We also find differences between sons and daughters and differences across area of residence only for females. This suggest that parental time allocation of girls and boys (and urban and rural females) might come from different decision-making processes. We also examine nonlinearities on birth order effects measuring the birth position of each kid with a dummy variable. We find that birth order effects turn out to be nonlinear for urban and rural boys. In addition, we find that birth order effects are sharpen by the number of younger sisters and younger brothers, on the one hand, and by the average birth spacing, on the other hand.

These findings suggest that Peru's conditional cash transfer program, JUNTOS, could include in its design the kids' birth order criterion. Since parents tend to send later-born kids to school and earlier-born children to perform either productive or domestic work, JUNTOS could specially condition the monthly cash transfer to school attendance of earlier-borns to achieve the goal of decreasing drop-out rates and child work. Likewise, our findings on nonlinearities support the idea that households should receive a higher cash transfer for sending the first-born to school, and less for the second-born and so on. Our findings also suggest that cash grants should not be homogeneous across households. Since the average birth spacing increases the probability of performing productive work for urban and rural first-born boys and decreases the probability of schooling for first-born rural boys, urban and rural households in which the first-born is a boy and siblings are widely separated (on average) should receive a higher monthly payment. Likewise, rural households with a son as the first-born and several younger brothers should receive a higher cash transfer because the number of younger brothers increases the probability of being engaged in productive work for rural first-born boys. Similarly, rural households with a daughter as the second-born and many younger sisters should receive a higher cash grant because the number of younger sisters increases the probability of being engaged in productive work for rural second-born girls.

On the other hand, our findings suggest that there is no trade-off between domestic work and schooling, but there is a trade-off between working and schooling except for rural girls. Results also indicate that the econometric approach applied in this paper is suitable for modelling child work and school attendance for boys and girls in urban areas. However, in rural areas, it seems to be appropiate only for modelling child participation in productive work and schooling.

This paper does not deal with individual unobserved fixed-effects and does not explicitly control for household unobserved fixed-effects. However, we make the attempt to control for unobserved household heterogeneity by excluding from our sample kids living in single-parent households, households with parents that are adolescents, households with twins among its members, households with only one kid, households where all kids speak spanish.

Further research should be oriented in five directions. First, methodologies to deal with individual and household unobserved fixed-effects in bivariate probit framework should be developed or longitudinal surveys specialized in child labor must be carried out. Second, refinements on the birth spacing measurement should be made to identify potential differences between siblings evenly separated and those slightly or widely separated or to distinguish, for instance, between households where the first two kids out of three siblings are slightly separated and the third one is widely separated from the others, or viceversa.

Third, interactions between birth order variables and household income must be analyzed to assess the theoretical prediction that financial constraint household are more likely to send kids to work and richer household are more likely to send kids to school. Fourth, experiments can be carried out to investigate whether changing school afternoon sessions for morning sessions increases the probability of attending school and decreases the likelihood of performing productive work for earlier-borns. Finally, the official poverty line should be included in the Peru National Child Labour Survey to restrict the analysis only to poor household since JUNTOS is particularly oriented to the poorest districts in Peru.

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A Appendix

A1. Tables: Chapter 2

Table 2.1

Birth Order Empirical Studies: Dependent Variables (Y)

Studies	Variables
Dammert (2010)	Dummy variables: work= 1 if the kid do productive work. domestic=1 if the kid do household chores at least 7 hours a week. school=1 if the kid attends school. Hours spent on productive and domestic work are also used.
Ejrnaes and Portner (2004)	Educational attainment measured in years. Time spent on school activities.
Edmonds (2006)	Total number of hours worked (domestic and productive work) in the las 7 days.
Khanam and Rahman (2005)	Four mutually exclusive categories: only school, only work (non-wage work and housework), work and school, and neither school nor work.
Tenikue and Verheyden (2010)	The dependent variable is the number of completed years of education.
Emerson and Souza (2008)	Dummy variables: work=1 if the kid is engaged in productive work. school=1 if the kid attends school.
Ilahi (2001)	Dummy variables: work= 1 if the kid do productive work. school=1 if the kid attends school. Hours spent on domestic work. Grade-for-age variable.

A.2 Tables: Chapter 3

Table 3.1

Peru 2007, National Child Labour Survey: Sample Structure for kids between 6-17 years

Sample*	National	Areas		Gender	
		Urban	Rural	Male	Female
Total Sample[1]	10,867	6,887	3,980	5,608	5,259
Sample living in two-parent household[2]	8,710	5,270	3,440	4,461	4,249
Sample living in single-head household	*2,157*	*1,617*	*540*	*1,147*	*1,010*
Sample living in adult-parent household[3]	9,492	6,097	3,395	4,887	4,605
Sample living in adolescent-parent household	*1,375*	*790*	*585*	*721*	*654*
Sample living in non-twins household[4]	10,553	6,683	3,870	5,437	5,116
Sample living in twins household	*314*	*204*	*110*	*171*	*143*
Sample living with one or more siblings[5]	9,655	5,972	3,683	4,973	4,682
Sample living in only-child household	*1,212*	*915*	*297*	*635*	*577*
Sample living with siblings that speak same language[6]	10,737	6,829	3,908	5,548	5,189
Sample living in multi-languages household	*130*	*58*	*72*	*60*	*70*
Sample whose mother-tongue is spanish[7]	8,973	6,474	2,499	4,640	4,333
Sample whose mother-tongue is not spanish[8]	*1,869*	*395*	*1,474*	*957*	*912*
Final Sample with 5 filters[9]	6,551	3,957	2,594	3,340	3,211
Information loss due to filters	*4,316*	*2,930*	*1,386*	*2,268*	*2,048*
Final Sample with 6 filters[10]	5,352	3,735	1,617	2,737	2,615
Information loss due to filters	*5,515*	*3,152*	*2,363*	*2,871*	*2,644*
Final Sample with 6 filters and complete information[11]	5,281	3,686	1,595	2,706	2,575
Information loss due to missing values	*71*	*49*	*22*	*31*	*40*

Notes

1 It refers to all the observations between 6 and 17 years who are residents and members of a household.

2 It reports all the observations between 6 and 17 years who live in a household where both parents are present. Therefore, it exlcudes observations who live with just one of her parents.

3 It considers all the observations between 6 and 17 whose parents are not adolescents. One household has adolescent parents if the difference between the age of the youngest parent and the oldest kid is less 18, because 18 is the "age of majority" in Peru.

4 Sample with only observations between 6 and 17 who live in household where there are no twins.

5 Sample with only observations between 6 and 17 who have at least one sibling.

6 Sample with only observations between 6 and 17 whose siblings share the same language with them.

7 Sample with only observations between 6 and 17 who speak spanish

8 There are 25 observations who did not report information for this question.

9 Sample that includes only individuals between 6-17 years who live in two-parent household, in households without the presence of twins, whose parents are not adolescents, who have at least one sibling, who share the same language with his/her siblings.

10 Sample that includes only individuals between 6-17 years who live in two-parent household, in households without the presence of twins, whose parents are not adolescents, who have at least one sibling, who speak spanish and his/her siblings as well.

11 Sample that includes only individuals between 6-17 years who pass the six filters and do not present missing values in the relevant variables: school attendance and participation in productive and domestic work.

* Take into account that these categories are not exclusive, they can be overlapped.

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 3.2

Peru 2007, National Child Labour Survey: Sample Structure for kids between 6-17 years (percentage)

Sample	National*	Areas**		Gender**	
		Urban	Rural	Male	Female
Total Sample[1]	100.0	63.4	36.6	51.6	48.4
Sample living in two-parent household[2]	80.2	60.5	39.5	51.2	48.8
Sample living in single-head household	*19.8*	*75.0*	*25.0*	*53.2*	*46.8*
Sample living in adult-parent household[3]	87.3	64.2	35.8	51.5	48.5
Sample living in adolescent-parent household	*12.7*	*57.5*	*42.5*	*52.4*	*47.6*
Sample living in non-twins household[4]	97.1	63.3	36.7	51.5	48.5
Sample living in twins household	*2.9*	*65.0*	*35.0*	*54.5*	*45.5*
Sample living with two or more siblings[5]	88.8	61.9	38.1	51.5	48.5
Sample living in only-child household	*11.2*	*75.5*	*24.5*	*52.4*	*47.6*
Sample living with siblings that speak same language[6]	98.8	63.6	36.4	51.7	48.3
Sample living in multi-language household	*1.2*	*44.6*	*55.4*	*46.2*	*53.8*
Sample whose mother-tongue is spanish[7]	82.6	72.1	27.9	51.7	48.3
Sample whose mother-tongue is not spanish[8]	*17.2*	*21.1*	*78.9*	*51.2*	*48.8*
Final Sample with 5 filters[9]	60.3	60.4	39.6	51.0	49.0
Information loss due to filters	*39.7*	*67.9*	*32.1*	*52.5*	*47.5*
Final Sample with 6 filters[10]	49.3	69.8	30.2	51.1	48.9
Information loss due to filters	*50.7*	*57.2*	*42.8*	*52.1*	*47.9*
Final Sample with 6 filters and complete information[11]	*48.6*	*69.8*	*30.2*	*51.2*	*48.8*
Information loss due to missing values	*0.7*	*69.0*	*31.0*	*43.7*	*56.3*

Notes

1 It refers to all the observations between 6 and 17 years who are residents and members of a household.

2 It reports all the observations between 6 and 17 years who live in a household where both parents are present. Therefore, it exlcudes observations who live with just one of her parents.

3 It considers all the observations between 6 and 17 whose parents are not adolescents. One household has adolescent parents if the difference between the age of the youngest parent and the oldest kid is less 18, because 18 is the "age of majority" in Peru.

4 Sample with only observations between 6 and 17 who live in household where there are no twins.

5 Sample with only observations between 6 and 17 who have at least one sibling.

6 Sample with only observations between 6 and 17 whose siblings share the same language with them.

7 Sample with only observations between 6 and 17 who speak spanish

8 There are 25 observations who did not report information for this question.

9 Sample that includes only individuals between 6-17 years who live in two-parent household, in households without the presence of twins, whose parents are not adolescents, who have at least one sibling, who share the same language with his/her siblings.

10 Sample that includes only individuals between 6-17 years who live in two-parent household, in households without the presence of twins, whose parents are not adolescents, who have at least one sibling, who speak spanish and his/her siblings as well.

11 Sample that includes only individuals between 6-17 years who pass the six filters and do not present missing values in the relevant variables: school attendance and participation in productive and domestic work.

