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## **Children's Time Use, Labor Division, and Schooling In Indonesia**

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## **Children's Time Use, Labor Division, and Schooling in Indonesia**

### **Abstract**

Using both time diary and qualitative data collected from Indonesia, this paper examines the association between gender and sibship composition on children's time use across four activities—schooling, market labor, non-market oriented labor (i.e. housework/childcare activities), and leisure. The quantitative results show that failing to consider children's contributions to domestic labor underestimates children's labor responsibilities, especially for girls. Once domestic labor is considered, girls spend more time working and less time enjoying leisure. Girls' time is also more sensitive to sibship composition. Older female siblings reduce their sisters' labor responsibilities while younger brothers increase work for their sisters. However, increases in workload do not parallel decreases in schooling but parallel decreases in leisure. Qualitative data collected from focus groups show that parents are reluctant to trade-off children's schooling for labor and that parents desire equal amounts of education for their sons and daughters. Taken together, the results provide descriptive evidence that girls' leisure time is traded off for work rather than schooling for work.

It is widely acknowledged that minimum levels of quality education provide individuals and families the knowledge and the means to improve health (Thomas et al. 1991; Lloyd and Blanc 1996; Desai and Alva 1998; Glewwe 1999) and lower fertility (Bongaarts 1978; Weinberger 1987; Gertler and Molyneaux 1994). International agencies have identified universal primary education as critical to ensuring economic development among the world's poorest countries, placing particular emphasis on rectifying disparities in educational attainment among boys and girls (United Nations 2004). With the growing recognition of the importance of education, international attention has also grown over the prevalence of child labor in developing countries with the concern that households with minimal resources and who place less value on education trade-off investments in their children's schooling for the short-term financial gains associated with child labor (Bellamy 2004). These concerns highlight the importance of better characterizing the nature of children's time use in both educational and non-educational activities in developing countries. By better characterizing how children spend their time, we can obtain a better understanding of the specific types of economic and social roles children are expected to fulfill within the household and why disparities in how children's time is "invested" across educational and non-educational activities may arise.

A growing line of research has emerged in the United States and other developed countries that utilizes time diary data to examine how parents and children spend their time (Bianchi and Robinson 1997, Bianchi et al. 2000, Gershuny 2000, Mattingly and Bianchi 2003). However, to my knowledge, there are no published studies of children's time use in developing countries that use large-scale data of this kind. Research that uses time diary data introduce advances to the study of child labor and schooling in developing countries by providing a more comprehensive description of the economic and social activities children perform within the household.

Most importantly, time diary data allow for detailed examination of gender divisions in children's labor activities and allow researchers to explicitly consider how gender divisions in children's labor responsibilities may result in disparities in schooling time among boys and girls. Economic activity or the "supply of labour for the production of economic goods and services" is commonly used in the literature to define the population of children who are considered to be working (ILO 2002). However, when labor is defined as including only market-oriented activities, the labor contributions of females to the household are underestimated because housework and childcare, which are primarily performed by women, are not considered (cite the Bianchi and others studies on gender divisions). This underestimate is particularly significant in developing countries where poor public infrastructure (e.g. electrification and water piping) increase the domestic burdens placed on women's time (Desai and Jain 1994; Ilahi 2000). Time diary data provides a unique opportunity to capture the full range of activities children perform in the household by expanding traditional definitions of labor to include both market oriented labor and labor related to housework and childcare.

Using time diary data collected from Central Java, Indonesia, this article examines the correlates of children's time use across four different activities: market oriented labor (both paid labor performed outside the home and unpaid labor performed in home production), non-market oriented labor such as housework and childcare responsibilities, schooling activities and leisure. First, this article characterizes gender divisions in children's time use by expanding traditional definitions of labor to take into account housework and childcare activities. Second, this article explores the extent to which children's time use is influenced by their position within the household with respect sex, age, and birth order. I examine the association between time use and sibship composition (e.g. how children's age and sex relative to their siblings jointly influences the allocation of labor, schooling and leisure time among siblings). Third, the article explores the

potential for trade-offs between work, schooling, and leisure. While the analysis employed in this article does not allow for a direct test of trade-offs in children's time use, the descriptive findings provide insight into whether potential trade-offs exist. Finally, this article combines the quantitative findings from the analysis of time diaries with qualitative information collected from focus groups conducted in a rural village in Central Java to obtain a better sense of the expectations and attitudes that potentially motivate parents' and children's time allocation decisions.

### *Theory and Background*

Time is an important family resource and how it is invested across different activities may play an important role in determining children's human capital and social capital development, formulating gender roles within the family, and developing children's attitudes towards work and schooling. In the following section, I will review the literature on family resource allocation paying particular attention to theories that seek to explain why disparities in resource allocation may arise within the household. The theories proposed in the literature can be roughly separated into two broad themes. The first set of theories describes a general model of resource allocation that suggests that parental preferences and resource constraints jointly determine how resources are allocated within the family. The second set of theories details potential factors that may constrain and influence parental choices.

### *Altruism Model*

Economic models of family resource allocation state that the outcomes of parental decisions regarding how resources should be distributed across family members reflect parental preferences toward their children, the endowments of children (e.g. intelligence, motivation, ambition, etc.) and the amount of resources, market opportunities, and credit available to the family (Becker 1981; Behrman, Pollak, and Taubman 1995). In particular, resources are

allocated according to a sharing rule that is determined by two important components: 1) a utility function which can be viewed as a measure of parental tastes or tolerance for inequality in the distribution of resources within the family, 2) a budget constraint which determines the amount of resources available to the family. This approach to modeling family behavior, called the altruism model, was formally introduced by Gary Becker (1981) and is based on the assumption that parents make decisions regarding the allocation of resources by taking into consideration the welfare of their children in addition to their own (Parish and Willis 1993). As Becker notes, the outcomes of allocation decisions reflect both parental preferences and the available opportunities (e.g. family income, wealth, relative endowments of each child, and labor market opportunities, etc.) (1981).

Therefore, disparities in how resources are distributed among children can arise for several reasons. For example, if parents favor boys, sons will receive more resources (e.g. investment in human capital) than daughters. But even if parents exhibit egalitarian preferences toward their children, disparities may still result due to differences in the endowments of children and biases in the labor market (e.g. gender discrimination that results in differential returns to schooling). Parents maximize family wealth by efficiently investing in children, meaning that parents will allocate more resources towards children who have a higher marginal rate of return to investments (Becker 1981). Additionally, if different returns to education exist in the market due to gender discrimination in the workplace, parents may choose to educate their sons instead of daughters not because they prefer sons to daughters, but because allocation decisions reflect differential returns in the economy. Buchmann finds some support for this theory in Kenya (2000). Specifically, she finds that parents' evaluation of the expected returns associated with investment in boys' and girls' education largely motivates why parents are more likely to invest in the education of their sons over their daughters.



In the Indonesia context, however, differences in the returns to schooling actually favor women over men; returns to education are lower for males with secondary and tertiary schooling than for females (Deolalikar, 1993). While a gender gap in enrollment rates still persists, Deolalikar speculates that evaluations of expected future returns to education motivate decisions to invest in schooling and may explain why women have been entering higher education in greater numbers over the years (1993). This finding suggests that if parents in Indonesia are investing in children's education with an eye towards expected future returns, parents should be investing more heavily in girls' education than in boys'. Under this scenario, the empirical findings from this paper should show that girls are spending more time on schooling activities than boys.

