Children's Work and Schooling Outcomes in Indonesia

Amy Hsin[†]
University of California-Los Angeles

[†] The research conducted for this paper was supported in part by the William and Flora Hewlett Foundation and by a travel grant from the United Statees-Indonesia Society.

Children's Work and Schooling Outcomes in Indonesia

Abstract

This paper examines the association between gender and sibship composition on children's time use patterns across four activities—schooling, market oriented labor, non-market labor such as housework/childcare activities, and leisure. Using time allocation data collected from Indonesia, the quantitative results show gender divisions in children's work activities with girls' being primarily responsible for housework/childcare duties and boys' primarily responsible for market oriented work. Having a younger sibling under the age of six increases the workload of both boys and girls; however, these increases in workload do not parallel decreases in schooling but parallel decreases in leisure. The qualitative data collected from focus groups conducted in Indonesia show that parents are reluctant to trade-off their children's schooling time for labor and that parents wish to educate both their sons and daughters. Taken together, the results suggest that children's leisure time is trade-off for work rather than schooling time for work.

I. Introduction

Time is an important family resource and how children's time is "invested" across activities may have important consequences for children's current and future well-being. How children's time is allocated across schooling and labor activities may help to formulate children's attitudes towards work and schooling and expectations for future occupational attainment, influence future migration decisions (whether a child may wish to leave the village to pursue higher education or better work opportunities), and help to socialize children into gender specific work roles. Understanding the outcomes of both parents' and children's decisions regarding children's time use may provide important insight into how families conceptualize the economic and social role of children. Identifying the outcomes of children's time use can enrich our understanding of how divisions in labor and disparities in schooling attainment may arise between boys and girls.

Using detailed time allocation information collected from Central Java, Indonesia, I examine the correlates of children's time use across 4 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. The quantitative findings provide information on the actual outcomes of parents' and children's decisions regarding children's time use. I combine the quantitative data 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.

I consider three issues related to children's time use in this paper. First, I expand traditional definitions of labor, which generally include only economically productive activities, to include housework and childcare activities. Previous empirical analyses of the determinants of children's time allocation have generally focused on two aspects of non-leisure activity—education and paid market labor. Work performed inside the home—such as work on home enterprises and/or housework—is often left out of the empirical analysis. In developing countries, ignoring unpaid household labor severely underestimates the burdens placed on children, particularly because poor domestic infrastructure, including limited access to electricity and running water, contributes to housework/childcare demands. Failure to consider unpaid household labor is likely to obfuscate gender differences in the division of labor. This omission

also underestimates the contributions of children in rural areas where agriculture predominates and children are expected to work without pay on the farm.

Second, I investigate the extent to which a child's pattern of time use is shaped by his or her position in the family with respect to sex and birth order. Evidence points to the importance of the age-sex composition of siblings in determining investments in education and health (Greenhalgh 1985; Das Gupta, 1987; Lloyd and Gage-Brandon 1996; Morduch and Garg, 1998). I am interested in determining the extent to which gender division in labor activities define girls' and boys' time use. Additionally, I examine the association between time use and sibship composition (e.g. how a child's age and sex relative to his/her siblings jointly influences the allocation of labor, schooling and leisure time across siblings).

Third, I explore the potential for trade-offs between work, schooling, and leisure. Children play an important economic role in developing countries because they work, both for pay and as unpaid labor in the family business and in the household by performing housework and childcare for their younger siblings. Children who work may provide immediate financial contributions to the household but the short term financial gains are potentially costly in the longer term if work interferes with schooling. However, child labor may not interfere with schooling if time spent working simply reduces leisure time. While the analysis employed in this paper does not allow for a direct test of trade-offs in children's time use, the descriptive findings of this paper may provide insight into whether such trade-offs may potentially exist.

II. Theory and Background

Disparities in resource allocation among siblings, particularly differentials in time allocation, may play an important part in determining children's educational and occupational attainment, formulating gender roles within the family, and developing children's attitudes towards work and schooling. Some of the proposed theories regarding why disparities may arise include parents formulating different expectations for their children's future based on patriarchal norms (Greenhalgh, 1985; Parish and Willis, 1993; Buchmann, 2000), differential returns to schooling for boys and girls (Deolalikar, 1993; Buchmann 2000), and resource and credit constraints faced by the household which may lead to differential investment in children across birth order (Parish and Willis, 1993). In this section, I will discuss some theories that have been proposed in the literature which seek to explain why disparities in resource allocation may arise within the family. 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 which suggests that parental preferences and resource constraints jointly determine how resources are allocated within the family. The first set of theories will be generally referred to as the altruism model. The second set of theories details potential factors that may constrain and influence parental choices. These factors include patriarchal norms which may influence parental preferences towards their children, family size which may dilute family resources and credit market constraints which may limit parents' ability to borrow in order to finance children's schooling. Finally, parents may invest children's time in different activities in order to socialize their children into specific gender and work-related roles within the family.

Altruism Model

Economic models of family resource allocation state that the outcomes of parental decisions regarding how resources are distributed across family members reflect not only parental preferences towards their children, but also reflect the endowments of children (e.g. intelligence, motivation, ambition, etc.), the amount of available family resources, market opportunities, and credit constraints (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 altruism model "…separates preferences from opportunity" (p 188). In other words, the outcomes of allocation decisions reflect both parental preferences and the opportunities (e.g. family income, wealth, relative endowments of each child, and labor market opportunities, etc.) available to both parents and children.

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 towards 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). Under the altruism model, even if parents have egalitarian preferences towards their children, parents may choose to invest more heavily in the education of children who have greater endowments such as greater cognitive ability or more motivation (Parish and Willis, 1993). 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 over 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 states that differential resource allocations may result from either parental preferences that favor some children over others and/or differences in the marginal returns to investment among siblings. However, the altruism model says little about the social and cultural forces that 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; Parish and Willis, 1993). Boserup argues that as agriculturally based

economies being industrializing, greater specialization in skills and knowledge is required in the work force (1970). Men and women have different access to the labor market; as a result, greater sex-segregation in labor activities force women to participate in less prestigious and lower paying work. 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; Parish and Willis, 1993; Lloyd and Gage-Brandon, 1994).

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 and Southeast Asian families, 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, however, 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, which is also prevalent in most East Asian and South Asian cultures, 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 my 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 can potentially become economically productive at an early age.

Resource Dilution, Credit Constraints, and Socialization

The literature focuses on 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 attitudes and expectations, 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 both adult and child achievement outcomes (1989). The theory largely accounts for why disparities among families, specifically families with many children and families with fewer children, may exist. The theory states that larger families (i.e. families with more children) have less financial resources and non-financial resources, such as the amount of time parents have to spend with 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. Empirical evidence from many countries offer some support for this theory (e.g. Lloyd and Gage-Brandon (1994) in Ghana; Patrino and Pscharopolous in Peru (1997)), although findings from other settings either show no significant association or a positive relationship between sibship size, educational attainment, and child labor. Contrary to the resource dilution hypothesis, some argue that larger kinship networks mitigate the effect of sibship size on resources (Shavit and Pierce (1991) in Israel; Fuller and Liang (1999) in South Africa). In the case where the nuclear family can seek both financial and psychological support in childrearing from extended family members by pooling resources and sharing risk, large sibship size may not necessarily have a negative effect on the attainment process.