* Column percentages.

** Row percentages.

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 3.3

Peru 2007 NCLS. Kids between 6-17 years per activity or combinations (percentage)

Activities	National	Areas		Gender		Area and Gender			
						Urban		Rural	
		Urban	Rural	Male	Female	Male	Female	Male	Female
No School, no Productive nor Domestic work	0.5	0.6	0.4	0.5	0.5	0.6	0.5	0.2	0.5
Only School	14.1	17.4	6.3	15.4	12.7	19.3	15.5	6.8	5.8
Only Productive work	1.1	0.8	1.9	1.8	0.5	1.1	0.4	3.2	0.5
Only Domestic work	1.5	1.6	1.2	1.1	1.8	1.5	1.7	0.5	2.0
School and Productive work	5.2	4.0	7.8	7.7	2.5	6.0	2.1	11.5	3.5
School and Domestic work	44.2	52.2	25.6	39.0	49.6	47.8	56.6	19.9	32.3
Productive and Domestic work	3.1	1.8	6.1	3.4	2.9	1.8	1.9	6.7	5.4
School, Productive and Domestic work	30.3	21.5	50.7	31.1	29.6	21.8	21.2	51.2	50.0

Notes

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 3.4

Perú 2007 NCLS. School Attendance rate, productive and domestic work participation rate.

	6 to 13 years	14 to 17 years	6 to 17 years
National			
Attend School	98.6	83.5	93.8
Do Productive Work	34.2	51.5	39.8
Do Domestic Work	79.0	79.2	79.1
Urban			
Attend School	99.3	87.1	95.2
Do Productive Work	21.1	42.3	28.2
Do Domestic Work	75.7	80.0	77.2
Rural			
Attend School	97.2	74.2	90.4
Do Productive Work	62.7	75.5	66.5
Do Domestic Work	86.3	77.2	83.6
Female			
Attend School	98.6	84.8	94.3
Do Productive Work	31.2	44.6	35.4
Do Domestic Work	82.7	86.3	83.8
Male			
Attend School	98.7	82.4	93.2
Do Productive Work	37.0	57.6	43.9
Do Domestic Work	75.5	72.9	74.6

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 3.5

Perú 2007 NCLS. School Attendance, productive and domestic work participation.

Activities	Area and Gender			
	Urban		Rural	
	Male	Female	Male	Female
Children 6-17 years				
Attend School	94.9	95.5	89.4	91.5
Do Productive Work	30.8	25.6	72.6	59.4
Do Domestic Work	72.9	81.4	78.3	89.7
Children 6-13 years				
Attend School	99.4	99.1	97.1	97.4
Do Productive Work	22.7	19.5	67.3	57.7
Do Domestic Work	72.5	78.9	81.7	91.2
Children 14-17 years				
Attend School	86.3	88.0	73.3	75.5
Do Productive Work	46.3	38.1	83.9	64.0
Do Domestic Work	73.7	86.6	71.1	85.5

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 3.6

Perú 2007 NCLS. Percentage distribution of kids aged 6-17 years by Age, activity, gender and area of residence

Age	Urban			Rural			Male			Female		
	Attend School	Productive Work	Domestic Work	Attend School	Productive Work	Domestic Work	Attend School	Productive Work	Domestic Work	Attend School	Productive Work	Domestic Work
6	98.9	8.7	60.0	99.1	46.9	78.8	98.9	21.1	64.3	99.0	18.7	66.5
7	99.0	13.3	68.9	97.8	53.2	80.6	98.7	28.1	66.5	98.6	24.0	79.3
8	99.3	17.1	66.4	97.9	58.6	83.6	99.1	34.6	69.1	98.6	26.8	75.1
9	99.0	18.2	78.9	99.2	50.0	86.9	100.0	31.2	80.5	98.0	23.8	82.2
10	100.0	19.3	76.8	99.3	69.0	91.7	99.6	36.0	77.3	100.0	33.2	85.0
11	99.7	26.7	84.4	97.7	68.5	90.8	99.2	44.2	83.9	99.1	32.2	88.8
12	99.7	30.9	82.6	96.2	73.1	88.7	99.2	45.8	79.9	97.7	46.6	89.4
13	98.4	31.6	84.2	91.4	74.8	87.1	94.7	51.1	78.7	97.8	38.7	91.3
14	96.7	36.6	81.3	83.0	72.8	81.6	91.4	55.6	80.2	93.6	39.6	82.6
15	95.5	38.9	86.1	72.2	77.0	81.0	88.4	56.2	79.8	90.0	41.6	90.0
16	89.8	46.1	76.4	77.1	78.0	69.7	84.9	59.1	64.9	88.1	49.4	87.5
17	63.0	49.5	74.7	59.3	74.7	73.6	61.1	60.1	64.6	63.2	50.6	85.6

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 3.7

Perú 2007 NCLS. Percentage distribution of kids aged 6-17 years by Age, activity, gender and area of residence

Age	Urban						Rural					
	Male			Female			Male			Female		
	Attend School	Productive Work	Domestic Work	Attend School	Productive Work	Domestic Work	Attend School	Productive Work	Domestic Work	Attend School	Productive Work	Domestic Work
6	99.3	9.7	60.4	98.6	7.8	59.6	98.0	51.0	74.5	100.0	43.5	82.3
7	100.0	15.4	61.7	97.9	11.1	76.4	96.0	53.3	76.0	100.0	53.1	85.9
8	99.3	18.1	64.4	99.3	16.1	68.6	98.5	70.6	79.4	97.2	47.2	87.5
9	100.0	21.1	78.9	97.9	14.8	78.9	100.0	54.3	84.3	98.3	45.0	90.0
10	100.0	21.1	71.7	100.0	17.7	81.1	98.6	67.1	89.0	100.0	70.8	94.4
11	100.0	29.9	82.6	99.4	23.3	86.2	97.3	76.0	86.7	98.2	58.2	96.4
12	99.4	29.4	77.9	100.0	32.3	87.2	98.8	76.7	83.7	94.0	70.0	93.0
13	97.2	34.5	79.3	99.4	29.2	88.3	90.0	81.3	77.5	93.2	66.1	100.0
14	95.6	42.4	80.4	97.7	31.2	82.1	83.5	80.0	80.0	82.3	62.9	83.9
15	95.9	45.3	81.4	95.2	32.1	90.9	70.0	82.9	75.7	75.0	69.6	87.5
16	89.4	47.8	66.5	90.2	43.9	89.4	73.4	87.5	60.9	82.2	64.4	82.2
17	61.1	50.0	65.3	65.0	48.9	84.7	61.1	87.0	63.0	56.8	56.8	89.2

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 3.8

Perú 2007 NCLS. School Attendance, productive and domestic work participation by Birth Order

Birth Order	Urban			Rural			Male			Female		
	Attend School	Productive Work	Domestic Work	Attend School	Productive Work	Domestic Work	Attend School	Productive Work	Domestic Work	Attend School	Productive Work	Domestic Work
1	94.5	28.0	80.6	87.0	67.8	86.0	91.2	44.5	79.1	93.8	32.5	85.1
2	95.0	29.6	75.9	89.7	70.4	83.4	93.5	44.2	73.4	93.6	37.9	83.0
3+	96.4	26.5	74.0	94.2	61.6	81.6	95.3	42.9	70.4	95.8	35.9	83.2

Notes: 3+ includes birth order 3rd, 4th, 5th, 6th and 7th.

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 3.9

Perú 2007 NCLS. Percentage distribution of kids aged 6-17 years by Birth order, activity, gender and area of residence

Birth Order	Urban						Rural					
	Male			Female			Male			Female		
	Attend School	Productive Work	Domestic Work	Attend School	Productive Work	Domestic Work	Attend School	Productive Work	Domestic Work	Attend School	Productive Work	Domestic Work
1	94.0	31.5	78.1	95.0	24.6	83.1	84.2	76.7	81.7	90.3	56.8	91.2
2	95.0	31.5	71.9	95.1	27.6	80.1	89.8	74.4	77.2	89.5	65.7	90.8
3+	96.1	28.7	67.1	96.7	24.3	80.8	94.1	66.9	76.0	94.2	56.1	87.4

Notes: 3+ includes birth order 3rd, 4th, 5th, 6th and 7th.

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 3.10

Perú 2007 NCLS. Percentage distribution of kids aged 6-17 years by Birth order, activity, gender and area of residence

Birth Order	Urban			Rural			Male			Female		
	Attend School	Productive Work	Domestic Work	Attend School	Productive Work	Domestic Work	Attend School	Productive Work	Domestic Work	Attend School	Productive Work	Domestic Work
1	94.5	28.0	80.6	87.0	67.8	86.0	91.2	44.5	79.1	93.8	32.5	85.1
2	95.0	29.6	75.9	89.7	70.4	83.4	93.5	44.2	73.4	93.6	37.9	83.0
3	96.2	26.4	74.2	92.3	63.9	82.1	94.4	44.3	72.3	95.4	33.8	81.6
4+	96.8	26.8	73.5	96.7	58.5	80.9	96.9	40.5	67.4	96.5	39.4	85.8

Notes: 4+ includes birth order 4th, 5th, 6th and 7th.

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 3.11

Perú 2007 NCLS. Percentage distribution of kids aged 6-17 years by Birth order, activity, gender and area of residence

Birth Order	Urban						Rural					
	Male			Female			Male			Female		
	Attend School	Productive Work	Domestic Work	Attend School	Productive Work	Domestic Work	Attend School	Productive Work	Domestic Work	Attend School	Productive Work	Domestic Work
1	94.0	31.5	78.1	95.0	24.6	83.1	84.2	76.7	81.7	90.3	56.8	91.2
2	95.0	31.5	71.9	95.1	27.6	80.1	89.8	74.4	77.2	89.5	65.7	90.8
3	95.5	29.2	68.6	96.9	23.7	79.8	92.4	71.9	78.9	92.2	54.9	85.6
4+	97.1	28.0	64.6	96.3	25.6	82.9	96.6	59.5	71.6	96.8	57.6	89.6

Notes: 4+ includes birth order 4th, 5th, 6th and 7th.