#### *Patriarchal Norms*

The altruism model says little about the social and cultural factors that may help shape parental preferences towards their children. An alternative theory suggests changing patterns in economic development, such as modernization, migration into urban, industrial areas, and new sex patterns of productive work, heighten existing patriarchal norms and give rise to the division of labor between the sexes (Boserup 1970, Greenhalgh 1985). Boserup argues that as agriculturally based economies begin industrializing, greater specialization in skills and knowledge is required in the work force (1970). Gender inequality in the labor market leads to sex-segregation in the workplace, which forces women to work in less prestigious and lower paying jobs. In the East Asia context, studies have found that the responsibility of financing the schooling of younger siblings falls on the shoulders of older sisters who are the most likely to trade-off schooling for work (Greenhalgh 1985).

Patriarchy may help explain differences in outcomes across societies and subgroups that vary in attitudes regarding gender roles. From a comparative standpoint, patriarchy may, in part,

explain potential differences in patterns of time and resource allocation among East and Southeast Asian families, on one hand, and Southeast Asian families, on the other, where patriarchal traditions are less severe. Family relations in Indonesia are not strongly patriarchal, and parents do not have strong gender preferences with regard to the composition of children (White, 1977; Hart, 1978). Javanese family descent is bilateral and nuclear families are the primary unit of social organization.

Other cultural factors may contribute to gender stereotyping and lead to gender divisions in children's time use. While women have long participated in economic activities outside the household economy, there is a common Javanese saying that "women are the ministers of the interior," meaning that women take the lead in household matters (White 1977; Hart 1978). This outlook may give rise to a division of labor early on that encourages female adolescents to play a greater role in childcare and housework while encourages male adolescents to invest their time and effort in the family business. Additionally, Indonesia's economy is dependent on agriculture. Nearly 80% of households in the study site reside in rural areas and nearly 60% of households own farmland. As a result, family members provide an important source of labor for farm businesses, suggesting that children potentially become economically productive at an early age.

#### *Resource Dilution and Credit Constraints*

The literature has widely examined family dynamics as a possible determinant of differential educational attainment among siblings within and among families. Factors that have been commonly examined in the literature include sibship size and sex composition, parental educational attainment, and family structure (such as the influence of nuclear versus extended family structure). Blake's resource dilution theory posits a negative correlation between sibship size and child achievement outcomes (1989). The theory states that larger families (i.e. families with more children) have less resources, both financial and non-financial resources, available for

each child. Therefore, children with many siblings are less likely to be enrolled in school, have lower schooling achievement and are more likely to participate in labor activities than children with fewer siblings.

While the resource dilution hypothesis may help to explain why disparities among families may exist, it cannot explain why disparities in investments among siblings within the same family may develop. Some findings also show that, net of sibship size, birth order is associated with lower educational attainment and higher rates of child labor. In Peru, Patrinos and Pscharopolous find that children with younger siblings are more likely to be pulled out of school and are also more likely to participate in market oriented labor activities (1997). Other studies show that birth order is particularly important in determining the time allocation of girls. In Mexico, Binder finds that birth order and nuclear family structure are positively correlated with for girls' schooling but not for boys suggesting that girls' schooling depend more on the specific gender roles they are expected to play in the household (1998). In Ghana, it is the older sisters that are most negatively affected by having younger siblings. Girls with younger siblings are less likely to be enrolled in school and are more likely to drop out of school than boys (Lloyd and Gage-Brandon1994).

Birth order effects in the allocation of resources may be a result of credit constraints. As proposed by Parish and Willis, credit constraints faced by the family at different stages in the life cycle may be one possible explanation for why older siblings are more likely to participate in child labor and suffer from lower educational attainment (1993). They posit that parents in the early stages of their careers may face stricter resource constraints than parents with more established careers and who have accumulated savings. As a result, children who were born early cannot benefit from their parents' financial stability as much as children who are born later (Parish and Willis, 1993). Because of credit constraints faced at different stages in during a

households' life-cycle, disparities in investments in education and labor responsibilities may result among siblings according to birth order.

The theories discussed above suggest that disparities in children's schooling attainment and labor activities can be accounted for by credit constraints faced by the family, family characteristics, and evaluations of expected returns to education. In this paper, I am particularly interested in using detailed time allocation data collected from Indonesia to examine how family characteristics, particularly sibship composition, may influence how children's time is "invested" across 4 mutually exclusive categories: schooling, market labor, non-market labor which includes both childcare and housework, and leisure. As discussed above, sibship size has been shown to dilute both the monetary and non-monetary resources available to children and lower children's educational attainment. Using detailed time allocation, I examine whether sibship size is also positively correlated with children's labor and negatively correlated with leisure activities, in addition to its potential negative association with schooling activities. Net of the effect of sibship size, children's social and economic position within the family may be, in part, determined by sibship age-sex composition. In this paper, I will examine 1) potential gender divisions' in children's time use, 2) explore whether older siblings, particularly older sisters, act to reduce their younger siblings' workload, 3) examine whether potential increases in children's workload also corresponds to decreases in educational activities in order to assess the potential for trade-offs in children's time use.

## **Data**

### *Discussion of Data Used in the Quantitative Analysis*

The data are drawn from the Worker Iron Status Evaluation (WISE)—an on-going longitudinal survey of 4,662 households in one district in Central Java, Indonesia. Households are interviewed every four months, over a period of 28 months. In each round of data collection

all respondents over the age of eight, nearly 17,000 individuals, were asked in detail about how they spent the previous, 24 hour period. Respondents were asked about the sequence of their activities beginning at 4 a.m. Each activity was classified into 26 activities by interviewers. Interviewers also record starting and stopping time on a grid that divides the 24 hour day into 96,15-minute intervals. Children between the ages of 8 to 11 have an adult member of the household complete their time diary<sup>1</sup>.

This time diary approach focuses on the chronology of events over a short period of time. This method, referred to as the time diary approach, provides a better measure of actual time spent on activities and more accurately captures non-market oriented activities, such as time spent on housework and childcare, compared to traditional retrospective questions on time use (Robinson 1977, Juster and Stafford 1985, Gershuny 2000). Nevertheless, time use data are susceptible to measurement error. WISE surveys a population that is predominately Muslim and prays at five specified times throughout the day. This practice helps to ground people's sense of time into concrete time blocks and helps to mitigate measurement error in WISE.

The analysis investigates the impact of sibling age-sex composition on labor divisions among children between the ages of 8 and 18 years old. The survey does not collect time use information on children below age 8. I set the upper age limit of my sample at age 18 years because I am interested in examining the effects of labor participation on the educational attainment of individuals up to the high school level. As a result, the years between the ages of 8

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<sup>1</sup> An important concern may be that time use reported by adults for their children may be biased. For example, adults may be more likely to report that their children are in school or doing homework rather than working. In this case, one would expect to see reported time spent working uniformly lower among children age 8 to 11 relative to children age 12 to 18, in addition to a discontinuous change in reported time use around age 12. Such discontinuous changes in time use cannot be found for children age 8 to 11, who had an adult member of the household complete their survey, and children age 12 to 18, who reported time use for themselves.

and 18 are the most critical for children in terms of any possible trade-offs between labor and schooling.

A criterion for inclusion in the study required that each household contain at least one member over the age of 30. For this reason, the survey is missing households in which all members are under the age of 30. Therefore the sample is weighted towards older households and includes 2,130 households without children between the ages of 8 to 18 years old. From the first round of data collection, I obtained time allocation information on 4,110 children between the ages of 8 and 18. Out of this sample, 641 children had either a dead mother or mother who was not living in the household. Among the set of children who had either a dead or nonresident mother, 138 children and their familial relations were identified through their fathers.