While the resource dilution hypothesis may help explain why disparities in resource allocation among families may exist, it cannot fully explain why disparities in investments among siblings 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 (Patrinos and Pscharopolous, 1997; Lloyd and Gage-Brandon, 1994; Ilahi, 2001). When limited family resources are stretched to meet the needs of numerous children, older siblings are often forced to leave school and enter the workforce to help meet the needs of the family. Credit constraints faced by families may create birth order effects in the allocation of resources. 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. Because parents in the early stages of their careers face stricter credit constraints, children who were born early cannot benefit from their parents'

financial stability as much as children who are born later (Parish and Willis, 1993). As a result of life cycle and credit constraint effects, birth order may be associated with children's labor and educational activities.

Children's sex and age may partially determine their social position within the family. In particular, labor divisions within the family are largely determined by age and sex (Boserup, 1970). Therefore, older brothers may act as role models for their younger brothers while older sisters may serve as role models for their younger sisters. In this sense, time use can be used to reproduce gender specific work roles. Because of gender divisions in labor activities, older sisters' time may be a better substitute for her younger sisters'. Likewise, older brothers' time may be a better substitute for his younger brothers'. Therefore, one may expect to see that older sisters have a greater effect on reducing girls' labor activities than older brothers. Likewise, older brothers should have a greater effect on his younger brothers[‡].

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. Some evidence suggests that older sisters bear the

[‡] The theories generally treat time allocation and schooling attainment as the outcome of parental choices. However, it is important to keep in mind that the attitudes and expectations of children also play an important role in influencing how their time is spent, particularly among adolescent children. The goal of this paper is not to identify the bargaining process that occurs between parents and children regarding time use but it is important to keep in mind that children's time use outcomes are the result of both parents' and children's own decisions. The qualitative analysis conducted in this paper attempts to capture possible differences between parents and children by collecting data on attitudes and expectations of fathers, mothers, adolescent girls and boys, separately. In general, children's responses during focus group discussions did not differ significantly from their parents'.

responsibility of financing their younger siblings' education (Greenhalgh, 1985; Parish and Willis, 1993; Lloyd and Gage-Brandon, 1994). 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

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[§].

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 more general questions on time use (Ilahi, 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, which helps to ground people's sense of time into concrete time blocks. This factor 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. This age group is selected for both

[§] One may suspect that time use reported by adults 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 12 to 18, who reported time use for themselves.

practical and substantive reasons. The survey does not collect time use information on children below age 8. Substantively, Indonesian law requires six years of compulsory schooling and sets the minimum working age at 14 years (U.S. Department of Labor 2004). For parents planning to legally enter their child into the labor force at age 14, the latest entry age of full-time schooling is at 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 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 non-resident 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[**].

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. Fieldwork was conducted 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. Fieldwork 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.

The qualitative data used in this paper were gathered in collaboration with Professor Elizabeth Frankenberg, one of the principal investigators of the WISE project and a professor of sociology at UCLA, along with several native Indonesian supervisors, ethnographers, and survey interviewers who work on the WISE project. A detailed set of questions relating to expectations and attitudes regarding work, schooling, marriage, and fertility were formulated after many rounds of discussions with Professor Frankenberg and our Indonesia collaborators (i.e. the supervisors, survey interviewers and ethnographers mentioned above). Specifically, we spent considerable time discussing the wording and intention of the questions with our Indonesia collaborators in order to situate our questions in the right cultural context. These sets of questions were then translated into Indonesian and distributed to the discussants. Our Indonesia collaborators served as moderators for the focus groups. All discussions were conducted in Indonesian. Focus groups of mothers and fathers were conducted simultaneously during a one

[**] 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 a half hour session; likewise, focus groups of adolescent boys and girls were held simultaneously during a one and a half hour session. I observed the focus groups sessions which were conducted with fathers and adolescent girls and participated in the discussions by redirecting questions and clarifying responses, with the aid of a simultaneous translator. All focus groups were recorded on audio tape. The tapes of these sessions were transcribed into Indonesian, and then translated into English. Additionally, in each session, two to three of our native speaking collaborators were present to take notes on the discussions. These notes were collected and also translated into English. The qualitative data used in this paper were based from my own notes and the notes and transcriptions written by my collaborators.

Measures

Children's Time Use

In this paper, I divided the total time spent in a 24 hour period among 4 mutually exclusive 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 essentially 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 some gender differences in the effects of family characteristics on children's time use. In order to examine gender differences in children's time use, I stratify my sample by sex. I then create several measures of sibling age-sex composition. 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 Psacharopolous, 1997; Parish and Willis, 1993). 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, in general, 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.

I create individual level age-sex composition variables which include 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 participating in labor activities. Therefore, the age-sex composition variables are created over the set of children between the ages of 6 to 18 years old and above the age of 18. I distinguish between siblings above the age of 18 from siblings younger than age 18 because I would like 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 older 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[††]. Age squared is included as a variable to capture possible non-linearity in the effect of age on time allocation.

Household Characteristics

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.

Considerable evidence suggests that child market and non-market labor is associated with poverty (Ray, 2000; Ilahi, 2002). Families may depend on the financial contributions of children to supplement adult income when household income is low. However, one of the major problems with accounting for socio-economic status is the difficulty of making causal inferences when measures such as income, household expenditures, and/or consumption are used as determinants of child labor. Ideally, one would like for the independent variable (income) to affect child's time spent on labor activities (dependent variables). However, if the money earned from child labor is also used to supplement household income, then a feedback effect becomes evident and statistical difficulty arises in determining causation.

Household wealth, however, is less likely to suffer from this problem. While it is likely that child labor has a significant impact on the day-to-day expenditures of households, it is much less likely that the financial contributions of children influence such things as household saving and/or the value of household property. This assumption rests on empirical findings from Peru and Pakistan that child labor is not used by parents to accumulate wealth, but rather to insure against fluctuations in household consumption (Ray 2000). In other words, parents may use child labor as a source of supplemental income to ensure that the basic needs of household members are met, but parents do not use child labor to increase household wealth.

[††] I have also estimated the model using a non-parametric measure of age. I have tried including age as a series of dummy variables with age 15 as the omitted category. I have also tried including 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.

Both parents' education and age may influence the value parents place on their children's education and child rearing practices. More educated parents may place a higher value on their children's schooling because more educated parents have a better understanding of the expected payoffs associated with educational investments. As a result, we would expect to see parents' education to be negatively correlated with children's labor participation and positively correlated with children's schooling time. Mare and Chang show that in Taiwan fathers' education sets a minimum education level for their sons in that sons generally obtain at least as much education as their fathers (2003). However, they find no such effect of fathers' education on their daughters nor did they find evidence that mothers' education had the same effect on their children's educational attainment. Therefore, 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 and tend to be more financially stable. Older parents, therefore, may be less vulnerable to the pressures of child rearing and less likely to burden children with labor activities.

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 inputs into household production. As a result, both increased participation and increased time spent in market labor is expected for those children who live in rural areas. Additionally, rural areas are less likely to have electricity and indoor plumbing. Therefore, one would also expect to see more labor participation from children from rural areas. I interact rural residence with age and a square term for age because the age at which children become actively 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. Children who live in rural areas may start to work at an earlier age and spend more time on labor activities than children from urban areas.