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

A.3 Tables: Chapter 5

Table 5.1

Bivariate Probit of productive work, domestic work and school attendance, Urban children 6-17 years

Regressors	Male				Female			
	School	Productive Work	School	Domestic Work	School	Productive Work	School	Domestic Work
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
First Born	-0.881***	0.381**	-0.837**	0.417**	-0.355	-0.005	-0.424	0.450**
	(0.328)	(0.178)	(0.326)	(0.171)	(0.318)	(0.190)	(0.314)	(0.206)
Second Born	-0.669**	0.346**	-0.609**	0.276*	-0.256	0.048	-0.305	0.261
	(0.306)	(0.158)	(0.305)	(0.153)	(0.291)	(0.167)	(0.286)	(0.184)
Third Born	-0.566*	0.177	-0.507*	0.177	0.006	-0.066	0.065	0.059
	(0.295)	(0.146)	(0.295)	(0.132)	(0.280)	(0.154)	(0.280)	(0.163)
Number of Siblings	-0.082	0.083*	-0.062	0.045	-0.039	-0.029	-0.048	0.157***
	(0.062)	(0.045)	(0.064)	(0.044)	(0.059)	(0.050)	(0.059)	(0.053)
Cohort 14-17 years	-1.362***	0.794***	-1.235***	0.257***	-0.894***	0.758***	-0.858***	0.406***
	(0.244)	(0.099)	(0.206)	(0.097)	(0.189)	(0.105)	(0.189)	(0.110)
Cohort 11-13 years	-0.320	0.438***	-0.177	0.432***	0.556**	0.463***	0.600**	0.452***
	(0.294)	(0.087)	(0.262)	(0.088)	(0.278)	(0.091)	(0.281)	(0.098)
Social Programme	0.107	-0.024	0.069	0.222***	-0.109	0.001	-0.117	0.081
	(0.137)	(0.087)	(0.136)	(0.079)	(0.144)	(0.090)	(0.146)	(0.089)
Biological parents present	0.230	-0.375***	0.228	-0.046	0.003	0.044	0.005	0.162
	(0.249)	(0.136)	(0.245)	(0.147)	(0.228)	(0.150)	(0.229)	(0.170)
Father's schooling	0.014	-0.027**	0.020	0.007	-0.004	-0.007	-0.004	-0.022
	(0.018)	(0.013)	(0.018)	(0.013)	(0.020)	(0.014)	(0.020)	(0.015)
Mother's schooling	0.031*	-0.049***	0.029*	-0.013	0.046***	-0.048***	0.047***	-0.031**
	(0.018)	(0.012)	(0.017)	(0.012)	(0.017)	(0.013)	(0.017)	(0.014)
Father's age	0.006	-0.002	0.005	-0.004	-0.010	0.000	-0.011	0.003
	(0.010)	(0.007)	(0.009)	(0.007)	(0.010)	(0.008)	(0.010)	(0.008)
Mother's age	-0.042***	-0.000	-0.041***	-0.011	-0.009	0.004	-0.010	-0.007
	(0.014)	(0.009)	(0.014)	(0.008)	(0.014)	(0.010)	(0.014)	(0.010)
Coast	-0.162	-0.297***	-0.192	-0.247***	-0.047	-0.374***	-0.054	0.027
	(0.134)	(0.085)	(0.134)	(0.085)	(0.137)	(0.091)	(0.140)	(0.094)
Constant	4.385***	-0.065	4.130***	0.840**	2.971***	-0.462	3.052***	0.542
	(0.834)	(0.415)	(0.817)	(0.422)	(0.735)	(0.443)	(0.734)	(0.470)
Rho	-0.203***		0.170**		-0.187**		0.207**	
Log-Likelihood	-1217.451		-1242.716		-1167.458		-1036.963	
Sample Size	1744		1729		1730		1716	

Notes:

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

Standard errors robust to within household correlation are reported in parenthesis.

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 5.2

Bivariate Probit of productive work, domestic work and school attendance, Rural children 6-17 years

Regressors	Male				Female			
	School	Productive Work	School	Domestic Work	School	Productive Work	School	Domestic Work
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
First Born	-0.811***	0.544**	-0.811***	0.443**	-0.762**	0.244	-0.763**	0.355
	(0.311)	(0.225)	(0.304)	(0.217)	(0.360)	(0.227)	(0.363)	(0.280)
Second Born	-0.623**	0.384**	-0.600**	0.294	-0.831**	0.411**	-0.832**	0.270
	(0.283)	(0.194)	(0.277)	(0.190)	(0.334)	(0.195)	(0.334)	(0.232)
Third Born	-0.423	0.410**	-0.407	0.252	-0.669**	-0.001	-0.669**	-0.087
	(0.266)	(0.172)	(0.257)	(0.160)	(0.322)	(0.161)	(0.323)	(0.203)
Number of Siblings	-0.134**	0.020	-0.130**	0.020	-0.118*	0.034	-0.117*	0.029
	(0.058)	(0.051)	(0.059)	(0.044)	(0.070)	(0.055)	(0.069)	(0.061)
Cohort 14-17 years	-1.294***	0.611***	-1.303***	-0.427***	-1.573***	0.191	-1.566***	-0.333
	(0.244)	(0.164)	(0.246)	(0.158)	(0.286)	(0.159)	(0.286)	(0.206)
Cohort 11-13 years	-0.258	0.441***	-0.281	0.003	-0.734***	0.327***	-0.725***	0.417**
	(0.239)	(0.124)	(0.242)	(0.134)	(0.268)	(0.122)	(0.267)	(0.190)
Social Programme	0.177	0.053	0.177	0.005	-0.175	-0.037	-0.176	0.055
	(0.176)	(0.128)	(0.176)	(0.121)	(0.190)	(0.132)	(0.190)	(0.155)
Biological parents present	0.375	0.169	0.384	-0.630**	-0.096	-0.068	-0.097	0.007
	(0.309)	(0.294)	(0.301)	(0.286)	(0.387)	(0.303)	(0.387)	(0.332)
Father's schooling	0.060**	-0.047**	0.060**	0.036*	0.019	-0.053**	0.019	-0.037
	(0.028)	(0.022)	(0.028)	(0.019)	(0.029)	(0.021)	(0.029)	(0.024)
Mother's schooling	0.051**	-0.052**	0.052**	-0.016	0.084***	-0.032	0.085***	0.033
	(0.024)	(0.021)	(0.024)	(0.019)	(0.032)	(0.021)	(0.032)	(0.027)
Father's age	0.008	-0.012	0.009	0.013	0.018	-0.004	0.018	-0.018
	(0.011)	(0.009)	(0.011)	(0.011)	(0.018)	(0.011)	(0.018)	(0.012)
Mother's age	-0.006	0.015	-0.006	-0.011	-0.023	0.004	-0.023	0.035**
	(0.016)	(0.012)	(0.016)	(0.014)	(0.021)	(0.013)	(0.021)	(0.016)
Coast	-0.078	-0.268**	-0.107	-0.170	-0.455**	-0.358**	-0.449**	-0.040
	(0.172)	(0.135)	(0.172)	(0.139)	(0.211)	(0.162)	(0.209)	(0.168)
Constant	1.877**	0.205	1.846**	0.947	3.324***	0.497	3.315***	0.447
	(0.847)	(0.625)	(0.860)	(0.615)	(1.016)	(0.654)	(1.016)	(0.809)
Rho	-0.291**		0.078		-0.041		-.00022	
Log-Likelihood	-641.102		-629.677		-609.955		-379.324	
Sample Size	822		820		719		717	

Notes:

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

Standard errors robust to within household correlation are reported in parenthesis.

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 5.3

Bivariate probit with birth order and average birth spacing interactions, Urban children 6-17 years

Regressors	Male				Female			
	School	Productive Work	School	Domestic Work	School	Productive Work	School	Domestic Work
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
First Born	-1.596**	-0.119	-1.582**	0.012	-0.616	-0.265	-0.726	1.154**
	(0.651)	(0.429)	(0.624)	(0.405)	(0.562)	(0.444)	(0.580)	(0.483)
Second Born	-1.063	-0.308	-1.041*	-0.072	-0.614	-0.172	-0.692	1.244***
	(0.649)	(0.421)	(0.623)	(0.402)	(0.556)	(0.441)	(0.574)	(0.480)
Third Born	-1.724**	-0.305	-1.638**	-0.050	-0.562	-0.078	-0.429	0.572
	(0.736)	(0.432)	(0.701)	(0.398)	(0.590)	(0.458)	(0.600)	(0.494)
Birth Spacing[1]	-0.173	-0.182	-0.181	-0.080	-0.073	-0.084	-0.085	0.235*
	(0.166)	(0.120)	(0.156)	(0.108)	(0.125)	(0.120)	(0.130)	(0.126)
First Born*Birth spacing	0.210	0.159	0.220	0.116	0.067	0.084	0.080	-0.212*
	(0.170)	(0.123)	(0.159)	(0.111)	(0.130)	(0.121)	(0.135)	(0.129)
Second Born*Birth spacing	0.138	0.193	0.150	0.102	0.090	0.072	0.099	-0.271**
	(0.167)	(0.120)	(0.156)	(0.109)	(0.127)	(0.121)	(0.132)	(0.127)
Third Born*Birth spacing	0.329*	0.155	0.323*	0.074	0.149	0.016	0.129	-0.165
	(0.195)	(0.122)	(0.182)	(0.112)	(0.141)	(0.126)	(0.142)	(0.132)
Number of Siblings	-0.070	0.071	-0.050	0.056	-0.037	-0.035	-0.046	0.167***
	(0.066)	(0.046)	(0.067)	(0.045)	(0.061)	(0.052)	(0.061)	(0.055)
Cohort 14-17 years	-1.407***	0.806***	-1.279***	0.253**	-0.868***	0.724***	-0.840***	0.412***
	(0.248)	(0.105)	(0.212)	(0.101)	(0.191)	(0.107)	(0.191)	(0.113)
Cohort 11-13 years	-0.319	0.446***	-0.172	0.425***	0.574**	0.442***	0.614**	0.458***
	(0.295)	(0.089)	(0.264)	(0.090)	(0.276)	(0.093)	(0.279)	(0.101)
Social Programme	0.080	-0.014	0.045	0.214***	-0.112	-0.001	-0.119	0.079
	(0.140)	(0.088)	(0.137)	(0.079)	(0.144)	(0.090)	(0.147)	(0.089)
Biological parents present	0.257	-0.386***	0.255	-0.037	0.005	0.042	0.007	0.175
	(0.251)	(0.136)	(0.248)	(0.148)	(0.228)	(0.150)	(0.229)	(0.171)
Father's schooling	0.014	-0.026**	0.020	0.009	-0.005	-0.007	-0.004	-0.022
	(0.018)	(0.013)	(0.019)	(0.013)	(0.020)	(0.014)	(0.020)	(0.015)
Mother's schooling	0.030*	-0.049***	0.028	-0.014	0.048***	-0.049***	0.048***	-0.032**
	(0.018)	(0.012)	(0.018)	(0.012)	(0.016)	(0.013)	(0.017)	(0.014)
Father's age	0.007	-0.002	0.006	-0.004	-0.011	0.001	-0.011	0.004
	(0.010)	(0.007)	(0.010)	(0.007)	(0.010)	(0.008)	(0.010)	(0.008)
Mother's age	-0.041***	0.000	-0.039***	-0.012	-0.011	0.007	-0.011	-0.009
	(0.015)	(0.010)	(0.015)	(0.009)	(0.015)	(0.010)	(0.015)	(0.010)
Coast	-0.160	-0.295***	-0.190	-0.239***	-0.048	-0.370***	-0.054	0.026
	(0.135)	(0.086)	(0.135)	(0.085)	(0.137)	(0.091)	(0.140)	(0.094)
Constant	4.865***	0.555	4.625***	1.069*	3.316***	-0.300	3.413***	-0.279
	(1.016)	(0.539)	(0.982)	(0.560)	(0.845)	(0.584)	(0.851)	(0.634)
Rho	-0.210***		0.175 **		-0.185**		0.209**	
Log-Likelihood	-1213.074		-1238.392		-1165.582		-1031.902	
Sample Size	1744		1729		1730		1716	