Sibship size, sibling age-sex composition variables, and all other household and child-specific variables used in the model were created using information obtained from the first round of data collection. Information on children's time use was pooled across four waves of data to obtain an average measure of time allocation. Only children who were present in all four waves of data collection on time allocation were included in the sample, resulting in a total of 679 children who were originally present in the first round being dropped from the sample. The final sample includes 2,928 children between the ages of 8 and 18 (1,576 boys; 1,352 girls) and 1,930 households.

While the study limits the analysis of labor activities to children between the ages of 8 and 18, sibship composition with respect to sex and birth order is defined over the entire set of children who are age 18 years or younger, who share the same biological mother or, if a biological mother is not present, who share the same biological father, and who live in the same household. For the purposes of this paper, children who live under the same roof are not treated as siblings by virtue of residence. In this paper, I am interested in examining time allocation that

results from the decisions of children and their parents rather than time allocation that results from decisions of children and other adult members of the household. For this reason, children who did not have mothers or fathers living in the household or children with deceased mothers or fathers were not included in the analysis<sup>2</sup>.

### *Discussion of Data Used in Qualitative Analysis*

Fieldwork was conducted to assess parent's expectations and attitudes for their children's futures and to assess children's expectations and attitudes for their own future. Qualitative data was collected during a 10 day period in February 2004. All fieldwork was conducted in Imogiri, a rural village in the same province where the WISE data are collected and consisted of focus group interviews on a variety of issues related to parental expectations for their children and adolescent children's own expectations for themselves on education, occupation, migration, marriage, and fertility. Four sets of focus groups were separately conducted. Each focus group consisted of 7-10 individuals. Focus group interviews were conducted with mothers with adolescent children between ages 6 to 14, fathers with adolescent children between age 6 to 14, and adolescent boys and girls between ages 6 to 14. Individuals were selected from different households so that individuals within focus groups and across focus groups did not belong to the same household.

### **Measures**

#### *Children's Time Use*

In this paper, I divided the total time spent in a 24 hour period into 4 mutually exclusive

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<sup>2</sup> The fact that non-related children are not included in the sample may introduce biases in the results. Non-related children living in the household may be contributing labor to the household and their contributions are not included in the analysis. In fact, non-related children may be performing more work than related children because their parents are not present to ensure their wellbeing. As a result, related children may be benefiting from having non-related children living in the household.

and exhaustive categories: market labor, non-market labor, education, and leisure. Market labor includes time spent in a day on work around the farm or homestead, manual labor, construction, building activities, retail, sales, and work as domestic servant or gardener. Non-market labor includes time spent in a day on cooking, shopping for family, cleaning, dusting, ironing, other household chores, fetching water and firewood, and all activities associated with tending to the sick, elderly and children. Education includes both attending school and time spent studying and working on homework. Leisure is a residual term. It includes time spent sleeping, on personal activities (e.g. eating, bathing, praying), playing sports, watching television, entertaining friends, and traveling. Time in each of these four categories is measured in hours. To obtain more accurate estimates of usual patterns of time use, averages of time spent in each of the four activities were taken across 4 waves of data.

#### *Sibling Age-Sex Composition*

In preliminary analysis, the results showed gender differences in correlations between family characteristics and children's time use. In order to explicitly examine gender differences in children's time use, the sample is stratified by sex. Several measures of sibling age-sex composition are also included. The presence of young siblings may place additional burdens on older siblings if older children are expected to contribute to childcare duties. Therefore, I include a variable that measures the number of siblings under the age of 6 in the model. I assume that having a female or a male sibling under the age of 6 has the same effect on their older siblings' time use since at young ages there should be no significant differences between the amount of care a boy needs versus the amount of care a girl needs.

In previous studies of the determinants of children's time allocation, sibship size and birth order variables are used to capture aspects of sibship composition (Ilahi, 2000; Patrinos and Psacharopoulos 1997; Binder 1998). In this study, I examine the simultaneous effect of birth



order and gender dimensions, net of the effect of sibship size, on time use. In preliminary analysis, several models were estimated. First, a restricted model was estimated which included only sibship size, although with other household level variables. The results showed that sibship size was positively associated with labor activities and negatively associated with schooling. More complex measures of sibship composition were estimated in order to capture the effects of sibship age and sex composition on children's time use. In this paper, I am interested in examining the simultaneously the effect of each child's age-sex characteristics relative to his/her siblings' characteristics on time use patterns.

Individual level age-sex composition variables were included to capture the number of siblings under the age of 6 and the number of male and female siblings living in the household who are older than age 18. Among those children between the ages of 6 and 18, I generate age-sex composition measures that include the number of older brother, number of older sisters, number of younger brothers, and number of younger sisters (the omitted category). I hypothesize that the age-sex sibship composition will only relate to patterns of time allocation after siblings are old enough to take on labor responsibilities. For example, the effect of having a younger sibling who is age 5 should be different than the effect of having a younger sibling who is age 10 and capable of working. Therefore, the age-sex composition variables are created over the set of children who are 6 years and older. I distinguish between siblings above the age of 18 from siblings between age 6 and 18 because in order to differentiate between the effect of having an older sibling between the ages of 6 and 18, who may still be in the process of completing primary and secondary schooling, from the effect of having an adult sibling, who is above the age of 18 and who has fully completed secondary schooling. Independent of the age-sex composition of siblings, there may be a positive association between time use and children's age.

In this paper, age is treated as a continuous variable<sup>3</sup>. Age squared is included as a variable to capture possible non-linearity in the effect of age on time allocation.

### *Household Characteristics*

Both parents' education and age may influence the value parents place on their children's education and child rearing practices. Better educated parents may place higher value on their children's schooling because better educated parents may have a better understanding of the expected payoffs associated with educational investments. Mothers' and fathers' education are introduced separately in the model to allow for the possibility that mothers' and fathers' education may have different effects on children's time allocation. Additionally, both mothers' and fathers' age are included in the analysis. Older parents may have more experience with child rearing, be more financially stable and less vulnerable to the pressures of child rearing, and, as a result, be less likely to burden children with labor activities.

I include household wealth as the main measure of socio-economic status. Household wealth is a measure of total household assets such as the value of the house, land, vehicles, savings and stocks. Household wealth is converted from Indonesian *rupiah* to U.S. dollars and is scaled in a way such that each unit increase in household wealth should be interpreted as equivalent to a \$1,000 increase in household wealth.

A dummy variable for rural residence is also included. Agriculture is the main source of economic activity in rural areas and families often depend on child labor to supply the needed

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<sup>3</sup> The model has also been estimated using non-parametric measures for age in order to examine the possibility that the demands and expectations placed on children with regard to schooling and work increase with age. I have estimated models that include age as a series of dummy variables with age 15 as the omitted category. I have also estimated models that include age as a series of dummy variables with age measured as separate dummy variables up to age 15 and one dummy for the interval of ages from 16 to 18. The results do not change substantively. In particular, the effect of sibship composition does not change in any meaningful way when age is measured non-parametrically.

inputs into household production. Both increased participation and increased time spent in market labor is expected for those children who live in rural areas. Rural areas are also less likely to have electricity and indoor plumbing. Therefore, one would also expect to see more child labor in rural areas and children from rural areas starting to working at earlier ages. I interact rural residence with age and a square term for age to account for the possibility that the age at which children become involved in market labor (i.e. agricultural activities) and in housework (e.g. fetching water and gathering fuel for the household) may differ between rural and urban households.

### **Sample Characteristics**

Table 1 provides the mean sample characteristics. Approximately 83% of the households reside in rural areas. On average, fathers have 7.24 years of education and mothers have 6.23 years. Each child has on average 1.82 siblings, 0.25 adult sisters above the age of 18 years and 0.12 adult brothers living in the household. This difference may in the number of adult sisters and brothers living in the household among girls and boys may reflect differential migration patterns among adult children. Girls above the age of 18 may be less likely to migrate out of the household in search of work related opportunities and/or more likely to stay at home to provide childcare and tend to aging relatives. Because selection bias may be particularly problematic when considering the effect of adult siblings on their younger siblings' time use, interpretations of this effect should be made with this caveat in mind.