Sample Characteristics

Table 1 provides the mean sample characteristics. Approximately 83% of the household 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. Each child also has on average 0.25 adult sisters above the age of 18 years and 0.12 adult brothers living in the household. This difference may

reflect differential migration patterns of adult children. Girls above the age of 18 may be less likely to migrate out of the household because they are less likely to migrate to follow work 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, on average, spend 0.34 hours in market labor and 1.53 hours on non-market labor. Boys spend a total of 1.42 hours working; boys, on average, 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. In this case, the process governing the decision to work is allowed to differ from the process governing decisions concerning how much time to work. For example, having an older brother may increase the probability of market labor participation for their younger brothers because parents may be willing to allow their younger sons to help on the family farm if an older brother is present to supervise. However, the effect of an older brother on younger brothers may be negative with respect to total time spent on market labor because older brothers may help reduce the workload responsibilities of their younger brothers.

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 account for the selection process that determines the sub-group of individuals who participate in those respective activities. The individual and household level characteristics associated with those individuals who participate in market or non-market labor may be different than those characteristics associated with those individuals who do not. If those characteristics that help define the sub-sample are not specified in the model, estimates of the correlates of the total time spent on market and non-market labor will be biased. For example, parents who believe that child labor helps to develop strong work ethic among children may be more likely to engage their children in labor activities. To the extent that parental "tastes" for child labor are not fully accounted for by parents' education, the estimated results may be biased. Adjusting for selection bias is outside the scope of this paper. However, I hope to address this issue in future work.

Second, it is also important to note that while decisions regarding how time is allocated across schooling, labor and leisure activities are treated as independent processes in this paper such decisions are most likely made jointly. Time allocation decisions 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, however, does not address this aspect of the decision-making process, in part, because a joint analysis is outside the scope of this paper. Therefore, the results of this paper should be considered as more descriptive in nature and one should be cautious in drawing causal inferences from the findings. In spite of the limitations, the analysis employed in this paper 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 joint aspect of time allocation decisions.

A multilevel analysis is used in this paper to account for correlations in the error terms among siblings within the same household. Multilevel analysis is often used to examine populations with hierarchical structures (e.g. children within households, students within schools, households within communities) (Hox, 2002). Standard statistical estimators, such as Ordinary Least Squares, assume that individual observations are randomly and independently distributed. However, in an analysis that examines children within households, this assumption cannot be easily made since children within a household are probably much more similar to each other than children across households. As a result, the average correlation between measured variables among children from the same household, or intra-class correlation, will be higher than the average correlation between variables measured on children from different households, or the inter-class correlation. If household level clustering or correlation between measured variables within the household occurs and is not corrected for then 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; Buchmann, 2000). This approach involves specifying a model which adjusts the standard errors to allow for the possibility of non-independence in the distribution of the error terms. The estimation process first estimates the model using standard Least Squared techniques and subsequently adjusted for clustering or intra-class correlation (Mason 2001). The robust regression which adjusts for clustering at the household level can be represented by the following form:

$$Y_{ij} = b_0 + b_1 G_j + b_2 X_{ij} + b_3 G_j X_{ij} + \varepsilon_{ij}$$

where j = 1, 2, ..,J denotes households and i = 1, 2, …, 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, $G_j X_{ij}$ (Mason 2001).

Least Square estimation with robust adjustment of the standard errors is one of several other multilevel specifications which can be used to handle hierarchical data. Other commonly employed approaches include fixed effect and random effect estimators. Fixed effects estimators are consistent estimators, meaning that estimated coefficients are unbiased (Greene, 1990). However, a fixed effect approach is unable to estimate the main effects of any characteristics that are the same across all siblings (i.e. parental education, rural residence, number of siblings under the age of 6, number of siblings above the age of 18, etc.). Another problem associated with a fixed effect approach is that households with only one observation per context (i.e. household with only one child between the ages of 8 and 18) are omitted by the fixed effects estimator and as a result, estimates cannot be obtained for such households. Likewise, households where all siblings have the same binary outcome (i.e. all siblings within the household work in market labor or do not work in market labor) are also dropped by the fixed effect, logistic regressions and estimates for these households also cannot be obtained.

Random effect estimators, while being efficient estimators, are also not employed in this paper. The random effects approach imposes strong assumptions concerning the structure of the error terms that cannot be made in this paper to justify the use of the model (Greene, 1990; Mason, 2001). For example, a random effect approach would require household wealth to be unrelated to the unobservable characteristics of the household, which may include characteristics such as parental attitudes towards education and parental preferences towards child labor. It is difficult to imagine that wealthier parents would not also be more likely to place greater value on their children's education and/or leisure time relative to poorer parents.

However, it may be informative to compare the results across all three estimation processes (i.e. the robust estimator, random effects estimator, and the fixed effects estimator) to

check for the consistency of the results. Results from the fixed effect, random effects and robust regressions for households with at least two siblings between the ages of 8 and 18 are provided in the appendix (households with only one child between the ages of 8 and 18 are not included because the fixed effect and random effect approach cannot provide estimates for these cases). Overall, the results from the random effects and robust estimation are similar. The results from the fixed effect estimation, however, are not consistent with the results obtained from the random and the robust estimation[‡‡]. Differences in the results from the fixed effect logistic regression can be attributed to the small sample size due to the fixed effects estimation dropping all observations within households that have the same binary outcome. However, differences that arise in the fixed effect linear regressions may suggest that the results are sensitive to the estimation process employed.

Results

Sibship Size

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

[‡‡] Note the small sample size for the fixed effect logistic estimates. Fixed effects cannot provide estimates of cases where all siblings within a household have the same binary outcome (e.g. all siblings work or all do not work) and drop these households from the sample. As a result, the estimates derived from the logistic fixed effect approach are based on of extremely small samples and must be interpreted with caution.

The observed effect of sibship size on children's time use 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 schooling 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 between the age of 6 and 18 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 spend 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. The 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.

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 12 or 13 (depending on age of entry into primary education) in Indonesia and may account for the declines in schooling time after age 13. 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 effect changes with the girls' 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, in general, 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, in general, 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 especially 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 and 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 non-market 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 said that they would rather ask their spouse, an adult relative, or an

adult child for help under these circumstances[§§]. In 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 highly value education and hold the belief that all children should receive the same amount of education.

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 is not interfering with schooling time. 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

[§§] It was unclear from the interviews whether the adult relatives the parents said that they would ask were also living in the household.

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. The quantitative data, however, do provide some descriptive evidence that girls' leisure time is traded-off for work rather than schooling for work, although a formal analysis which considers the joint allocation of children's time across labor, schooling and leisure activities is necessary to make a more conclusive statement about trade-offs in children's time use.

Finally, there results provide some evidence that children's position within the household with respect to sibling 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 and childcare responsibilities while 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.

Reference

Becker, Gary S. 1981. *A Treatise on the Family*. Cambridge: Harvard University Press.

Behrman, Jere R., Robert Pollak, and Paul Taubman. 1995. *From Parent to Child:Intrahousehold Allocations and Intergenerational Relations in the United States*, Chicago: University of Chicago Press.

Blake, Judith. 1989. *Family Size and Achievement*, Berkeley: University of California Press.

Boserup, Ester. 1970. *Women and Economic Development*. New York: St. Martins Press.

Buchmann, Claudia. 2000. "Family Structure, Parental Perceptions, and Child Labor in Kenya: What Factors Determine Who is Enrolled in School?" *Social Forces*, 78(4), 1349-1378.