Notes:

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

Standard errors robust to within household correlation are reported in parenthesis.

[1] It refers to the average age gap between siblings.

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 5.4

Bivariate probit with birth order and average birth spacing interactions, Rural children 6-17 years

Regressors	Male				Female			
	School	Productive Work	School	Domestic Work	School	Productive Work	School	Domestic Work
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
First Born	1.555	0.428	1.191	0.738*	-1.289*	0.342	-1.264*	0.570
	(1.042)	(0.439)	(0.945)	(0.433)	(0.705)	(0.457)	(0.723)	(0.558)
Second Born	1.291	0.192	0.942	0.315	-0.806	0.260	-0.783	0.353
	(1.010)	(0.419)	(0.909)	(0.424)	(0.696)	(0.443)	(0.708)	(0.496)
Third Born	1.111	0.281	0.734	0.050	-1.643**	0.014	-1.630**	0.495
	(1.051)	(0.443)	(0.964)	(0.440)	(0.759)	(0.447)	(0.773)	(0.570)
Birth Spacing[1]	0.821**	-0.068	0.664**	0.008	-0.159	-0.026	-0.148	0.091
	(0.375)	(0.118)	(0.327)	(0.114)	(0.203)	(0.129)	(0.209)	(0.154)
First Born*Birth spacing	-0.940**	0.037	-0.785**	-0.095	0.174	-0.030	0.162	-0.076
	(0.380)	(0.122)	(0.334)	(0.122)	(0.214)	(0.136)	(0.220)	(0.167)
Second Born*Birth spacing	-0.808**	0.058	-0.650**	-0.018	0.035	0.038	0.024	-0.041
	(0.374)	(0.119)	(0.326)	(0.117)	(0.207)	(0.132)	(0.212)	(0.156)
Third Born*Birth spacing	-0.680*	0.041	-0.517	0.049	0.304	-0.005	0.298	-0.181
	(0.383)	(0.125)	(0.339)	(0.123)	(0.236)	(0.136)	(0.241)	(0.172)
Number of Siblings	-0.156***	0.009	-0.152**	0.008	-0.126*	0.021	-0.126*	0.032
	(0.060)	(0.054)	(0.061)	(0.047)	(0.075)	(0.056)	(0.075)	(0.064)
Cohort 14-17 years	-1.187***	0.610***	-1.206***	-0.391**	-1.655***	0.212	-1.644***	-0.329
	(0.248)	(0.167)	(0.251)	(0.161)	(0.297)	(0.163)	(0.297)	(0.207)
Cohort 11-13 years	-0.187	0.442***	-0.220	0.024	-0.781***	0.339***	-0.770***	0.417**
	(0.246)	(0.124)	(0.251)	(0.136)	(0.272)	(0.124)	(0.271)	(0.192)
Social Programme	0.234	0.071	0.237	0.039	-0.185	-0.012	-0.181	0.046
	(0.179)	(0.129)	(0.181)	(0.123)	(0.191)	(0.135)	(0.190)	(0.160)
Biological parents present	0.315	0.151	0.317	-0.669**	-0.096	-0.068	-0.097	0.022
	(0.332)	(0.299)	(0.323)	(0.298)	(0.380)	(0.302)	(0.380)	(0.331)
Father's schooling	0.065**	-0.045**	0.065**	0.038**	0.023	-0.052**	0.023	-0.039
	(0.028)	(0.022)	(0.028)	(0.019)	(0.028)	(0.021)	(0.028)	(0.024)
Mother's schooling	0.054**	-0.052**	0.056**	-0.014	0.087***	-0.032	0.087***	0.033
	(0.024)	(0.021)	(0.024)	(0.018)	(0.033)	(0.021)	(0.033)	(0.027)
Father's age	0.004	-0.012	0.005	0.012	0.017	-0.003	0.017	-0.018
	(0.011)	(0.009)	(0.011)	(0.011)	(0.018)	(0.011)	(0.018)	(0.012)
Mother's age	-0.009	0.016	-0.009	-0.011	-0.020	0.003	-0.020	0.035**
	(0.016)	(0.012)	(0.017)	(0.014)	(0.022)	(0.013)	(0.022)	(0.016)
Coast	-0.092	-0.262*	-0.119	-0.167	-0.496**	-0.358**	-0.491**	-0.030
	(0.175)	(0.134)	(0.177)	(0.139)	(0.215)	(0.163)	(0.213)	(0.169)
Constant	0.195	0.392	0.534	1.040	3.804***	0.585	3.777***	0.184
	(1.334)	(0.712)	(1.251)	(0.707)	(1.136)	(0.741)	(1.141)	(0.862)
Rho	-0.308***		0.054		-0.041		0.030	
Log-Likelihood	-636.204		-623.527		-606.511		-375.788	
Sample Size	822		820		719		717	

Notes:

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

Standard errors robust to within household correlation are reported in parenthesis.

[1] It refers to the average age gap between siblings.

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 5.5

Bivariate probit with birth order and number of siblings interactions, Urban children 6-17 years

Regressors	Male				Female			
	School	Productive Work	School	Domestic Work	School	Productive Work	School	Domestic Work
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
First Born	-0.378	0.031	-0.400	0.298	-0.464	0.015	-0.489	-0.145
	(0.338)	(0.215)	(0.337)	(0.208)	(0.359)	(0.221)	(0.357)	(0.239)
Second Born	-0.031	0.107	0.003	0.313*	0.005	0.044	-0.014	-0.029
	(0.295)	(0.185)	(0.295)	(0.168)	(0.315)	(0.181)	(0.316)	(0.186)
Third Born	0.228	-0.030	0.301	0.191	0.205	-0.088	0.393	-0.072
	(0.349)	(0.191)	(0.349)	(0.171)	(0.321)	(0.181)	(0.322)	(0.190)
# Younger Brothers[1]	0.270	-0.068	0.278	0.076	5.110***	-0.057	4.894***	-0.096
	(0.262)	(0.147)	(0.251)	(0.134)	(0.499)	(0.177)	(0.295)	(0.203)
# Younger Sisters[2]	0.478	0.091	0.569	0.158	-0.352*	-0.081	-0.319*	0.390*
	(0.374)	(0.180)	(0.389)	(0.183)	(0.184)	(0.167)	(0.193)	(0.232)
First Born*Younger brothers	-0.211	0.153	-0.171	-0.063	-5.026***	-0.062	-4.816***	0.365
	(0.285)	(0.163)	(0.276)	(0.159)	(0.528)	(0.190)	(0.305)	(0.229)
Second Born*Younger brothers	-0.434	0.193	-0.414	-0.121	-5.464***	0.055	-5.262***	0.204
	(0.285)	(0.155)	(0.274)	(0.159)	(0.529)	(0.200)	(0.324)	(0.226)
Third Born*Younger brothers	-0.440	0.007	-0.454	-0.050	-5.614***	0.236	-5.529***	0.086
	(0.342)	(0.180)	(0.340)	(0.158)	(0.548)	(0.220)	(0.368)	(0.263)
First Born*Younger sisters	-0.519	0.018	-0.590	-0.032	0.491**	0.184	0.444*	-0.177
	(0.393)	(0.195)	(0.408)	(0.204)	(0.220)	(0.185)	(0.227)	(0.256)
Second Born*Younger sisters	-0.572	-0.070	-0.656	-0.192	0.348*	0.085	0.329	-0.252
	(0.399)	(0.194)	(0.414)	(0.203)	(0.211)	(0.170)	(0.220)	(0.251)
Third Born*Younger sisters	-1.046**	0.257	-1.137***	-0.088	0.577*	-0.079	0.513	-0.171
	(0.418)	(0.208)	(0.431)	(0.220)	(0.321)	(0.191)	(0.319)	(0.289)
Cohort 14-17 years	-1.368***	0.795***	-1.251***	0.270***	-0.940***	0.750***	-0.892***	0.403***
	(0.248)	(0.100)	(0.211)	(0.098)	(0.206)	(0.106)	(0.204)	(0.109)
Cohort 11-13 years	-0.301	0.424***	-0.165	0.435***	0.571**	0.466***	0.642**	0.451***
	(0.299)	(0.088)	(0.268)	(0.088)	(0.285)	(0.091)	(0.289)	(0.098)
Social Programme	0.138	-0.028	0.104	0.233***	-0.071	-0.007	-0.066	0.094
	(0.139)	(0.087)	(0.138)	(0.080)	(0.148)	(0.090)	(0.150)	(0.090)
Biological parents present	0.243	-0.382***	0.242	-0.053	-0.051	0.032	-0.047	0.168
	(0.249)	(0.136)	(0.244)	(0.146)	(0.229)	(0.151)	(0.229)	(0.171)
Father's schooling	0.015	-0.027**	0.021	0.007	-0.002	-0.007	-0.002	-0.022
	(0.018)	(0.013)	(0.019)	(0.013)	(0.020)	(0.014)	(0.021)	(0.015)
Mother's schooling	0.032*	-0.050***	0.029*	-0.013	0.048***	-0.049***	0.050***	-0.030**
	(0.018)	(0.012)	(0.017)	(0.012)	(0.017)	(0.012)	(0.017)	(0.014)
Father's age	0.006	-0.002	0.006	-0.004	-0.013	0.001	-0.012	0.004
	(0.009)	(0.007)	(0.009)	(0.006)	(0.011)	(0.008)	(0.011)	(0.008)
Mother's age	-0.045***	-0.000	-0.043***	-0.012	-0.008	0.004	-0.011	-0.009
	(0.014)	(0.009)	(0.014)	(0.008)	(0.014)	(0.010)	(0.014)	(0.010)
Coast	-0.178	-0.304***	-0.207	-0.256***	-0.032	-0.384***	-0.028	0.027
	(0.139)	(0.085)	(0.138)	(0.085)	(0.137)	(0.091)	(0.141)	(0.094)
Constant	3.794***	0.289	3.581***	0.981***	2.927***	-0.523	2.962***	1.023**
	(0.739)	(0.388)	(0.705)	(0.378)	(0.689)	(0.407)	(0.684)	(0.429)
Rho	-0.187**		0.174**		-0.187**		0.225**	
Log-Likelihood	-1209.328		-1235.837		-1153.171		-1023.393	
Sample Size	1744		1729		1730		1716	

Notes:

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

Standard errors robust to within household correlation are reported in parenthesis.