Table 2 presents the general time use patterns for boys and girls. On average, girls spend more time working than boys. Girls spend a total of 1.87 hours working; girls spend 0.34 hours in market labor and 1.53 hours on non-market labor. Boys spend a total of 1.42 hours working; they spend 0.70 hours on market labor and 0.72 hours on non-market labor. Children of both sexes are more likely to participate in non-market labor than in market labor. Boys are more

likely to participate in market labor than girls; 47% of boys and 27% of girls perform some amount of market-oriented activity. Among children who work, the gender gap in actual time spent working shrinks; girls work on average 1.26 hours and boys work 1.51 hours. Girls are more likely to participate in non-market labor than boys; nearly all girls perform housework and/or childcare, 93%, while 76% of boys perform some amount of non-market labor. Among children who perform non-market labor, girls spend nearly twice the amount of time working; girls spend 1.64 hours per day while boys spend 0.95 hours per day on housework and/or childcare. In addition to spending more time on labor activities, girls also spend more time on educational activities, approximately 30 minutes more per day than boys. As a result, girls spend approximately one hour less per day on leisure activities than boys. Sex differences in time use are significant at the 1% level for non-market labor, market labor, education, and leisure.

### **Model Specification**

In this paper, I examine the association between sibling age-sex composition and patterns in children's time use across four mutually exclusive and exhaustive activities: market labor, non-market labor, education, and leisure. I estimate the correlates of time spent on each of the four activities separately. Since a significant portion of children do not work in either market or non-market oriented activities, I model children's time use on labor activities in a two step process. First, I look at the determinants of labor participation using a logistic regression. Next, I estimate the determinants of total time spent on each activity conditional on labor participation using a linear regression.

There are two important limitations to the method employed in this paper. First, in estimating the correlates of total time spent on market and non-market labor, I do not correct for the possibility of selection between those children who work and those children who do not work. This may be problematic because the characteristics associated with children who work are most

likely different than the characteristics associated with children who do not work. For example, parents who believe that child labor helps to develop strong work ethic among children may be more likely to encourage their children to work. To the extent that parental “tastes” for child labor are not fully accounted for by parents’ education, the estimated results may be biased. Second, it is also important to note that while decisions regarding how time should be allocated across schooling, labor and leisure activities are treated as independent processes in this paper such decisions are most likely made jointly. In reality, decisions regarding how time should be spent across multiple activities tend to be made jointly with individuals simultaneously considering all their options. For example, parents may decide to reduce the amount of farm related work performed by girls so that they can help out in the home by performing housework or childcare. Children may choose to work less so that they have more time for leisure. The analysis employed in this paper does not address this aspect of the decision-making process.

The results of this paper should be considered as largely descriptive in nature and one should be cautious in drawing causal inferences from the findings. In spite of these limitations, this paper constitutes the first large-scale study of children’s time use in a developing country that employs time diary data and provides important descriptive information regarding the associations between family characteristics, sibling composition and children’s time use. Additionally, the empirical findings and the analysis employed provide the necessary first steps towards a more complex approach which explicitly considers the issue of selection and the joint aspect of time allocation decisions.

Another econometric issue is introduced by the use of sibling data. Correlations exist between the error terms among siblings because of shared unmeasured family characteristics. If these correlations are not corrected, results may be spuriously significant (Hox 2002). A standard practice in the literature is to use a robust estimator to adjust for contextual clustering (Parish and

Willis, 1993; Lloyd and Blanc 1996, Buchmann, 2000). The estimation process first estimates the model using standard Least Squared techniques and subsequently adjusted for clustering or intra-class correlation (Mason 2001). Robust regressions that adjust for clustering at the household level can be represented by the following form:

$$Y_{ij} = b_0 + b_1G_j + b_2X_{ij} + b_3G_jX_{ij} + \varepsilon_{ij}$$

where  $j = 1, 2, \dots, J$  denotes households and  $i = 1, 2, \dots, n_j$  denotes individuals within household  $j$ .

In this paper, I will estimate 6 separate models for time use across 4 activities. With respect to the models estimated,  $Y_{ij}$  alternately represents a binary term for market labor participation, total hours spent on market oriented activities conditional on participation, a binary term for non-market labor participation, total hours spent on non-market labor conditional on participation, hours spent on educational activities, and hours spent on leisure. At the individual level,  $X_{ij}$  includes all child specific characteristics such as age, sex, sibship size and the sibling age-sex composition variables. At the household level,  $G_j$  includes all household characteristics such as household wealth and parents' education. Interactions between household level and child specific characteristics, such as interactions between age and rural residence, are represented by,  $G_jX_{ij}$  (Mason 2001)<sup>4</sup>.

## **Results**

### *Sibship Size*

Resource dilution theory argues that sibship size dilutes the resources available to invest in children's schooling. If parents respond to resource constraints by turning to child labor, one

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<sup>4</sup> Random effects models were also estimated in this paper. The results from the random effects approach and the robust regression approach are not significantly different. Results from the random effect estimation also show that variation in time use among children is mainly the result of variation across households rather than variation within household. Because of the strong assumptions concerning the structure of the error terms associated with a random effects model, I opted for a more conservative approach and employ robust estimators in this paper.

would expect sibship size to be associated with decreases in time spent on schooling and leisure activities and increases in child labor. The results are not fully consistent with this argument. Table 3 shows that net of sibship composition and all other family-specific and child-specific characteristics, sibship size is associated with a decrease in boys' schooling time and an increase in the girls' market participation. Sibship size is associated an 11 minute or 0.186 hour per day decrease in time spent on educational activities for boys. However, increases in sibship size do not correspond to an increase in boys' labor activities once other aspects of sibship are taken into account. For girls, sibship size has no net correlation with schooling activities but is positively associated with market labor participation. Each additional increase in sibship size is correlated with a 0.211 increase in the log odds of market labor participation. This increase in labor participation does not correspond with decreases in schooling activities, nor decreases in leisure time.

The observed association of sibship size with time use patterns may reflect the indirect effect of wealth and parents' education on children's time use patterns. Sibship size is not randomly assigned to families. Individuals base fertility decisions, in part, on their desired family size, and fertility choices are highly correlated with the education level of parents and family wealth (Morgan and King, 2001). More educated and wealthier parents are more likely to reduce fertility in favor of increasing the amount of family resources available for each child. Because fertility choices are highly correlated with household wealth and parents' education, the observed correlations between sibship size and time use may also partially reflect the effect of parents' education and wealth on time use.

#### *Youngest Siblings (younger than 6 years)*

In the following sections, I will discuss the results of sibship composition on children's time use. Recall that the omitted category among the sibship composition variables is the number

of younger sisters between the ages of 6 and 18. Therefore, all interpretations of the sibship composition results (although not sibship size) should be made in reference to this omitted category. For example, if the number of older sisters between the ages of 6 and 18 is associated with a 0.246 increase in girls' leisure time, the results should be interpreted as the following: each additional older sister between the ages of 6 and 18, relative to the addition of a younger sister between the ages of 6 and 18, is correlated with a 0.246 increase in girls' leisure time. In the discussions of the results below, I will not make repeated references to the omitted category, although the reader should keep this in mind.