Das Gupta, Monica. 1987. "Selective Discrimination against Female Children in Rural Punjab, India," *Population and Development Review*, 13(1), 77-100.

Deolalikar, Anil B., 1993, "Gender Differences in the Returns to Schooling Enrollment Rates in Indonesia," *The Journal of Human Resources*, 28(4), 899-932.

Fuller, B. and Liang, X, 1999, "Which Girls Stay in School? The Influence of Family Economy, Social Demands and Ethnicity in South Africa" C. H. Bledsoe, J. Casteline, J. Johnson-Kuhn and J. Haaga (eds.), *Critical Perspectives in Schooling and Fertility in the Developing World.* Washington DC: National Academic Press.

Garg, Ashish and Jonathan Morduch, 1998, "Sibling Rivalry and the Gender Gap:Evidence from Child Health Outcomes in Ghana," *Journal of Population Economics,* 11, 471 - 493.

Greene, William H. (1990). *Econometric Analysis*. New York: Macmillian Publishing Company.

Greenhalgh, Susan, 1985, "Sexual Stratification: Other Side of 'Growth with Equity' in East Asia," *Population and Development Reivew*, 11(2), 265-314.

Hart, Gillian Patricia, 1978, "Labor Allocation Strategies in Rural Javanese Households." Dissertation. Ithaca: Cornell University.

Hox, Joop. (2002). *Multilevel Analysis: Techniques and Applications*. New Jersey: Lawrence Erlbaum Associates.

Ilahi, Nadeem, 2002, "Childern's Work and Schooling: Does Gender Matter? Evidence from the Peru LSMS Panel Data," LAC-PREM, The World Bank, The Work Bank, Washington DC.

Lloyd, Cynthia B. and Anastasia J. Gage-Brandon, 1994, "High Fertility and Children's

Schooling in Ghana: Sex Differences in Parental Contributions and Educational Outcomes," *Population Studies*, 48(2), 293-306.

Mason, William M., 2001, "Statistical Analysis: Multilevel Methods," N.J. *International Encyclopedia of the Social and Behavioral Sciences.* Smelser and P.B. Baltes (eds.), Oxford: Pergamon. 14988-94.

Morduch, Jonathan and Ashish Garg, 1998. "Sibling Rivalry and the Gender Gap: Evidence from Child Health Outcomes in Ghana", *Journal of Population Economics* 11 (4), 471 - 493.

Morgan, Philip and Rosalind Berkowitz King, 2001. "Why Have Children in the 21st Century? Biological Predisposition, Social Coercion and Rational Choice." *European Journal of Population*. 17: 3-20.

Patrinos, Harry A., and George Psacharopoulos, 1997,"Family size, schooling and child labor in Peru—An empirical analysis," *Journal of Population Economics*, 10, 387-405.

Parish, William and Robert Willis, 1994, "Daughters, Education and Family Budgets: Taiwan Experiences," *Journal of Human Resources*, 28, 862-898.

Ray, Ranjan, 2000, "Child Labor, Child Schooling, and Their Interaction with Adult Labor: Empirical Evidence for Peru and Pakistan," *The World Bank Economic Review*, 14(2), 347-67.

Shavit, T. and J. Pierce. 1993, "Sibship Size and Educational Attainment in Nuclear and Extended Families: Arab and Jess in Israel," *American Sociological Review*, 56(June), 321-330.

White, Benjamin, 1977. "Production and Reproduction in a Javanese Village," Dissertation. New York: Columbia University.

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

Variables	Mean	Standard Deviation
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	*Boys*		*Girls*	
	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*