[1] It refers to the number of younger brothers kid "i" has.

[2] It refers to the number of younger sisters kid "i" has.

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 5.6

Bivariate probit with birth order and number of siblings interactions, Rural children 6-17 years

Regressors	Male				Female			
	School	Productive Work	School	Domestic Work	School	Productive Work	School	Domestic Work
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
First Born	-0.339	0.374	-0.451	0.500*	-0.991*	0.036	-1.000*	0.169
	(0.432)	(0.272)	(0.448)	(0.281)	(0.557)	(0.270)	(0.563)	(0.326)
Second Born	-0.367	0.401*	-0.424	0.204	-1.423***	0.424*	-1.435***	0.221
	(0.397)	(0.222)	(0.417)	(0.223)	(0.524)	(0.225)	(0.533)	(0.297)
Third Born	-0.124	0.642***	-0.191	0.459**	-1.165**	0.021	-1.171**	-0.246
	(0.440)	(0.225)	(0.456)	(0.215)	(0.557)	(0.218)	(0.564)	(0.288)
# Younger Brothers[2]	-0.227	-0.014	-0.264	-0.070	-0.574***	0.223	-0.574***	0.155
	(0.161)	(0.105)	(0.164)	(0.125)	(0.172)	(0.151)	(0.173)	(0.195)
# Younger Sisters[3]	0.085	0.178	0.060	0.266	-0.214	-0.165	-0.220	-0.128
	(0.257)	(0.183)	(0.234)	(0.179)	(0.136)	(0.131)	(0.136)	(0.159)
First Born*Younger brothers	0.081	0.235*	0.131	0.100	0.301	-0.162	0.300	0.066
	(0.184)	(0.136)	(0.189)	(0.144)	(0.225)	(0.181)	(0.225)	(0.239)
Second Born*Younger brothers	0.078	0.231	0.114	0.220	0.577***	-0.269	0.578***	-0.096
	(0.172)	(0.148)	(0.175)	(0.162)	(0.213)	(0.170)	(0.216)	(0.202)
Third Born*Younger brothers	0.033	-0.035	0.060	-0.099	0.431*	-0.219	0.427*	0.238
	(0.150)	(0.126)	(0.151)	(0.139)	(0.259)	(0.189)	(0.258)	(0.265)
First Born*Younger sisters	-0.194	-0.196	-0.156	-0.316	0.184	0.258	0.190	0.060
	(0.280)	(0.209)	(0.259)	(0.208)	(0.186)	(0.158)	(0.187)	(0.182)
Second Born*Younger sisters	-0.101	-0.312*	-0.072	-0.223	0.113	0.144	0.120	0.072
	(0.274)	(0.175)	(0.254)	(0.201)	(0.210)	(0.190)	(0.209)	(0.224)
Third Born*Younger sisters	-0.255	-0.386**	-0.218	-0.290	0.010	0.131	0.013	0.021
	(0.289)	(0.188)	(0.268)	(0.214)	(0.208)	(0.166)	(0.207)	(0.216)
Cohort 14-17 years	-1.314***	0.604***	-1.323***	-0.437***	-1.574***	0.232	-1.565***	-0.369*
	(0.246)	(0.165)	(0.248)	(0.159)	(0.291)	(0.162)	(0.291)	(0.209)
Cohort 11-13 years	-0.261	0.416***	-0.281	-0.017	-0.772***	0.338***	-0.764***	0.426**
	(0.243)	(0.125)	(0.247)	(0.136)	(0.271)	(0.124)	(0.269)	(0.191)
Social Programme	0.144	0.025	0.144	-0.031	-0.179	-0.023	-0.177	0.042
	(0.175)	(0.131)	(0.176)	(0.121)	(0.196)	(0.133)	(0.196)	(0.162)
Biological parents present	0.364	0.172	0.367	-0.596**	-0.058	-0.073	-0.060	-0.009
	(0.313)	(0.304)	(0.306)	(0.287)	(0.400)	(0.302)	(0.400)	(0.324)
Father's schooling	0.059**	-0.045**	0.058**	0.037*	0.014	-0.053**	0.014	-0.033
	(0.028)	(0.021)	(0.028)	(0.019)	(0.029)	(0.021)	(0.029)	(0.024)
Mother's schooling	0.051**	-0.058***	0.053**	-0.018	0.087***	-0.033	0.088***	0.031
	(0.024)	(0.021)	(0.024)	(0.019)	(0.033)	(0.021)	(0.033)	(0.027)
Father's age	0.009	-0.015*	0.009	0.013	0.018	-0.006	0.018	-0.018
	(0.011)	(0.009)	(0.011)	(0.012)	(0.019)	(0.011)	(0.018)	(0.012)
Mother's age	-0.007	0.016	-0.007	-0.012	-0.023	0.003	-0.023	0.039**
	(0.016)	(0.012)	(0.016)	(0.014)	(0.022)	(0.013)	(0.021)	(0.016)
Coast	-0.078	-0.276**	-0.108	-0.166	-0.490**	-0.347**	-0.486**	-0.045
	(0.172)	(0.135)	(0.173)	(0.139)	(0.217)	(0.162)	(0.215)	(0.169)
Constant	1.420*	0.324	1.499*	0.985*	3.691***	0.665	3.693***	0.483
	(0.841)	(0.583)	(0.870)	(0.583)	(0.986)	(0.603)	(0.998)	(0.752)
Rho	-0.278**		0.069		-0.020		0.016	
Log-Likelihood	-632.908		-625.014		-604.624		-372.210	
Sample Size	822		820		719		717	

Notes:

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

Standard errors robust to within household correlation are reported in parenthesis.

[1] It refers to the number of younger brothers kid "i" has.

[2] It refers to the number of younger sisters kid "i" has.

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 5.7

Marginal Effects for School attendance and Productive Work, Urban Male 6-17 years

Variables	Pr(school and productive[1])		Pr(only school)		Pr(only productive)		Pr(neither school nor productive)	
	Mg. Effect	***S.E***	**Mg. Effect**	***S.E***	**Mg. Effect**	***S.E***	**Mg. Effect**	***S.E***
First Born[2]	0.106 *	*0.060*	-0.154 **	*0.063*	0.026 *	*0.014*	0.022	*0.014*
Second Born[2]	0.102 *	*0.054*	-0.135 **	*0.056*	0.019 *	*0.011*	0.015	*0.010*
Third Born[2]	0.045	*0.051*	-0.078	*0.053*	0.017	*0.012*	0.016	*0.014*
Number of Siblings	0.026 *	*0.015*	-0.029 *	*0.016*	0.002	*0.001*	0.001	*0.001*
Cohort 14-17 years[2]	0.219 ***	*0.035*	-0.318 ***	*0.035*	0.063 ***	*0.015*	0.036 ***	*0.010*
Cohort 11-13 years[2]	0.146 ***	*0.033*	-0.161 ***	*0.032*	0.011	*0.008*	0.004	*0.007*
Social Programme[2]	-0.006	*0.029*	0.010	*0.029*	-0.002	*0.002*	-0.002	*0.003*
Biological parents present[2]	-0.129 **	*0.051*	0.140 ***	*0.052*	-0.009	*0.009*	-0.002	*0.006*
Father's schooling	-0.009 *	*0.005*	0.0093 **	*0.005*	-0.0004	*0.0003*	-0.00013	*0.0004*
Mother's schooling	-0.016 ***	*0.004*	0.017 ***	*0.004*	-0.001 **	*0.0004*	-0.00036	*0.0004*
Father's age	-0.0006	*0.002*	0.001	*0.002*	-0.0001	*0.0002*	-0.00012	*0.0002*
Mother's age	-0.001	*0.003*	-0.001	*0.003*	0.001 ***	*0.0003*	0.0009 **	*0.0004*
Coast	-0.105 ***	*0.030*	0.099 ***	*0.031*	0.001	*0.002*	0.005	*0.003*
Predicted Probability	0.280		0.704		0.007		0.008	

Notes:

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

[1] Refers to Productive work

[2] Marginal effect is for discrete change of dummy variable from 0 to 1

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 5.8

Marginal Effects for School attendance and Domestic work, Urban Male 6-17 years

Variables	Pr(school and domestic[1])		Pr(only school)		Pr(only domestic)		Pr(neither school nor domestic)	
	Mg. Effect	***S.E***	**Mg. Effect**	***S.E***	**Mg. Effect**	***S.E***	**Mg. Effect**	***S.E***
First Born[2]	0.093 *	*0.053*	-0.144 ***	*0.050*	0.038 *	*0.020*	0.013	*0.008*
Second Born[2]	0.064	*0.048*	-0.097 **	*0.046*	0.024	*0.015*	0.009	*0.007*
Third Born[2]	0.033	*0.042*	-0.065 *	*0.039*	0.023	*0.018*	0.009	*0.008*
Number of Siblings	0.013	*0.014*	-0.015	*0.014*	0.002	*0.002*	0.001	*0.001*
Cohort 14-17 years[2]	0.016	*0.031*	-0.109 ***	*0.028*	0.066 ***	*0.014*	0.028 ***	*0.008*
Cohort 11-13 years[2]	0.122 ***	*0.025*	-0.131 ***	*0.024*	0.009	*0.009*	-0.0003	*0.004*
Social Programme[2]	0.071 ***	*0.025*	-0.069 ***	*0.024*	-0.0003	*0.004*	-0.003	*0.002*
Biological parents present[2]	-0.007	*0.047*	0.019	*0.045*	-0.008	*0.011*	-0.004	*0.006*
Father's schooling	0.003	*0.004*	-0.0020	*0.004*	-0.0005	*0.001*	-0.00040	*0.0004*
Mother's schooling	-0.003	*0.004*	0.005	*0.004*	-0.001 *	*0.001*	-0.00040	*0.0003*
Father's age	-0.001	*0.002*	0.001	*0.002*	-0.0002	*0.0003*	-0.00006	*0.0002*
Mother's age	-0.005 *	*0.003*	0.003	*0.003*	0.001 **	*0.0004*	0.0008 ***	*0.000*
Coast	-0.081 ***	*0.026*	0.074 ***	*0.025*	0.003	*0.003*	0.005 **	*0.002*
Predicted Probability	0.726		0.256		0.011		0.007	

Notes:

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

[1] Refers to Domestic work

[2] Marginal effect is for discrete change of dummy variable from 0 to 1

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 5.9

Marginal Effects for School attendance and Productive Work, Rural Male 6-17 years

Variables	Pr(school and productive[1])		Pr(only school)		Pr(only productive)		Pr(neither school nor productive)	
	Mg. Effect	S.E	Mg. Effect	S.E	Mg. Effect	S.E	Mg. Effect	S.E
First Born[2]	0.052	0.080	-0.166 ***	0.058	0.109 **	0.052	0.005	0.006
Second Born[2]	0.039	0.070	-0.121 **	0.053	0.077 *	0.042	0.004	0.006
Third Born[2]	0.063	0.060	-0.120 ***	0.043	0.056	0.041	0.001	0.004
Number of Siblings	-0.007	0.016	-0.008	0.016	0.013 **	0.007	0.002	0.001
Cohort 14-17 years[2]	-0.023	0.058	-0.191 ***	0.040	0.201 ***	0.045	0.013 *	0.007
Cohort 11-13 years[2]	0.099 **	0.042	-0.130 ***	0.033	0.032	0.028	-0.001	0.003
Social Programme[2]	0.034	0.043	-0.014	0.040	-0.017	0.019	-0.003	0.003
Biological parents prese	0.100	0.085	-0.046	0.101	-0.043	0.050	-0.011	0.010
Father's schooling	-0.009	0.007	0.0153 **	0.007	-0.006 **	0.003	-0.00033	0.0004
Mother's schooling	-0.011 *	0.007	0.017 ***	0.006	-0.005 **	0.002	-0.00015	0.0003
Father's age	-0.003	0.003	0.004	0.003	-0.001	0.001	0.00001	0.0002
Mother's age	0.004	0.004	-0.005	0.004	0.001	0.002	-0.0001	0.0002
Coast	-0.094 **	0.046	0.085 *	0.046	0.005	0.017	0.004	0.004
Predicted Probability	0.700		0.246		0.049		0.005	

Notes:

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

[1] Refers to Productive work

[2] Marginal effect is for discrete change of dummy variable from 0 to 1

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 5.10

Marginal Effects for School attendance and Domestic work, Rural Male 6-17 years

Variables	Pr(school and domestic[1])		Pr(only school)		Pr(only domestic)		Pr(neither school nor domestic)	
	Mg. Effect	S.E	Mg. Effect	S.E	Mg. Effect	S.E	Mg. Effect	S.E
First Born[2]	0.021	0.068	-0.135 ***	0.050	0.100 **	0.047	0.014	0.011
Second Born[2]	0.015	0.060	-0.094 **	0.047	0.067 *	0.037	0.012	0.010
Third Born[2]	0.021	0.052	-0.075 **	0.037	0.048	0.034	0.007	0.009
Number of Siblings	-0.005	0.014	-0.009	0.012	0.011 **	0.006	0.003	0.002
Cohort 14-17 years[2]	-0.270 ***	0.055	0.055	0.044	0.139 ***	0.033	0.077 ***	0.023
Cohort 11-13 years[2]	-0.025	0.042	-0.009	0.037	0.026	0.023	0.008	0.009
Social Programme[2]	0.016	0.037	0.004	0.033	-0.015	0.017	-0.005	0.006
Biological parents prese	-0.081	0.071	0.137 ***	0.039	-0.058	0.049	0.003	0.009
Father's schooling	0.015 **	0.006	-0.0082	0.005	-0.004 *	0.003	-0.00227 **	0.001
Mother's schooling	-0.0001	0.006	0.006	0.005	-0.005 **	0.002	-0.00114	0.001
Father's age	0.004	0.003	-0.003	0.003	-0.0005	0.001	-0.00047	0.000
Mother's age	-0.004	0.004	0.003	0.004	0.0003	0.001	0.0004	0.001
Coast	-0.057	0.046	0.045	0.040	0.006	0.014	0.007	0.007
Predicted Probability	0.747		0.199		0.040		0.014	

Notes:

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

[1] Marginal effect is for discrete change of dummy variable from 0 to 1

[2] Refers to Domestic work

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 5.11

Marginal Effects for School attendance and Productive Work, Urban Female 6-17 years

Variables	Pr(school and productive[1])		Pr(only school)		Pr(only productive)		Pr(neither school nor productive)	
	Mg. Effect	S.E	Mg. Effect	S.E	Mg. Effect	S.E	Mg. Effect	S.E
First Born[2]	-0.009	0.057	-0.011	0.059	0.007	0.008	0.013	0.013
Second Born[2]	0.009	0.051	-0.024	0.052	0.006	0.007	0.008	0.011
Third Born[2]	-0.020	0.045	0.020	0.046	-0.001	0.005	0.000	0.009
Number of Siblings	-0.009	0.015	0.007	0.015	0.000	0.001	0.001	0.002
Cohort 14-17 years[2]	0.213 ***	0.035	-0.279 ***	0.036	0.040 ***	0.011	0.026 ***	0.010
Cohort 11-13 years[2]	0.160 ***	0.032	-0.138 ***	0.032	-0.006	0.004	-0.016 ***	0.006
Social Programme[2]	-0.002	0.027	-0.004	0.028	0.002	0.003	0.004	0.005
Biological parents prese	0.013	0.044	-0.013	0.046	0.000	0.004	0.000	0.007
Father's schooling	-0.002	0.004	0.0020	0.004	0.00002	0.0004	0.00019	0.001
Mother's schooling	-0.014 ***	0.004	0.016 ***	0.004	-0.001 ***	0.0004	-0.00106 *	0.001
Father's age	-0.0001	0.002	-0.0004	0.002	0.000	0.0002	0.00033	0.0003
Mother's age	0.001	0.003	-0.002	0.003	0.000	0.0003	0.0002	0.0004
Coast	-0.121 ***	0.030	0.118 ***	0.031	-0.002	0.003	0.004	0.004
Predicted Probability	0.233		0.746		0.008		0.013	

Notes:

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

[1] Refers to Productive work

[2] Marginal effect is for discrete change of dummy variable from 0 to 1

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 5.12

Marginal Effects for School attendance and Domestic work, Urban Female 6-17 years

Variables	Pr(school and domestic[1])		Pr(only school)		Pr(only domestic)		Pr(neither school nor domestic)	
	Mg. Effect	S.E	Mg. Effect	S.E	Mg. Effect	S.E	Mg. Effect	S.E
First Born[2]	0.088 *	0.048	-0.111 **	0.045	0.021	0.016	0.003	0.005
Second Born[2]	0.050	0.044	-0.067	0.042	0.014	0.013	0.002	0.005
Third Born[2]	0.017	0.041	-0.014	0.039	-0.002	0.009	-0.001	0.004
Number of Siblings	0.037 ***	0.013	-0.040 ***	0.013	0.003	0.002	-0.0005	0.001
Cohort 14-17 years[2]	0.046 *	0.027	-0.107 ***	0.023	0.051 ***	0.015	0.010 **	0.005
Cohort 11-13 years[2]	0.118 ***	0.020	-0.095 ***	0.020	-0.014 **	0.007	-0.009 ***	0.003
Social Programme[2]	0.016	0.023	-0.022	0.022	0.005	0.005	0.001	0.002
Biological parents prese	0.043	0.049	-0.043	0.047	0.001	0.007	-0.001	0.004
Father's schooling	-0.006	0.004	0.0054	0.004	-0.00003	0.001	0.00022	0.0003
Mother's schooling	-0.006 *	0.003	0.008 **	0.003	-0.002 ***	0.001	-0.00046	0.0003
Father's age	0.0004	0.002	-0.001	0.002	0.0004	0.0004	0.00013	0.0002
Mother's age	-0.002	0.003	0.002	0.002	0.0003	0.0005	0.0002	0.0002
Coast	0.005	0.024	-0.007	0.024	0.002	0.005	0.001	0.002
Predicted Probability	0.814		0.166		0.014		0.007	

Notes:

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

[1] Marginal effect is for discrete change of dummy variable from 0 to 1

[2] Refers to Domestic work

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 5.13

Marginal Effects for School attendance and Productive Work, Rural Female 6-17 years

Variables	Pr(school and productive[1])		Pr(only school)		Pr(only productive)		Pr(neither school nor productive)	
	Mg. Effect	*S.E*	Mg. Effect	*S.E*	Mg. Effect	*S.E*	Mg. Effect	*S.E*
First Born[2]	0.038	*0.083*	-0.114	*0.081*	0.054	*0.035*	0.022	*0.017*
Second Born[2]	0.090	*0.072*	-0.173 **	*0.067*	0.063 *	*0.035*	0.020	*0.015*
Third Born[2]	-0.045	*0.064*	-0.026	*0.060*	0.045	*0.031*	0.026	*0.018*
Number of Siblings	0.007	*0.020*	-0.016	*0.021*	0.006	*0.004*	0.003	*0.002*
Cohort 14-17 years[2]	-0.086	*0.063*	-0.147 ***	*0.054*	0.159 ***	*0.041*	0.074 ***	*0.025*
Cohort 11-13 years[2]	0.068	*0.048*	-0.141 ***	*0.043*	0.055 **	*0.023*	0.019	*0.012*
Social Programme[2]	-0.021	*0.050*	0.009	*0.049*	0.007	*0.008*	0.005	*0.005*
Biological parents present[2]	-0.029	*0.109*	0.023	*0.113*	0.003	*0.017*	0.003	*0.008*
Father's schooling	-0.019 **	*0.008*	0.0201 **	*0.008*	-0.002	*0.001*	0.00014	*0.001*
Mother's schooling	-0.008	*0.008*	0.014 *	*0.008*	-0.004 ***	*0.002*	-0.00185 *	*0.001*
Father's age	-0.001	*0.004*	0.002	*0.004*	-0.001	*0.001*	-0.00044	*0.0005*
Mother's age	0.0003	*0.005*	-0.002	*0.005*	0.001	*0.001*	0.0006	*0.001*
Coast	-0.159 ***	*0.060*	0.116 *	*0.063*	0.019	*0.016*	0.025 *	*0.014*
Predicted Probability	0.585		0.382		0.021		0.012	