The results from Table 3 also show that, among all other sibship composition effects, the number of siblings under the age of 6 have the strongest association with children's time use. Net of sibship size, the number of siblings younger than 6 years living in the household increases boys' market labor responsibilities and increases the amount of housework/childcare duties of both boys and girls. These observed increases in workload, however, do not correspond with a decrease in educational activities, but do correspond to a decrease in children's leisure time. The addition of a youngest sibling is correlated with a 15 minute or 0.243 hour increase in market labor for boys; a 0.433 increase in the log odds of boys' non-market labor participation; and an increase in the amount of time both boys and girls spend on non-market labor, 8 minutes or 0.136 hours for boys and 24 minutes or 0.393 hours per day for girls. Leisure time is also correlated with the number of siblings under age 6. With each addition of a sibling under the age of 6, leisure time decreases by 20 minutes or 0.341 hours for boys and decreases by 21 minutes or 0.352 hours for girls. Education for both boys and girls remains unaffected by the presences of children under the age of 6.

Table 4 presents the predicted time use on labor, schooling and leisure activities for children with and without a sibling under the age of 6, adjusted at the sample mean for all other



variables. Among all children, boys with a young sibling spend the most time working on market labor, 42 minutes or 0.705 hours per day. Boys without a young sibling spend approximately 30 minutes per day working on market oriented activities. Overall, boys spend significantly more time on market labor than girls; they spend over 22 minutes per day than girls ( $0.504 - 0.132 = 0.372$  hours among children with no young sibling;  $0.705 - 0.120 = 0.59$  hours among children with one young sibling). The average time girls spend performing market labor increases once I condition on participation but the gender gap persists; boys spend at least 38 minutes more per day on market labor than girls ( $1.151 - 0.521 = 0.63$  hours among children with no young sibling;  $1.394 - 0.557 = 0.837$  hours among children with one young sibling). Among children who perform market oriented activities, boys with a young sibling spend the most time working in market labor, 1.394 hours per day, among children with one or less younger siblings under the age of 6.

The presence of a young sibling increases the probability of non-market participation for boys. The fact that it is not statistically significant for girls may be, in part, due to the finding that nearly all girls participate in non-market labor, irrelevant of whether a younger sibling below the age of 6 years is present. Among children with or without a sibling under the age of 6, girls with a sibling young spend the most time performing non-market labor, 1.940 hours per day, while boys with no young siblings spend the least amount of time in non-market labor, 36 minutes or 0.6 hours. Restricting the sample to only those who participate in non-market labor increases the average amount of time boys spend on non-market labor, but the same pattern remains: among those with or without a young sibling, girls with a young sibling spend the most amount of time in non-market labor, 1.967 hours per day, and boys without a young sibling spend the least amount of time, 0.793 hours per day.

Overall, table 4 also shows that the effect of having a young sibling in the household

increases the total time boys and girls spend on all labor activities by approximately the same amount of time, 22 minutes ( $1.474 - 1.104 = 0.37$ ) for boys and 24 minutes ( $2.065 - 1.663 = 0.393$ ) for girls. For boys, this increase is due to changes in both market labor and non-market labor time. For girls, this increase is almost exclusively due to increases in non-market activity. The addition of a young child potentially adds both financial and non-financial constraints on family resources. The results suggest that boys, in addition to contributing to the housework and childcare needs associated with the addition of a young sibling, are also expected to contribute financially through increased market labor activity. On the other hand, increases in the housework and childcare duties associated with the addition of a young child are the primary responsibility of girls. However, it is important to note that while having a young sibling increases the workload for both boys and girls, the results do not show that children's schooling time suffers because of these increases in work responsibilities. Increases in workload parallel decreases in leisure time but do not parallel decreases in schooling.

The results also show that girls spend more time working than boys, irrelevant of whether a young sibling is present. Among children with no young siblings, girls spend 34 more minutes per day working than boys. Among children with a young sibling, girls spend 35 more minutes working than boys. Considering only children who participate in both market and non-market work, the gender gap is significantly reduced. Among children with no young siblings, girls spend only 9 more minutes per day working than boys. Among children with a young sibling, girls spend only 12 more minutes working than boys.

#### *All Other Sibling Composition Effects*

Table 3 presents the results of the F-tests and Wald tests of the joint association of sibship composition (the number of older brothers and sisters between the ages of 6 and 18, number of younger brothers between the ages of 6 and 18, and the number of older brothers and sisters

above the age of 18) and children's time use. The Wald tests show that sibship composition (not including the number of siblings under age 6) is jointly significant for boys' non-market participation, even though no sibship composition variables are independently significant. The Wald test also shows that sibship composition is jointly associated with girls' market and non-market participation.

The regression results in Table 3 show that the effect of having older siblings differs for boys and girls. Having older sisters or older brothers of school age is not associated with any significant changes in boys' time use. There is, however, a significant effect on girls' time use. Additionally, the effect of having older sisters between the ages of 6 and 18 differs from the effect of having an older brother between the ages of 6 and 18. Older sisters help to reduce their younger sisters' workload while older brothers increase their younger sisters' workload. Specifically, older sisters of school age help to reduce girls' market labor participation and increase their younger sisters' leisure time. Older brothers between the ages of 6 and 18 also help to reduce their sisters' market labor participation, but this is not statistically significant. Older sisters between the ages of 6 and 18 decrease the log odds of girls' market labor participation by 0.461 and increase girls' leisure time by 15 minutes per day or 0.246 hours. Each additional older brother of schooling age increases the log odds of girls' non-market labor participation by 0.759.

The number of younger brothers each child has is associated with increases in the labor activities of both boys and girls. Each additional younger brother of school age increases the amount of time boys spent in market labor by 12 minutes or 0.201 hours per day and increases the time spent on non-market work for girls by 10 minutes or 0.16 hours per day. These increases in labor activity do not parallel significant changes in children's educational or leisure time. The effect of having an older brother or sister above the age of 18 is associated with

changes in children's time in labor activities but is uncorrelated with changes in educational or leisure activities. Each additional older brother above the age of 18 is associated with a 0.343 decrease in the log odds of market labor participation for girls. For boys, the presence of adult brothers in the household is not correlated with significant changes in time use. Adult sisters, however, influence both the time use of their younger sisters and brothers by reducing their younger brothers' leisure time by 17 minutes per day and reducing the amount of market labor their younger sisters perform by 24 minutes per day.

In summary, girls' time use in labor activities is more sensitive to sibship composition than boys' time use in labor activities in that more sibship composition variables are significantly correlated with girls' time use in labor activities than with boys' time use in labor activities. Each additional older adult brother (above that age of 18), older adult sister and older sister between the ages of 6 and 18 helps to decrease the girls' market labor. Both older and younger brothers between the ages of 6 and 18, however, increase girls' non-market labor. Younger brothers between the ages of 6 and 18 increase boys' market labor responsibilities while adult sisters living in the household decrease boys' leisure time. However, while sibship composition is associated with some changes in children's labor and leisure activities, there are no significant correlations between sibship composition and schooling.

#### *Child Specific Characteristics*

Net of sibship size and composition, children's age is an important correlate of time use, particularly with respect to time use in educational and leisure activities. Figures 1 and 2 graphically represent the predicted hours per day boys and girls spend on educational and leisure activities by children's age, respectively. In Figure 1, the results show that across all ages girls spend at least as much time as boys, if not more, on schooling activities. At the youngest ages (10 to 12 years old), boys and girls spend about the same amount of time on educational

activities. At older ages, girls begin spend more time than boys. For all children, time spent on educational activities increases with age up to age 13. After age 13, time spent on schooling begins to decline with age. Schooling stops being compulsory after age 13 in Indonesia and may account for the declines in schooling time after age 13 (ILO 2005). Figure 2 presents the total hours per day boys and girls spend on leisure activities by age. Across all ages, girls spend less time on leisure than boys. Among boys, those between the ages of 8 and 9 spend the most while those between the ages of 12 and 15 spend the least about of time on leisure. For girls, leisure time generally declines with age. Among girls, the youngest girls (younger than 10 years) spend the most amount of time while those older than age 15 spend the least amount of time on leisure.