	Boys						Girls					
	Market		*Non-Market*				*Market*		*Non-Market*			
	Participation	Hours Spent	Participation	Hours Spent	Education	Leisure	Participation	Hours Spent	Participation	Hours Spent	Education	Leisure
<u>Sibling Composition</u>												
Sibship Size	0.076	-0.045	0.038	0.045	-0.186	0.141	0.211	0.163	-0.015	0.031	-0.068	-0.083
	[0.125]	[0.100]	[0.126]	[0.049]	[0.081]**	[0.088]	[0.124]*	[0.141]	[0.345]	[0.072]	[0.106]	[0.094]
# siblings <6 yrs	0.272	0.243	0.433	0.136	-0.003	-0.341	-0.207	0.036	0.548	0.393	0.012	-0.352
	[0.178]	[0.146]*	[0.180]**	[0.072]*	[0.115]	[0.123]***	[0.187]	[0.187]	[0.430]	[0.101]***	[0.137]	[0.130]***
# older sisters age 6-18	0.194	0.121	0.038	-0.016	0.018	-0.145	-0.461	-0.095	-0.127	-0.067	-0.03	0.246
	[0.190]	[0.145]	[0.186]	[0.065]	[0.124]	[0.125]	[0.169]***	[0.183]	[0.342]	[0.086]	[0.117]	[0.108]**
# older brothers age 6-18	0.195	-0.104	0.16	-0.071	-0.043	0.072	-0.203	-0.075	0.759	0.037	-0.028	0.041
	[0.167]	[0.108]	[0.164]	[0.062]	[0.105]	[0.116]	[0.180]	[0.169]	[0.411]*	[0.092]	[0.131]	[0.123]
# yngr sisters age 6-18	--	--	--	--	--	--	--	--	--	--	--	--
# yngr brothers age 6-18	0.093	0.201	-0.284	-0.072	0.097	-0.124	-0.084	0.132	0.003	0.16	-0.143	-0.027
	[0.181]	[0.121]*	[0.187]	[0.068]	[0.123]	[0.127]	[0.169]	[0.175]	[0.449]	[0.092]*	[0.144]	[0.128]
# brothers >18 yrs	0.085	0.17	-0.256	-0.015	0.149	-0.204	-0.343	-0.225	0.008	0.051	0.108	0.027
	[0.172]	[0.134]	[0.174]	[0.067]	[0.132]	[0.134]	[0.180]*	[0.173]	[0.438]	[0.097]	[0.141]	[0.123]
# sisters >18 yrs	-0.206	0.21	-0.203	-0.018	0.261	-0.286	-0.097	-0.404	-0.454	0.018	0.187	-0.009
	[0.211]	[0.203]	[0.225]	[0.099]	[0.159]	[0.167]*	[0.204]	[0.207]*	[0.430]	[0.109]	[0.197]	[0.174]
F/Wald tests[¥]	4.67	1.82	9.35	0.51	1.12	1.66	9.47	1.84	15.72	1.42	0.97	1.55
	[0.465]	[0.108]	[0.096]	[0.77]	[0.346]	[0.140]	[0.092]	[0.104]	[0.008]	[0.213]	[0.438]	[0.172]
degrees of freedom	5	5	5	5	5	5	5	5	5	5	5	5
<u>Child Specific Characteristics</u>												
Age of child	0.675	-0.35	0.717	-0.291	1.233	-1.108	0.356	-1.179	-0.591	-0.207	2.189	-1.424
	[0.489]	[0.381]	[0.468]	[0.215]	[0.288]***	[0.334]***	[0.552]	[0.652]*	[0.755]	[0.227]	[0.387]***	[0.336]***
Age of child squared	-0.02	0.021	-0.018	0.012	-0.048	0.038	-0.007	0.051	0.035	0.013	-0.085	0.046
	[0.018]	[0.016]	[0.019]	[0.008]	[0.011]***	[0.013]***	[0.021]	[0.025]**	[0.031]	[0.009]	[0.016]***	[0.014]***
Rural x Age	0.605	0.253	-0.111	0.229	0.242	-0.397	0.104	0.476	2.532	0.533	-0.836	-0.1
	[0.541]	[0.427]	[0.509]	[0.231]	[0.319]	[0.364]	[0.600]	[0.714]	[0.903]***	[0.255]**	[0.423]**	[0.372]
Rural x Age squared	-0.016	-0.011	-0.001	-0.009	-0.013	0.016	-0.006	-0.018	-0.096	-0.02	0.033	0.003
	[0.020]	[0.017]	[0.020]	[0.009]	[0.013]	[0.014]	[0.023]	[0.027]	[0.037]***	[0.010]**	[0.017]*	[0.015]
<u>Household Specific Characterisitcs</u>												
Household wealth	-0.006	-0.009	-0.015	-0.008	0.007	0.004	0.007	0	-0.012	-0.009	0.015	-0.007
	[0.013]	[0.007]	[0.011]	[0.003]***	[0.006]	[0.007]	[0.013]	[0.006]	[0.012]	[0.005]	[0.007]**	[0.007]
Father's education	-0.043	-0.066	0.007	-0.005	0.06	-0.017	-0.037	-0.024	-0.06	-0.015	0.033	-0.004
	[0.021]**	[0.019]***	[0.022]	[0.008]	[0.016]***	[0.016]	[0.024]	[0.023]	[0.045]	[0.012]	[0.018]*	[0.017]
Mother's education	-0.082	-0.023	-0.028	-0.008	0.063	-0.03	-0.046	-0.008	-0.053	-0.051	0.082	-0.017
	[0.022]***	[0.019]	[0.023]	[0.009]	[0.017]***	[0.017]*	[0.025]*	[0.023]	[0.053]	[0.011]***	[0.017]***	[0.016]
Father's age	0.002	0	0.014	-0.002	-0.008	0.008	-0.003	0	-0.014	-0.011	-0.002	0.012
	[0.012]	[0.009]	[0.012]	[0.005]	[0.008]	[0.009]	[0.012]	[0.011]	[0.022]	[0.006]*	[0.009]	[0.009]
Mother's age	0.003	-0.01	-0.007	0.003	0.012	-0.012	0.003	0.003	-0.027	0.013	-0.006	-0.003
	[0.016]	[0.012]	[0.016]	[0.007]	[0.011]	[0.011]	[0.016]	[0.014]	[0.030]	[0.008]	[0.013]	[0.013]
Rural	-4.226	-1.297	1.336	-1.443	-1.227	2.443	-0.111	-3.405	-14.984	-3.174	4.522	1.024
	[3.501]	[2.504]	[3.027]	[1.463]	[1.918]	[2.191]	[3.838]	[4.513]	[5.289]***	[1.545]**	[2.488]*	[2.207]
Constant	-5.92	3.109	-5.037	2.592	-3.714	26.311	-4.222	7.436	6.606	2.137	-8.784	27.611
	[3.238]*	[2.213]	[2.802]*	[1.356]*	[1.760]**	[2.042]***	[3.613]	[4.181]*	[4.669]	[1.407]	[2.329]***	[2.025]***
N	1576	736	1576	1202	1576	1576	1352	366	1352	1263	1352	1352
R-squared		0.15		0.02	0.18	0.1		0.21		0.18	0.15	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
Market Labor		
Participation		
no siblings age 6 yrs	0.438	0.253
1 sibling under age 6 yrs	0.506	0.216
Hours Spent (among all children)		
no siblings age 6 yrs	0.504*	0.132
1 sibling under age 6 yrs	0.705*	0.120
Hours Spent (conditional participation)		
no siblings age 6 yrs	1.151*	0.521
1 sibling under age 6 yrs	1.394*	0.557
Non-market Labor		
Participation		
no siblings age 6 yrs	0.756**	0.973
1 sibling under age 6 yrs	0.827**	0.984
Hours Spent (among all children)		
no siblings age 6 yrs	0.600*	1.532***
1 sibling under age 6 yrs	0.768*	1.940***
Hours Spent (conditional on participation)		
no siblings age 6 yrs	0.793*	1.574***
1 sibling under age 6 yrs	0.929*	1.967***
Education		
no siblings age 6 yrs	4.730	4.996
1 sibling under age 6 yrs	4.727	4.644
Leisure		
no siblings age 6 yrs	18.048***	17.365***
1 sibling under age 6 yrs	17.707***	17.013***
Total Time Spent on Market and Non-market Labor		
Total Hours Spent (among all children)		
no siblings age 6 yrs	1.104	1.663
1 sibling under age 6 yrs	1.474	2.056
Total Hours Spent (conditional participation)		
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

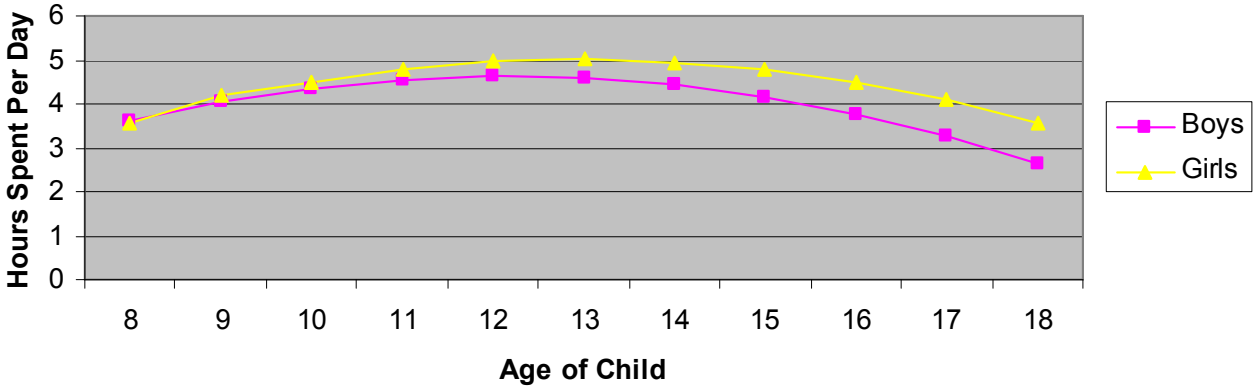


Figure 2: Predicted Hours Spent on Leisure Activities, Adjusted at the Sample Mean

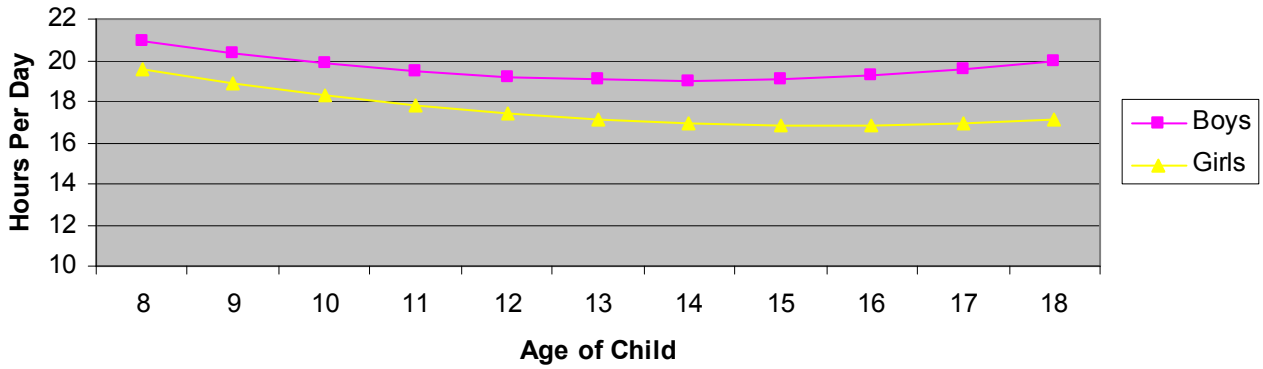


Figure 3: Predicted Log Odds of Non-Market Participation for Girls, Adjusted at the Sample Mean