Notes:

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

* Marginal effect is for discrete change of dummy variable from 0 to 1

[1] Refers to Productive work

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 5.14

Marginal Effects for School attendance and Domestic Work, Rural Female 6-17 years

Variables	Pr(school and domestic[1])		Pr(only school)		Pr(only domestic)		Pr(neither school nor domestic)	
	Mg. Effect	*S.E*	Mg. Effect	*S.E*	Mg. Effect	*S.E*	Mg. Effect	*S.E*
First Born[2]	-0.020	*0.059*	-0.056	*0.036*	0.073	*0.047*	0.003	*0.004*
Second Born[2]	-0.037	*0.055*	-0.046	*0.032*	0.079 *	*0.045*	0.005	*0.005*
Third Born[2]	-0.078	*0.053*	0.007	*0.034*	0.063	*0.043*	0.008	*0.006*
Number of Siblings	-0.003	*0.011*	-0.005	*0.010*	0.008	*0.005*	0.001	*0.001*
Cohort 14-17 years[2]	-0.260 ***	*0.061*	0.028	*0.035*	0.199 ***	*0.051*	0.033 **	*0.015*
Cohort 11-13 years[2]	-0.009	*0.039*	-0.063 ***	*0.023*	0.070 **	*0.031*	0.002	*0.003*
Social Programme[2]	-0.002	*0.028*	-0.010	*0.025*	0.012	*0.011*	0.001	*0.001*
Biological parents present[2]	-0.005	*0.062*	-0.002	*0.053*	0.006	*0.022*	0.001	*0.003*
Father's schooling	-0.005	*0.004*	0.0059	*0.004*	-0.001	*0.002*	0.00007	*0.0002*
Mother's schooling	0.011 **	*0.005*	-0.005	*0.004*	-0.005 **	*0.002*	-0.00075 *	*0.0004*
Father's age	-0.002	*0.002*	0.003	*0.002*	-0.001	*0.001*	-0.00003	*0.0001*
Mother's age	0.004	*0.003*	-0.006 **	*0.003*	0.002	*0.001*	0.0000	*0.0002*
Coast	-0.045	*0.037*	0.002	*0.027*	0.039	*0.025*	0.004	*0.003*
Predicted Probability	0.879		0.088		0.030		0.003	

Notes:

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

[1] Refers to Productive work

[2] Marginal effect is for discrete change of dummy variable from 0 to 1

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 5.15

Bivariate Probit with mothers aged 35 years or more, Urban children 6-17 years

Regressors	Male				Female			
	School	Productive Work	School	Domestic Work	School	Productive Work	School	Domestic Work
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
First Born	-0.829**	0.346*	-0.833**	0.337*	-0.361	-0.025	-0.444	0.406*
	(0.339)	(0.192)	(0.342)	(0.185)	(0.345)	(0.209)	(0.339)	(0.230)
Second Born	-0.649**	0.340**	-0.638**	0.293*	-0.213	-0.004	-0.272	0.268
	(0.318)	(0.167)	(0.320)	(0.161)	(0.312)	(0.183)	(0.307)	(0.206)
Third Born	-0.545*	0.180	-0.532*	0.167	0.024	-0.156	0.080	0.104
	(0.303)	(0.150)	(0.307)	(0.135)	(0.293)	(0.161)	(0.293)	(0.176)
Number of Siblings	-0.079	0.087	-0.074	0.050	-0.041	-0.033	-0.049	0.196***
	(0.068)	(0.054)	(0.069)	(0.051)	(0.067)	(0.058)	(0.067)	(0.063)
Cohort 14-17 years	-1.539***	0.824***	-1.539***	0.294***	-1.049***	0.790***	-1.001***	0.441***
	(0.322)	(0.112)	(0.323)	(0.106)	(0.268)	(0.118)	(0.269)	(0.120)
Cohort 11-13 years	-0.479	0.503***	-0.470	0.407***	0.357	0.492***	0.413	0.542***
	(0.373)	(0.105)	(0.375)	(0.103)	(0.340)	(0.110)	(0.343)	(0.115)
Social Programme	0.022	-0.023	0.016	0.215**	-0.188	0.050	-0.194	0.103
	(0.144)	(0.106)	(0.145)	(0.096)	(0.159)	(0.106)	(0.161)	(0.110)
Biological parents present	0.183	-0.509***	0.184	-0.212	0.094	0.048	0.099	0.001
	(0.270)	(0.171)	(0.268)	(0.179)	(0.251)	(0.179)	(0.252)	(0.218)
Father's schooling	0.011	-0.027*	0.009	0.009	0.004	-0.004	0.006	-0.016
	(0.019)	(0.015)	(0.019)	(0.014)	(0.022)	(0.015)	(0.022)	(0.017)
Mother's schooling	0.025	-0.054***	0.025	-0.010	0.044**	-0.050***	0.045**	-0.030**
	(0.018)	(0.014)	(0.017)	(0.013)	(0.018)	(0.014)	(0.018)	(0.015)
Father's age	0.005	-0.002	0.005	-0.004	-0.011	-0.003	-0.012	-0.003
	(0.010)	(0.008)	(0.010)	(0.008)	(0.012)	(0.009)	(0.012)	(0.009)
Mother's age	-0.039***	-0.005	-0.042***	-0.007	-0.008	0.001	-0.009	-0.008
	(0.015)	(0.011)	(0.015)	(0.010)	(0.016)	(0.012)	(0.016)	(0.013)
Coast	-0.232*	-0.245**	-0.260*	-0.261***	-0.042	-0.401***	-0.053	0.013
	(0.140)	(0.098)	(0.141)	(0.098)	(0.150)	(0.105)	(0.154)	(0.110)
Constant	4.629***	0.255	4.759***	0.762	2.953***	-0.107	3.074***	0.842
	(0.947)	(0.513)	(0.956)	(0.513)	(0.817)	(0.554)	(0.820)	(0.598)
Rho	-0.207***		0.211***		-0.180**		0.246**	
Log-Likelihood	-971.540		-991.294		-928.980		-779.908	
Sample Size	1290		1280		1263		1254	

Notes:

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

Standard errors robust to within household correlation are reported in parenthesis.

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 5.16

Bivariate Probit with mothers aged 35 years or more, Rural children 6-17 years

Regressors	Male School (1)	Male Productive Work (2)	Male School (3)	Male Domestic Work (4)	Female School (5)	Female Productive Work (6)	Female School (7)	Female Domestic Work (8)
First Born	-0.873**	0.644**	-0.866**	0.266	-0.753**	0.297	-0.732**	0.645*
	(0.372)	(0.252)	(0.362)	(0.234)	(0.367)	(0.261)	(0.370)	(0.349)
Second Born	-0.529	0.268	-0.506	0.310	-0.799**	0.425**	-0.785**	0.392
	(0.348)	(0.206)	(0.339)	(0.211)	(0.339)	(0.216)	(0.340)	(0.269)
Third Born	-0.363	0.279	-0.349	0.137	-0.659**	-0.019	-0.645**	0.044
	(0.332)	(0.176)	(0.318)	(0.167)	(0.323)	(0.173)	(0.323)	(0.230)
Number of Siblings	-0.080	-0.030	-0.076	-0.013	-0.098	-0.023	-0.096	0.054
	(0.064)	(0.054)	(0.065)	(0.048)	(0.074)	(0.062)	(0.074)	(0.073)
Cohort 14-17 years	-1.742***	0.477***	-1.787***	-0.461**	-1.500***	0.142	-1.502***	-0.524**
	(0.364)	(0.181)	(0.379)	(0.180)	(0.293)	(0.180)	(0.297)	(0.237)
Cohort 11-13 years	-0.616*	0.332**	-0.673*	-0.056	-0.596**	0.307**	-0.591**	0.413*
	(0.370)	(0.144)	(0.386)	(0.161)	(0.284)	(0.139)	(0.286)	(0.231)
Social Programme	0.083	0.019	0.089	0.130	-0.202	0.116	-0.206	-0.055
	(0.183)	(0.149)	(0.183)	(0.138)	(0.204)	(0.153)	(0.205)	(0.166)
Biological parents present	0.378	0.038	0.366	-0.480	-0.081	-0.015	-0.065	-0.485
	(0.361)	(0.357)	(0.350)	(0.312)	(0.413)	(0.391)	(0.410)	(0.413)
Father's schooling	0.042	-0.049*	0.039	0.037	0.026	-0.068***	0.025	-0.036
	(0.030)	(0.025)	(0.029)	(0.022)	(0.029)	(0.024)	(0.029)	(0.028)
Mother's schooling	0.079***	-0.051**	0.080***	-0.017	0.079**	-0.037	0.082**	0.013
	(0.030)	(0.025)	(0.029)	(0.021)	(0.034)	(0.024)	(0.034)	(0.031)
Father's age	0.008	-0.014	0.007	0.009	0.020	0.005	0.020	-0.021
	(0.013)	(0.010)	(0.012)	(0.012)	(0.019)	(0.013)	(0.019)	(0.013)
Mother's age	-0.011	0.016	-0.012	-0.020	-0.014	-0.016	-0.014	0.025
	(0.019)	(0.015)	(0.019)	(0.016)	(0.023)	(0.017)	(0.024)	(0.019)
Coast	-0.220	-0.264*	-0.268	-0.176	-0.479**	-0.478**	-0.471**	-0.107
	(0.201)	(0.155)	(0.199)	(0.161)	(0.222)	(0.192)	(0.221)	(0.194)
Constant	2.387**	0.701	2.536**	1.519**	2.633**	1.069	2.606**	1.598*
	(1.144)	(0.797)	(1.170)	(0.734)	(1.138)	(0.833)	(1.141)	(0.965)
Rho	-0.269**		0.163		-0.104		-0.071	
Log-Likelihood	-486.536		-491.597		-467.421		-296.222	
Sample Size	629		629		539		538	

Notes:

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

Standard errors robust to within household correlation are reported in parenthesis.