#### *Household Specific Characteristics*

Parents' education and rural residence are important household specific characteristics that are correlated with children's time use. As expected, parents' education is negatively correlated with children's labor activities and positively correlated with children's schooling activities. Each additional year of fathers' education is associated with a 0.043 decrease in the log odds of boys' market labor participation and a 4 minute, or 0.066 hour, decrease in the total time boys spend working in market labor. Fathers' education has no observed effects on girls' labor activities. However, each completed year of fathers' education is correlated with a 4 minute, or 0.06 hour, increase in boys' schooling and a 2 minute, or 0.033 hour, increase in girls' schooling. Each additional year of mothers' education reduces both boys' and girls' market labor participation by 0.082 and 0.046 log odds, respectively. For girls, each year of mothers' education is also associated with a 3 minute, or 0.051 hour, decrease in the time girls spend in non-market work. Finally, mother's education, like father's education, is positively correlated with the amount of time children spend in studying and in school. Each additional year of mothers' education is correlated with a 4 minute, or 0.06 hour, increase in boys' schooling time

and a 5 minute, or 0.082 hour, increase in the amount of time girls spend on educational activities.

The results presented in Table 3 also show that girls from rural households experience different patterns of time use than girls from non-rural households and that this relationship changes with age; this effect is not statistically significant for boys. The results show that rural residence is associated with girls' non-market labor participation and the average time girls spend on non-market labor and educational activities. Figures 3 and 4 present graphs of the log odds of non-market labor participation and the total hours per day spend on non-market labor for girls from rural and non-rural households, respectively. Figure 3 shows that, overall, girls from rural households are more likely to participate in non-market labor than girls from non-rural. In particular, rural residence has the greatest effect on increasing the log odds of participation among girls between age 12 and 15. This pattern is also reflected in the results presented in Figure 4. Rural residence has the greatest effect of increasing the total time spent on non-market labor among girls between the ages of 12 and 15. Figure 4 also shows that girls from rural households spend more time on housework and childcare than girls from non-rural households.

The results from Figures 3 and 4 reinforce the importance of considering non-market labor when assessing the impact of labor demands on children's time use. Girls, in general, spend more time on non-market labor than boys. Additionally, the results presented here also show that girls from rural household are significantly more likely to participate in non-market labor and spend more time working on non-market labor than girls from non-rural households. Therefore, failing to consider children's housework and childcare responsibilities not only underestimates girls' labor contributions to the household but, particularly, underestimates the contributions of girls from rural households.

## **Discussion of Quantitative and Qualitative Results**

The quantitative findings show strong gender divisions in children's work responsibilities. Boys are more likely to perform market labor. Among the children that perform market work, boys spend significantly more time on market work than girls. Unlike boys, nearly all girls perform housework and/or childcare duties and among children that participate in non-market labor, girls also spend significantly more time working than boys. Overall, girls spend nearly 30 minutes more per day on labor activities (both market and nonmarket labor) than boys. On average, girls also spend nearly half an hour more time on schooling activities than boys and approximately one hour less leisure time than boys.

These time use patterns correspond to the qualitative findings gathered during focus group interviews. Both fathers and mothers were asked whether they saw any difference in their children's interests with respect to work and school. Fathers reported that they saw no difference between boys and girls in terms of their interest in school and work and that boys and girls generally work the same amount, with boys working with fathers and girls with mothers. Mothers, however, revealed that both boys and girls help out around the house but girls do more work than boys. They reported while it is harder to get the boys to work, girls often offer their help without being asked. Mothers said that boys were lazier than girls about work, less willing to learn, and less quick to volunteer. These comments were consistent with girls' responses; girls replied that they often feel obligated to offer their help even when they are not asked, especially when their parents are the busiest. The focus group interviews suggest that girls tend to be more motivated with respect to work and schooling and were willing to take on more responsibilities than boys. The quantitative data suggest that the differences in attitudes do translate into observable differences in behavior: girls work more and spend more time in schooling than boys.

Additionally, while there is some evidence that sibship composition influences the allocation of time across work and leisure time, time spent on educational activities does not

change significantly across siblings or between boys and girls. The qualitative data also support these results. Parents, both mothers and fathers, recognized the importance of education for their children's future and believed that both boys and girls should receive the same amount of education. While all parents said that they involved their children in both farm related work and housework/childcare, they also made it a point to report that children only start work after they came home from school and after homework was completed.

When asked who among their children they would ask to leave school temporarily during harvest season to help on the farm or in the case of a household emergency, such as a wedding or an illness, both mothers and fathers said that they would not ask their school aged children to stop attending school. They would rather ask a spouse, an adult relative, or an adult child for help under these circumstances<sup>5</sup>. From their responses, parents seem to be resistant to the idea of asking their children to trade-off schooling for work. Both boys and girls said that they have never been asked to miss school to help at home.

When asked the hypothetical question of how much education boys and girls needed in today's world, both fathers and mothers reported that boys and girls needed the same amount of education. Both mothers and fathers emphasized that girls should receive as much education as boys. While the quantitative results suggest that time use in labor and leisure activities is associated with some aspects of sibship composition, the results also show that time spent in schooling activities does not vary much between boys and girls, nor by sibship composition. The qualitative findings suggest that this may be partly due to the value parents place on educating their children. Parents seem to value education and hold the belief that both boys and girls should receive the same amount of education.

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<sup>5</sup> It was unclear from the interviews whether the adult relatives the parents said that they would ask were also living in the household.



## **Conclusion**

The results highlight the importance of including children's time use in housework and childcare activities in assessing trade-offs between work and schooling. The vast majority of children participate in some form of non-market oriented labor. Nearly all girls, 93%, and most boys, 76%, participate in non-market oriented work. The amount of time spent on housework/childcare activities per day is also significant: girls spend 1.5 hours while boys spend 0.73 hours. Gender divisions in children's time use clearly arise, particularly with respect to time use in non-market activities. All girls work and girls in all sibling age-sex compositions spend over twice the amount of time on non-market labor than boys. Failing to consider children's time use in non-market labor underestimates the labor activities of all children, particularly for girls.

Both the quantitative and qualitative findings provide some descriptive evidence that suggest child labor does not interfere with educational activities. The quantitative findings show that the average time spent on educational activities is constant across sibship composition, even though time use patterns for labor and leisure activities are associated with sibship composition. Qualitative data collected from focus groups also support this finding. The data show that parents expect the same amount of education for both their sons and daughters and say that they would not ask their children to sacrifice schooling for work. Children also say that they have never been asked to leave school to work. Interviews with mothers and daughters suggest that girls tend to be more motivated with respect to work and schooling which supports the quantitative findings that girls spent more time working and slightly more time on educational activities than boys. Additionally, the quantitative findings do provide some descriptive evidence that girls' leisure time is traded-off for work rather than girls' schooling for work, although a formal analysis that considers the joint allocation of children's time is necessary to make a more conclusive statement about trade-offs in time use.

Finally, the results provide some evidence that children's age-sex composition is associated with differential time use in both types of labor activities. The number of young siblings under the age of 6 has the strongest association with both boys' and girls' labor and leisure activities. The addition of a young sibling only increases girls' housework/childcare duties. For boys, it increases both market and non-market work. Overall, the results also suggest that girls' labor responsibilities are more sensitive to changes in sibship composition than boys' in that more sibship composition variables are correlated with girls' labor activities than with boys'. Specifically, older siblings, particularly older female siblings, help to reduce girls' market labor responsibilities, but both older and younger brothers (between the ages of 6 and 18) increase the housework and childcare duties of their sisters.