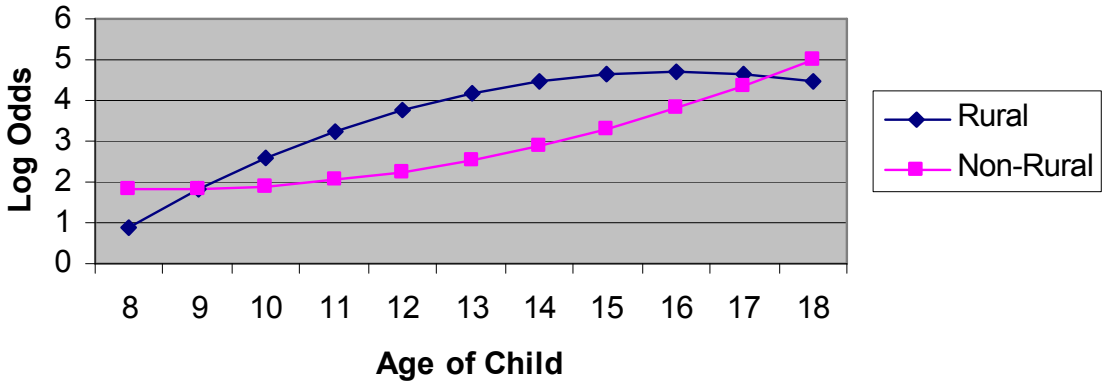
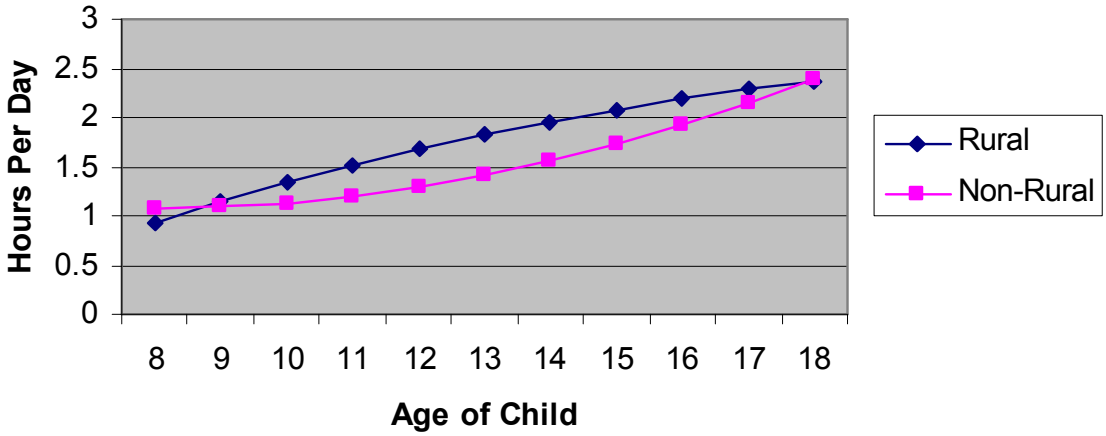


Figure 4: Hours Spent on Non-Market Labor for Girls, Adjusted at the Sample Mean



Appendix Table A

Robust Regression of Boys' and Girls' Time Use in Market Labor, Non-Market Labor, Schooling, and Leisure Activities