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 5.17

Bivariate Probit controlling for Income (log), Urban children 6-17 years

Regressors	Male				Female			
	School	Productive Work	School	Domestic Work	School	Productive Work	School	Domestic Work
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
First Born	-0.785**	0.360**	-0.735**	0.390**	-0.348	-0.013	-0.420	0.460**
	(0.321)	(0.178)	(0.318)	(0.173)	(0.315)	(0.192)	(0.312)	(0.208)
Second Born	-0.607**	0.335**	-0.543*	0.254*	-0.251	0.040	-0.304	0.280
	(0.302)	(0.158)	(0.298)	(0.154)	(0.290)	(0.169)	(0.286)	(0.185)
Third Born	-0.505*	0.171	-0.442	0.157	0.012	-0.060	0.070	0.075
	(0.289)	(0.146)	(0.288)	(0.133)	(0.280)	(0.156)	(0.281)	(0.164)
Number of Siblings	-0.069	0.083*	-0.048	0.045	-0.041	-0.034	-0.050	0.159***
	(0.061)	(0.045)	(0.062)	(0.044)	(0.060)	(0.050)	(0.060)	(0.054)
Cohort 14-17 years	-1.378***	0.806***	-1.247***	0.267***	-0.891***	0.757***	-0.857***	0.416***
	(0.249)	(0.099)	(0.208)	(0.098)	(0.188)	(0.105)	(0.187)	(0.110)
Cohort 11-13 years	-0.309	0.440***	-0.161	0.433***	0.562**	0.467***	0.606**	0.445***
	(0.292)	(0.088)	(0.260)	(0.088)	(0.276)	(0.092)	(0.279)	(0.098)
Social Programme	0.147	-0.050	0.109	0.188**	-0.098	0.013	-0.105	0.064
	(0.142)	(0.088)	(0.139)	(0.081)	(0.146)	(0.091)	(0.148)	(0.090)
Biological parents present	0.236	-0.377***	0.237	-0.054	0.003	0.054	0.005	0.152
	(0.250)	(0.136)	(0.247)	(0.148)	(0.228)	(0.149)	(0.228)	(0.169)
Father's schooling	0.012	-0.022	0.019	0.012	-0.005	-0.011	-0.005	-0.018
	(0.019)	(0.014)	(0.019)	(0.013)	(0.020)	(0.014)	(0.021)	(0.015)
Mother's schooling	0.027	-0.045***	0.024	-0.010	0.046***	-0.050***	0.047***	-0.029**
	(0.018)	(0.012)	(0.017)	(0.012)	(0.017)	(0.013)	(0.017)	(0.014)
Father's age	0.004	-0.001	0.004	-0.003	-0.010	-0.000	-0.011	0.003
	(0.010)	(0.007)	(0.010)	(0.007)	(0.010)	(0.008)	(0.011)	(0.008)
Mother's age	-0.041***	0.001	-0.040***	-0.010	-0.010	0.002	-0.011	-0.006
	(0.014)	(0.009)	(0.014)	(0.008)	(0.014)	(0.010)	(0.014)	(0.010)
Coast	-0.172	-0.289***	-0.200	-0.249***	-0.053	-0.378***	-0.059	0.026
	(0.137)	(0.086)	(0.137)	(0.085)	(0.136)	(0.091)	(0.139)	(0.094)
Log_Income	*0.136*	*-0.117**	*0.139*	*-0.104*	*0.019*	*0.061*	*0.022*	*-0.064*
	(0.111)	(0.069)	(0.107)	(0.066)	(0.104)	(0.067)	(0.107)	(0.066)
Constant	3.427***	0.582	3.148***	1.467**	2.884***	-0.734	2.948***	0.887
	(0.977)	(0.576)	(0.958)	(0.589)	(0.938)	(0.589)	(0.954)	(0.628)
Rho	-0.186**		0.180**		-0.192**		0.213**	
Log-Likelihood	-1204.903		-1226.574		-1159.030		-1028.990	
Sample Size	1726		1713		1715		1703	

Notes:

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

Standard errors robust to within household correlation are reported in parenthesis.

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 5.18

Bivariate Probit controlling for Income (log), Rural children 6-17 years

Regressors	Male: School (1)	Male: Productive Work (2)	Male: School (3)	Male: Domestic Work (4)	Female: School (5)	Female: Productive Work (6)	Female: School (7)	Female: Domestic Work (8)
First Born	-0.767**	0.502**	-0.763**	0.425**	-0.914**	0.246	-0.913**	0.310
	(0.313)	(0.225)	(0.306)	(0.217)	(0.377)	(0.231)	(0.379)	(0.287)
Second Born	-0.588**	0.343*	-0.564**	0.293	-0.914***	0.419**	-0.913***	0.223
	(0.284)	(0.194)	(0.278)	(0.191)	(0.354)	(0.198)	(0.353)	(0.234)
Third Born	-0.398	0.380**	-0.381	0.241	-0.697**	-0.001	-0.695**	-0.138
	(0.265)	(0.172)	(0.256)	(0.161)	(0.338)	(0.162)	(0.338)	(0.206)
Number of Siblings	-0.133**	0.017	-0.128**	0.019	-0.118*	0.035	-0.117*	0.026
	(0.058)	(0.052)	(0.059)	(0.044)	(0.068)	(0.055)	(0.068)	(0.061)
Cohort 14-17 years	-1.326***	0.645***	-1.335***	-0.416***	-1.518***	0.188	-1.511***	-0.314
	(0.239)	(0.163)	(0.240)	(0.158)	(0.284)	(0.160)	(0.285)	(0.207)
Cohort 11-13 years	-0.280	0.448***	-0.304	0.013	-0.723***	0.332***	-0.712***	0.422**
	(0.233)	(0.124)	(0.236)	(0.135)	(0.268)	(0.122)	(0.268)	(0.192)
Social Programme	0.187	0.039	0.185	-0.010	-0.191	-0.025	-0.191	0.050
	(0.176)	(0.129)	(0.177)	(0.122)	(0.193)	(0.133)	(0.193)	(0.157)
Biological parents present	0.368	0.187	0.377	-0.620**	-0.079	-0.073	-0.080	-0.002
	(0.310)	(0.293)	(0.302)	(0.286)	(0.394)	(0.303)	(0.395)	(0.330)
Father's schooling	0.055**	-0.038*	0.055**	0.040**	0.033	-0.051**	0.033	-0.041
	(0.028)	(0.022)	(0.028)	(0.020)	(0.029)	(0.022)	(0.029)	(0.025)
Mother's schooling	0.049**	-0.049**	0.050**	-0.014	0.086***	-0.032	0.087***	0.032
	(0.024)	(0.021)	(0.024)	(0.019)	(0.032)	(0.021)	(0.033)	(0.027)
Father's age	0.009	-0.013	0.010	0.013	0.014	-0.005	0.014	-0.017
	(0.011)	(0.009)	(0.011)	(0.012)	(0.018)	(0.011)	(0.018)	(0.012)
Mother's age	-0.008	0.018	-0.008	-0.010	-0.018	0.003	-0.018	0.034**
	(0.016)	(0.012)	(0.016)	(0.014)	(0.022)	(0.013)	(0.022)	(0.017)
Coast	-0.049	-0.295**	-0.075	-0.188	-0.481**	-0.352**	-0.474**	-0.039
	(0.178)	(0.136)	(0.178)	(0.140)	(0.212)	(0.162)	(0.211)	(0.167)
Log_Income	*0.104*	*-0.170**	*0.102*	*-0.087*	*-0.235**	*-0.003*	*-0.232**	*0.060*
	(0.114)	(0.088)	(0.116)	(0.088)	(0.128)	(0.093)	(0.129)	(0.114)
Constant	1.270	1.168	1.237	1.436*	4.782***	0.501	4.753***	0.199
	(1.111)	(0.772)	(1.134)	(0.778)	(1.243)	(0.841)	(1.239)	(1.010)
Rho	-0.288**		0.085		-0.054		0.003	
Log-Likelihood	-637.930		-626.525		-606.463		-374.931	
Sample Size	820		818		716		714	

Notes:

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

Standard errors robust to within household correlation are reported in parenthesis.

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.

Table 5.19

Trivariate Probit of school attendance, productive and domestic work
Urban Females 6-17 years

Regressors	School	Productive Work	Domestic Work
First Born	-0.443	0.008	0.456**
	(0.312)	(0.191)	(0.210)
Second Born	-0.316	0.049	0.280
	(0.276)	(0.167)	(0.188)
Third Born	0.057	-0.091	0.072
	(0.270)	(0.154)	(0.166)
Number of Siblings	-0.052	-0.030	0.161***
	(0.059)	(0.050)	(0.055)
Cohort 14-17 years	-0.825***	0.738***	0.408***
	(0.204)	(0.105)	(0.110)
Cohort 11-13 years	0.524**	0.453***	0.459***
	(0.229)	(0.092)	(0.099)
Social Programme	-0.080	-0.007	0.100
	(0.152)	(0.090)	(0.090)
Biological parents present	-0.000	0.038	0.155
	(0.223)	(0.151)	(0.169)
Father's schooling	-0.001	-0.008	-0.021
	(0.019)	(0.014)	(0.015)
Mother's schooling	0.048***	-0.049***	-0.031**
	(0.016)	(0.013)	(0.014)
Father's age	-0.011	0.001	0.003
	(0.010)	(0.007)	(0.008)
Mother's age	-0.008	0.005	-0.007
	(0.014)	(0.010)	(0.010)
Coast	-0.068	-0.380***	0.034
	(0.138)	(0.091)	(0.095)
Constant	2.942***	-0.452	0.485
	(0.725)	(0.446)	(0.477)
Rho1: school-productive	-0.068		
Rho2: school-domestic	0.229***		
Rho3: productive-domestic	0.208***		
Rho1=Rho2=Rho3=0	Rejected***		
Log-Likelihood	-1939.228		
Sample Size	1715		

Notes:

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

Standard errors robust to within household correlation are reported in parenthesis.

Source: Peru 2007 NCLS . Questionnaire addressed to the indirect respondent.