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**Table 1: Sample Characteristics for Children age 8 to 18 years old**

<b>Variables</b>	<b>Mean</b>	<b>Standard Deviation</b>
Age of Child	12.65	2.92
Percent Male	53%	
Percent Rural	83%	
Father's Age	47.1	7.77
Father's Education (years)	7.24	3.77
Mother's Age	41.35	6.3
Mother's Education (years)	6.23	3.6
Household Wealth	3,349.746	6,607.155
# of Siblings	1.82	1.34
# of Siblings under age 6	0.33	0.57
# of Siblings between age 6 and 18	1.11	0.93
# of Older Brothers (ages 6-18)	0.29	0.54
# of Older Sisters (ages 6-18)	0.28	0.53
# of Younger Brothers (ages 6-18)	0.28	0.51
# Younger Sisters (ages 6-18)	0.27	0.53
# of Sisters above the age of 18	0.25	0.55
# of Brothers above the age of 18	0.123	0.369
N	2,928	

**Table 2: Descriptive Statistics of Child Time Use By Gender (N=2,928)**

Variables	<i>Boys</i>		<i>Girls</i>	
	Mean	Std Dev	Mean	Std Dev
Percent of Children Working in Market Labor	47		27	
Hours Spent on Market Labor	0.70	1.23	0.34	0.93
Hours Spent on Market Labor Conditional on Working	1.51	1.43	1.26	1.43
Percent of Children Working in Non-Market Labor	76		93	
Hours Spent of Non-Market Labor	0.72	0.83	1.53	1.26
Hours Spent of Non-Market Labor Conditional on Working	0.95	0.83	1.64	1.23
Hours Spent on Educational Activities	3.96	1.81	4.52	1.84
Hours Spent on Leisure Activities	18.61	1.84	17.60	1.86





**Table 3: Estimated Coefficients for Boys' and Girls' Time Use in Market Oriented Labor, Non-market Oriented Labor, Education, and Leisure**

Sibling Composition	Boys					Girls				
	Market		Non-Market		Leisure	Market		Non-Market		Leisure
	Participation	Hours Spent	Participation	Hours Spent		Participation	Hours Spent	Participation	Hours Spent	
Sibship Size	0.076 [0.125]	-0.045 [0.100]	0.038 [0.126]	0.045 [0.049]	0.141 [0.088]	0.211 [0.124]*	0.163 [0.141]	-0.015 [0.345]	0.031 [0.072]	-0.068 [0.094]
# siblings <6 yrs	0.272 [0.178]	0.243 [0.146]*	0.433 [0.180]**	0.136 [0.072]*	-0.341 [0.123]**	-0.207 [0.187]	0.393 [0.187]	0.548 [0.430]	0.393 [0.101]**	0.012 [0.137]
# older sisters age 6-18	0.194 [0.190]	0.121 [0.145]	0.038 [0.166]	-0.016 [0.065]	-0.145 [0.125]	-0.461 [0.169]**	-0.095 [0.183]	-0.127 [0.342]	-0.067 [0.086]	-0.03 [0.117]
# older brothers age 6-18	0.195 [0.167]	-0.104 [0.108]	0.16 [0.164]	-0.071 [0.062]	0.072 [0.116]	-0.203 [0.180]	-0.075 [0.169]	0.759 [0.411]*	0.037 [0.092]	0.041 [0.123]
# yngr sisters age 6-18	--	--	--	--	--	--	--	--	--	--
# yngr brothers age 6-18	0.093 [0.181]	0.201 [0.121]*	-0.284 [0.187]	-0.072 [0.068]	-0.124 [0.127]	-0.084 [0.169]	0.132 [0.175]	0.003 [0.449]	0.16 [0.092]*	-0.143 [0.144]
# brothers >18 yrs	0.085 [0.172]	0.17 [0.134]	-0.256 [0.174]	-0.015 [0.067]	-0.204 [0.134]	-0.343 [0.180]*	-0.225 [0.173]	0.008 [0.438]	0.051 [0.097]	0.108 [0.141]
# sisters >18 yrs	-0.206 [0.211]	0.21 [0.203]	-0.203 [0.225]	-0.018 [0.099]	-0.286 [0.167]*	-0.097 [0.204]	-0.404 [0.207]*	-0.454 [0.430]	0.018 [0.109]	0.187 [0.174]
F/Wald tests*	4.67 [0.465]	1.82 [0.108]	9.35 [0.096]	0.51 [0.77]	1.66 [0.140]	9.47 [0.092]	1.84 [0.104]	15.72 [0.008]	1.42 [0.213]	0.97 [0.438]
degrees of freedom	5	5	5	5	5	5	5	5	5	5
<b>Child-Specific Characteristics</b>										
Age of child	0.675 [0.489]	-0.35 [0.381]	0.717 [0.468]	-0.291 [0.215]	-1.108 [0.334]**	0.356 [0.552]	-1.179 [0.652]*	-0.591 [0.755]	-0.207 [0.227]	2.189 [0.387]**
Age of child squared	-0.02 [0.018]	0.021 [0.016]	-0.018 [0.019]	0.012 [0.008]	0.038 [0.013]**	-0.007 [0.021]	0.051 [0.025]**	0.035 [0.031]	0.013 [0.009]	-0.085 [0.016]**
Rural x Age	0.605 [0.541]	0.253 [0.427]	-0.111 [0.509]	0.229 [0.231]	-0.397 [0.364]	0.104 [0.600]	0.476 [0.714]	2.532 [0.903]**	0.533 [0.255]**	-0.836 [0.423]*
Rural x Age squared	-0.016 [0.020]	-0.011 [0.017]	-0.001 [0.020]	-0.009 [0.009]	0.016 [0.014]	-0.006 [0.023]	-0.018 [0.027]	-0.096 [0.037]**	-0.02 [0.010]**	0.003 [0.017]*
<b>Household Specific Characteristics</b>										
Household wealth	-0.006 [0.013]	-0.009 [0.007]	-0.015 [0.011]	-0.008 [0.003]**	0.004 [0.007]	0.007 [0.013]	0 [0.006]	-0.012 [0.012]	-0.009 [0.005]	0.015 [0.007]**
Father's education	-0.043 [0.021]**	-0.066 [0.019]**	0.007 [0.022]	-0.005 [0.008]	-0.017 [0.016]	-0.037 [0.024]	-0.024 [0.023]	-0.06 [0.045]	-0.015 [0.012]	0.033 [0.018]*
Mother's education	-0.082 [0.022]**	-0.023 [0.019]	-0.028 [0.023]	-0.008 [0.009]	-0.03 [0.017]*	-0.046 [0.025]*	-0.008 [0.023]	-0.053 [0.053]	-0.051 [0.017]**	0.082 [0.016]
Father's age	0.002 [0.012]	0 [0.009]	0.014 [0.012]	-0.002 [0.005]	0.008 [0.009]	-0.003 [0.012]	0 [0.011]	-0.014 [0.022]	-0.011 [0.006]*	-0.002 [0.009]
Mother's age	0.003 [0.016]	-0.01 [0.012]	-0.007 [0.016]	0.003 [0.007]	-0.012 [0.011]	0.012 [0.016]	0.003 [0.014]	-0.027 [0.030]	0.013 [0.008]	-0.006 [0.013]
Rural	-4.226 [3.501]	-1.297 [2.504]	1.336 [3.027]	-1.443 [1.463]	2.443 [2.191]	-0.111 [3.838]	-3.405 [4.513]	-14.984 [5.289]**	-3.174 [1.545]**	4.522 [2.488]*
Constant	-5.92 [3.238]*	3.109 [2.213]	-5.037 [2.802]*	2.592 [1.356]*	26.311 [2.042]**	-4.222 [3.613]	7.436 [4.181]*	6.606 [4.669]	2.137 [1.407]	-8.784 [2.329]**
N	1576	736	1576	1202	1576	1352	366	1352	1263	1352
R-squared	0.15	0.15	0.15	0.02	0.1	0.18	0.21	0.15	0.18	0.24