	Boys						Girls					
	Market		*Non-Market*				*Market*		*Non-Market*			
	Participation	Hours Spent	Participation	Hours Spent	Education	Leisure	Participation	Hours Spent	Participation	Hours Spent	Education	Leisure
<u>Sibling Composition</u>												
Sibship Size	-0.138	-0.168	-0.082	0.068	0.12	-0.041	0.179	0.299	-0.456	0.056	0.063	-0.25
	[0.154]	[0.154]	[0.157]	[0.055]	[0.104]	[0.114]	[0.155]	[0.167]*	[0.361]	[0.085]	[0.115]	[0.127]**
# siblings <6 yrs	0.535	0.352	0.606	0.077	-0.325	-0.107	-0.127	-0.048	1.144	0.39	-0.553	0.209
	[0.222]**	[0.206]*	[0.233]***	[0.081]	[0.149]**	[0.155]	[0.232]	[0.235]	[0.532]**	[0.119]***	[0.160]***	[0.171]
# older sisters age 6-18	0.183	0.143	0.117	-0.035	-0.095	-0.022	-0.476	-0.348	0.036	-0.124	0.176	0.163
	[0.212]	[0.183]	[0.215]	[0.068]	[0.142]	[0.147]	[0.196]**	[0.197]*	[0.387]	[0.096]	[0.128]	[0.137]
# older brothers age 6-18	0.248	-0.098	0.186	-0.069	0.102	-0.106	-0.196	-0.259	0.87	-0.001	-0.003	0.116
	[0.161]	[0.122]	[0.163]	[0.062]	[0.114]	[0.113]	[0.206]	[0.184]	[0.428]**	[0.103]	[0.140]	[0.147]
# yngr sisters age 6-18	0.144	0.267	-0.319	-0.097	-0.073	0.029	-0.014	0.09	0.382	0.147	-0.116	-0.055
	[0.210]	[0.148]*	[0.212]	[0.071]	[0.143]	[0.143]	[0.179]	[0.179]	[0.491]	[0.096]	[0.136]	[0.153]
# yngr brothers age 6-18	--	--	--	--	--	--	--	--	--	--	--	--
# brothers >18 yrs	0.265	0.358	-0.258	-0.059	-0.189	0.017	-0.223	-0.459	0.4	-0.012	-0.142	0.354
	[0.226]	[0.221]	[0.222]	[0.082]	[0.169]	[0.191]	[0.239]	[0.217]**	[0.523]	[0.119]	[0.166]	[0.191]*
# sisters >18 yrs	0.191	0.299	-0.097	-0.017	-0.137	-0.063	0.09	-0.52	-0.183	0.045	-0.019	0.178
	[0.275]	[0.288]	[0.292]	[0.128]	[0.212]	[0.192]	[0.243]	[0.238]**	[0.470]	[0.137]	[0.216]	[0.250]
F/Wald tests[¥]	2.81	2.16	9.03	0.55	0.76	0.31	7.91	2.43	11.18	1.78	1.21	1.04
	[0.728]	[0.058]	[0.108]	[0.737]	[0.580]	[0.906]	[0.161]	[0.036]	[0.048]	[0.115]	[0.304]	[0.393]
<u>Child Specific Characteristics</u>												
Age of child	0.283	-0.214	0.52	-0.573	-0.729	1.129	0.679	-1.028	0.547	0.208	-1.203	1.359
	[0.559]	[0.489]	[0.599]	[0.275]**	[0.401]*	[0.329]***	[0.743]	[1.131]	[0.957]	[0.272]	[0.424]***	[0.503]***
Age of child squared	-0.006	0.014	-0.01	0.023	0.023	-0.043	-0.019	0.043	-0.008	-0.006	0.035	-0.048
	[0.021]	[0.020]	[0.024]	[0.011]**	[0.016]	[0.013]***	[0.028]	[0.044]	[0.040]	[0.011]	[0.017]**	[0.021]**
Rural x Age	0.87	-0.149	0.212	0.579	-0.823	0.447	0.088	0.13	1.709	0.262	-0.457	0.008
	[0.635]	[0.542]	[0.650]	[0.295]*	[0.438]*	[0.368]	[0.801]	[1.206]	[1.260]	[0.301]	[0.464]	[0.540]
Rural x Age squared	-0.024	0.005	-0.013	-0.023	0.033	-0.022	-0.005	-0.005	-0.067	-0.007	0.019	-0.003
	[0.024]	[0.022]	[0.026]	[0.011]**	[0.017]*	[0.015]	[0.030]	[0.047]	[0.053]	[0.012]	[0.019]	[0.022]
<u>Household Specific Characterisitcs</u>												
Household wealth	0.001	-0.008	-0.034	-0.008	0.007	0.005	0.005	0.003	-0.016	-0.01	-0.005	0.013
	[0.014]	[0.008]	[0.010]***	[0.005]	[0.008]	[0.008]	[0.015]	[0.006]	[0.014]	[0.006]*	[0.008]	[0.008]
Father's education	-0.044	-0.061	0.015	0	-0.026	0.061	-0.044	-0.014	-0.049	-0.002	-0.014	0.029
	[0.026]*	[0.023]***	[0.027]	[0.010]	[0.020]	[0.020]***	[0.030]	[0.027]	[0.059]	[0.015]	[0.021]	[0.023]
Mother's education	-0.089	-0.022	-0.005	-0.01	-0.031	0.066	-0.042	-0.021	-0.056	-0.055	0.001	0.071
	[0.028]***	[0.023]	[0.029]	[0.011]	[0.022]	[0.020]***	[0.033]	[0.031]	[0.073]	[0.014]***	[0.020]	[0.022]***
Father's age	-0.004	0.002	0.005	0.002	0.011	-0.012	0.01	-0.008	-0.01	0	0.012	-0.014
	[0.015]	[0.010]	[0.015]	[0.006]	[0.011]	[0.010]	[0.015]	[0.015]	[0.037]	[0.008]	[0.013]	[0.013]
Mother's age	0.006	-0.005	0.012	0.002	-0.003	-0.003	0.005	0.021	-0.031	0.009	-0.014	0.003
	[0.021]	[0.015]	[0.021]	[0.008]	[0.015]	[0.015]	[0.022]	[0.022]	[0.049]	[0.011]	[0.017]	[0.017]
Rural	-6.071	1.083	-0.725	-3.525	4.958	-2.275	-0.149	-1.126	-9.148	-1.977	3.12	-0.269
	[4.077]	[3.129]	[3.808]	[1.855]*	[2.627]*	[2.222]	[5.196]	[7.628]	[7.218]	[1.859]	[2.792]	[3.186]
Constant	-2.644	2.47	-3.89	4.078	23.648	-2.797	-6.79	6.307	0.142	-0.387	26.47	-3.679
	[3.756]	[2.837]	[3.552]	[1.704]**	[2.462]***	[2.063]	[4.997]	[7.069]	[6.160]	[1.785]	[2.605]***	[3.098]
	1061	529	1061	820	1061	1061	896	249	896	847	896	896
N		0.18		0.03	0.12	0.2		0.21		0.21	0.29	0.15
R-squared												

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 brack

Appendix Table B

Random Effect Regression of Boys' and Girls' Time Use in Market Labor, Non-Market Labor, Schooling, and Leisure Activities