Robust standard errors in brackets

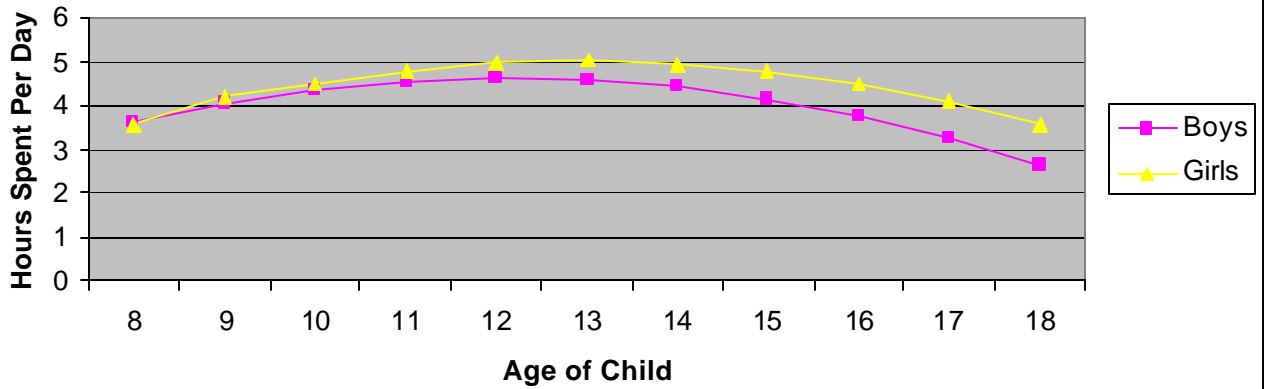
\* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%

\* F-statistics/Wald test for the joint significance of # older brothers age 6-18, # older sisters age 6-18, # yngr brothers age 6-18, # brothers >18 yrs, # sisters >18 yrs; p-values presented in brackets

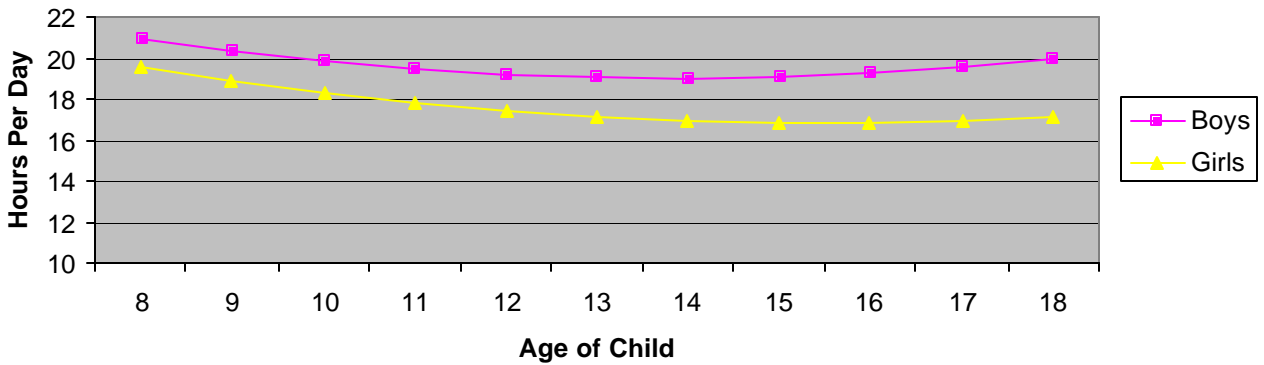
**Table 4:** Predict Time Use on Labor, Schooling, and Leisure Activities for C with and without a Sibling Younger than 6 Years

	Boys	Girls
<b>Market Labor</b>		
<i>Participation</i>		
no siblings age 6 yrs	0.438	0.253
1 sibling under age 6 yrs	0.506	0.216
<i>Hours Spent (among all children)</i>		
no siblings age 6 yrs	0.504*	0.132
1 sibling under age 6 yrs	0.705*	0.120
<i>Hours Spent (conditional participation)</i>		
no siblings age 6 yrs	1.151*	0.521
1 sibling under age 6 yrs	1.394*	0.557
<b>Non-market Labor</b>		
<i>Participation</i>		
no siblings age 6 yrs	0.756**	0.973
1 sibling under age 6 yrs	0.827**	0.984
<i>Hours Spent (among all children)</i>		
no siblings age 6 yrs	0.600*	1.532***
1 sibling under age 6 yrs	0.768*	1.940***
<i>Hours Spent (conditional on participation)</i>		
no siblings age 6 yrs	0.793*	1.574***
1 sibling under age 6 yrs	0.929*	1.967***
<b>Education</b>		
no siblings age 6 yrs	4.730	4.996
1 sibling under age 6 yrs	4.727	4.644
<b>Leisure</b>		
no siblings age 6 yrs	18.048***	17.365***
1 sibling under age 6 yrs	17.707***	17.013***
<b>Total Time Spent on Market and Non-market Labor</b>		
<i>Total Hours Spent (among all children)</i>		
no siblings age 6 yrs	1.104	1.663
1 sibling under age 6 yrs	1.474	2.056
<i>Total Hours Spent (conditional participation)</i>		
no siblings age 6 yrs	1.944	2.095
1 sibling under age 6 yrs	2.323	2.524

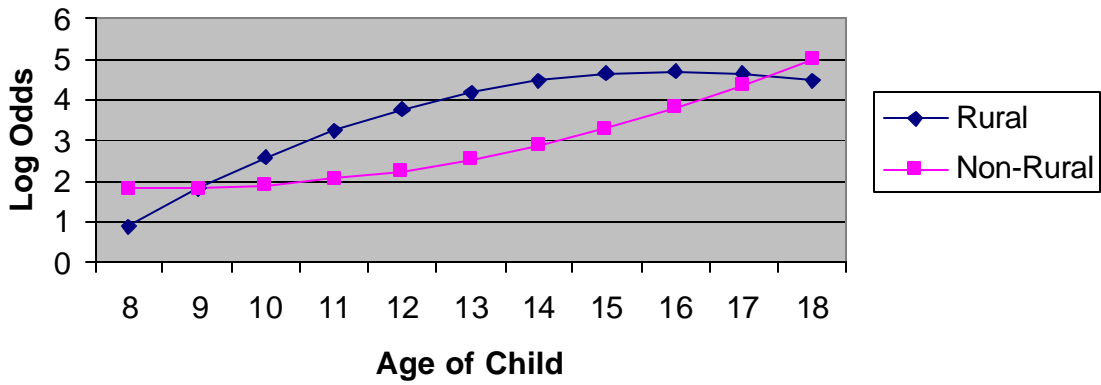
**Figure1: Predicted Hours Spent on Educational Activities by Age, Adjusted at the Sample Mean**



**Figure 2: Predicted Hours Spent on Leisure Activities, Adjusted at the Sample Mean**



**Figure 3: Predicted Log Odds of Non-Market Participation for Girls, Adjusted at the Sample Mean**



**Figure 4: Hours Spent on Non-Market Labor for Girls, Adjusted at the Sample Mean**