	Boys						Girls					
	Market		*Non-Market*				*Market*		*Non-Market*			
	Participation	Hours Spent	Participation	Hours Spent	Education	Leisure	Participation	Hours Spent	Participation	Hours Spent	Education	Leisure
<u>Sibling Composition</u>												
Sibship Size	-0.108	-0.126	-0.132	0.067	-0.055	0.106	0.237	0.303	-0.741	0.078	-0.245	0.043
	[0.296]	[0.134]	[0.192]	[0.059]	[0.108]	[0.116]	[0.266]	[0.153]**	[0.590]	[0.077]	[0.116]**	[0.109]
# siblings <6 yrs	0.767	0.302	0.752	0.079	-0.097	-0.301	-0.144	-0.041	1.887	0.36	0.191	-0.528
	[0.423]*	[0.183]*	[0.292]***	[0.080]	[0.153]	[0.164]*	[0.397]	[0.226]	[0.971]*	[0.113]***	[0.170]	[0.159]***
# older sisters age 6-18	0.24	0.136	0.173	-0.034	-0.02	-0.089	-0.757	-0.371	0.149	-0.123	0.089	0.237
	[0.369]	[0.158]	[0.257]	[0.076]	[0.136]	[0.146]	[0.340]**	[0.248]	[0.621]	[0.089]	[0.130]	[0.123]*
# older brothers age 6-18	0.547	-0.136	0.272	-0.069	-0.099	0.066	-0.198	-0.258	1.532	-0.013	0.092	0.002
	[0.317]*	[0.147]	[0.205]	[0.063]	[0.113]	[0.121]	[0.354]	[0.222]	[0.859]*	[0.098]	[0.147]	[0.138]
# yngr sisters age 6-18	--	--	--	--	--	--	--	--	--	--	--	--
# yngr brothers age 6-18	0.018	0.235	-0.355	-0.096	0.069	-0.067	-0.013	0.078	0.567	0.112	-0.028	-0.071
	[0.375]	[0.162]	[0.255]	[0.078]	[0.138]	[0.148]	[0.315]	[0.178]	[0.735]	[0.092]	[0.138]	[0.130]
# brothers >18 yrs	0.27	0.306	-0.302	-0.058	0.013	-0.138	-0.281	-0.463	0.455	-0.021	0.324	-0.129
	[0.436]	[0.172]*	[0.275]	[0.086]	[0.157]	[0.168]	[0.411]	[0.235]**	[0.797]	[0.118]	[0.176]*	[0.165]
# sisters >18 yrs	0.197	0.276	-0.098	-0.015	-0.065	-0.119	0.345	-0.516	-0.244	0.023	0.154	-0.045
	[0.547]	[0.237]	[0.346]	[0.115]	[0.200]	[0.215]	[0.452]	[0.234]**	[0.751]	[0.134]	[0.199]	[0.186]
F/Wald tests[¥]	3.43	8.12	8.88	2.48	1.70	2.17	7.19	10.22	5.42	5.19	4.32	7.91
	[0.634]	[0.150]	[0.114]	[0.780]	[0.889]	[0.825]	[0.210]	[0.069]	[0.367]	[0.394]	[0.504]	[0.162]
<u>Child Specific Characteristics</u>												
Age of child	1.286	-0.286	0.79	-0.567	0.978	-0.761	1.162	-1.037	1.665	0.275	1.197	-1.198
	[0.913]	[0.527]	[0.690]	[0.207]***	[0.340]***	[0.360]**	[1.214]	[0.860]	[1.655]	[0.302]	[0.416]***	[0.394]***
Age of child squared	-0.038	0.016	-0.019	0.023	-0.037	0.024	-0.03	0.043	-0.04	-0.009	-0.043	0.035
	[0.035]	[0.020]	[0.027]	[0.008]***	[0.013]***	[0.014]*	[0.046]	[0.031]	[0.064]	[0.012]	[0.016]***	[0.015]**
Rural x Age	0.767	-0.076	0.092	0.573	0.555	-0.7	-0.023	0.136	2.187	0.094	0.27	-0.436
	[1.003]	[0.576]	[0.750]	[0.233]**	[0.378]	[0.400]*	[1.299]	[0.933]	[1.775]	[0.327]	[0.455]	[0.431]
Rural x Age squared	-0.013	0.003	-0.009	-0.022	-0.026	0.028	-0.005	-0.005	-0.088	0	-0.013	0.018
	[0.039]	[0.022]	[0.030]	[0.009]**	[0.015]*	[0.016]*	[0.049]	[0.034]	[0.072]	[0.013]	[0.018]	[0.017]
<u>Household Specific Characterisitcs</u>												
Household wealth	0.004	-0.009	-0.04	-0.008	0.004	0.007	0.006	0.003	-0.034	-0.009	0.012	-0.005
	[0.023]	[0.010]	[0.015]***	[0.006]	[0.008]	[0.009]	[0.022]	[0.012]	[0.030]	[0.006]	[0.009]	[0.009]
Father's education	-0.101	-0.059	0.019	0	0.064	-0.027	-0.079	-0.013	-0.081	-0.003	0.031	-0.017
	[0.053]*	[0.022]***	[0.034]	[0.010]	[0.019]***	[0.020]	[0.053]	[0.030]	[0.095]	[0.015]	[0.022]	[0.021]
Mother's education	-0.154	-0.027	-0.004	-0.01	0.059	-0.026	-0.065	-0.021	-0.107	-0.058	0.07	0.004
	[0.057]***	[0.023]	[0.036]	[0.011]	[0.020]***	[0.022]	[0.054]	[0.031]	[0.103]	[0.015]***	[0.023]***	[0.021]
Father's age	-0.013	0.002	0.006	0.002	-0.012	0.013	0.014	-0.008	-0.004	-0.002	-0.01	0.01
	[0.028]	[0.011]	[0.018]	[0.005]	[0.010]	[0.011]	[0.028]	[0.018]	[0.049]	[0.008]	[0.012]	[0.011]
Mother's age	0.022	-0.006	0.017	0.002	-0.002	-0.005	-0.001	0.021	-0.048	0.011	0.001	-0.009
	[0.039]	[0.016]	[0.025]	[0.007]	[0.014]	[0.015]	[0.041]	[0.025]	[0.074]	[0.011]	[0.017]	[0.016]
Rural	-5.77	0.41	-0.013	-3.489	-2.927	4.231	1.221	-1.147	-11.167	-0.908	-2	2.906
	[6.291]	[3.694]	[4.527]	[1.453]**	[2.335]	[2.472]*	[8.403]	[6.306]	[10.429]	[2.061]	[2.832]	[2.682]
Constant	-10.566	3.035	-5.638	4.037	-1.866	23.895	-11.635	6.351	-4.933	-0.849	-2.607	26.432
	[5.981]*	[3.376]	[4.262]	[1.317]***	[2.159]	[2.289]***	[8.108]	[5.848]	[9.859]	[1.967]	[2.693]	[2.549]***
N	1061	529	1061	820	1061	1061	896	249	896	847	896	896
# of households	760	419	760	616	760	760	666	213	666	645	666	666

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 brack

Appendix Table C
Fixed Effect Regression of Boys' and Girls' Time Use in Market Labor, Non-Market Labor, Schooling, and Leisure Activities

	Boys						Girls					
	Market		*Non-Market*				*Market*		*Non-Market*			
	Participation	Hours Spent	Participation	Hours Spent	Education	Leisure	Participation	Hours Spent	Participation	Hours Spent	Education	Leisure
Sibling Composition												
# older sisters age 6-18	0.248	0.557	-0.907	0	0.383	-0.301	0.361	-0.531	3.416	-0.211	-0.1	0.386
	[0.761]	[0.331]*	[0.545]*	[0.000]	[0.215]*	[0.225]	[0.829]	[0.610]	[3.517]	[0.161]	[0.230]	[0.221]*
# older brothers age 6-18	0.033	0	0.058	0.02	0	0	2.878	1.282	49.107	0.377	-0.442	-0.004
	[0.000]	[0.000]	[0.000]	[0.166]	[0.000]	[0.000]	[1.451]**	[1.362]	[0.000]	[0.557]	[0.756]	[0.724]
# yngr sisters age 6-18	--	--	--	--	--	--	--	--	--	--	--	--
# yngr brothers age 6-18	-2.449	-0.838	0.399	0.278	0.309	-0.124	0.516	0.264	91.703	0.181	-0.334	0.29
	[1.257]*	[0.860]	[1.016]	[0.306]	[0.398]	[0.417]	[0.000]	[1.276]	[0.000]	[0.554]	[0.763]	[0.730]
F/Wald tests[¥]	4.78	1.97	3.09	0.47	1.69	0.9	4.34	1.15	0.94	1.04	0.17	1.61
	[0.092]	[0.144]	[0.216]	[0.625]	[0.186]	[0.409]	[0.114]	[0.346]	[0.331]	[0.377]	[0.917]	[0.187]
Child Specific Characteristics												
Age of child	2.555	-1.068	3.126	-0.148	0.127	-0.429	28.276	6.314	138.865	0.344	0.954	-1.227
	[1.575]	[1.014]	[1.691]*	[0.366]	[0.496]	[0.520]	[0.000]	[4.116]	[0.000]	[0.441]	[0.562]*	[0.538]**
Age of child squared	-0.091	0.04	-0.106	0.007	-0.007	0.013	-0.547	-0.211	-4.6	-0.012	-0.036	0.035
	[0.060]	[0.038]	[0.064]*	[0.014]	[0.020]	[0.020]	[0.031]***	[0.139]	[0.032]***	[0.017]	[0.022]*	[0.021]*
Rural x Age	-2.069	0.841	-2.113	0.277	1.184	-0.715	-27.554	-6.301	-131.651	-0.316	0.785	-0.255
	[1.834]	[1.083]	[1.788]	[0.410]	[0.551]**	[0.577]	[0.832]***	[4.198]	[5.005]***	[0.473]	[0.614]	[0.588]
Rural x Age squared	0.098	-0.027	0.082	-0.011	-0.052	0.029	0.541	0.216	4.379	0.016	-0.032	0.014
	[0.069]	[0.040]	[0.068]	[0.016]	[0.021]**	[0.023]	[0.000]	[0.144]	[0.185]***	[0.018]	[0.024]	[0.023]
Constant		2.876		0.107	-1.936	25.501		-7.822		0.274	-4.926	27.694
		[2.576]		[1.118]	[1.412]	[1.478]***		[7.593]		[1.284]	[1.835]***	[1.757]***
N	206	529	161	820	1061	1061	128	249	54	847	896	896
R-squared		0.33		0.03	0.19	0.16		0.34		0.29	0.19	0.52
# of households	93	419	73	616	760	760	57	213	23	645	666	666

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; p-values presented in brackets