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Tasks and Opportunities within Indian Families[1]

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Abstract

This paper uses the Indian Time Use Survey (1999) to document gender inequalities in adult and child tasks and their impact on an important part of inequality of opportunity – the resources invested in the education of children. We examine the school attendance of boys and girls and the relative probability that Indian children will receive informal parental instruction or assistance with learning at home. We document clear gender inequities in the allocation of household tasks among adults and children but find more mixed evidence regarding gender favouritism in human capital investment. In rural areas, school attendance falls off much more rapidly with age for girls, but in urban areas, the school attendance of boys and girls is essentially similar. We estimate a household fixed effects model of informal instruction, and show that in both urban and rural areas, there is no evidence of discrimination on the basis of gender with regards to allocation of instruction time by adults (parents or members of the extended family) – the coefficient on gender is statistically insignificant and has a negligible size.

Tasks and Opportunities within Indian Families

1.1 Introduction

Conventional data on the market incomes and commodity purchases of households cannot reveal much about individuals who have little or no money income or control over expenditure (e.g. children, or many women, or the very poor). In this regard, time use data has a massive advantage, because time is the ultimate "scarce resource" and everyone does *something* with his or her 24 hours every day.[2] Hence, time use analyses can examine the lives of previously ignored people, and the determinants of otherwise ignored processes – people and processes which are particularly important in developing countries, where the monetary/market economy is a smaller proportion of the total economic activity, where the very poor constitute significant proportions of the population, and where gender inequalities are important. To illustrate this general idea, we use time use data from India to document gender inequalities in adult and child tasks and examine an important part of inequality of opportunity – the time invested in the education of children.

Human societies have always had to find ways to transfer their accumulated knowledge and useful skills to younger generations – historically, in very poor societies, informal instruction within the family was often the only available option. However, an important characteristic of the development process is the transition to much greater reliance on schools, daycares and other formal institutional venues. Time use analysis data offers researchers an otherwise unavailable window on this transition, as well as the opportunity to distinguish between school enrolment and actual attendance (which may be determined by different, perhaps gender-dependent processes). Since the major cost to families of producing human capital via informal instruction within the home is the opportunity cost of parental time, time use data also enables researchers to examine whether constraints on the labour market opportunities available to women may imply that their time becomes available for the informal instruction of children, and to assess whether boys or girls benefit thereby.

Gender inequities start in the home, but the allocation of tasks and opportunities within households is usually an unobserved process. Because the linked issues of gender

[2] Juster and Stafford (1991) argue that "the fundamental scarce resource in the economy is the availability of human time"

inequality and human capital investment are increasingly recognized as crucial for development (e.g. Dreze and Sen, 2002, Chapter 5; Morrison et al., 2007), we think that time use data has great potential to assist our understanding of the development process. Section 1.2 describes the data set that we use and documents patterns in male and female time use. Section 2.1 then examines the enrolment and school attendance of boys and girls, and the total investment in schooling time of Indian children. Section 2.2 asks whether gender bias can be observed in informal instruction within the home. Section 3 concludes and discusses the policy implications of our analysis and findings.

1.2 Data Description

Between June 1998 and July 1999, the Central Statistical Organization of India conducted a pilot Time Use Survey (the ITUS). As Pandey (1999) describes, a stratified random sampling design, as followed in the National Sample Surveys (NSS), was used to select 1066 rural and 488 urban strata of small, medium and large rural villages and urban towns within 52 (out of 147) separate districts in 6 states. In each First Stage Unit, 12 randomly selected households were interviewed, producing a sample of 18,591 households (12,750 rural and 5,841 urban) with 77,593 persons (53,981 rural and 23,612 urban). The survey was conducted in four rounds during the year to capture seasonal variations in the time use patterns of the population. Two person teams of male and female interviewers stayed in each village or urban block for nine days to compile time diaries for normal, abnormal and weekly variant days. Respondent households were first visited to assess their weekly pattern of time use and then revisited to complete a full diary of activities concerning the previous day for all household members aged six years or older.[3] Although the sample design was explicitly constructed to capture differences in time use between normal and weekly variant or abnormal days, in practice Hirway (2000:24) noted that "On an average, of the total 7 days, 6.51 were normal, 0.44 weekly variant day and 0.05 was abnormal day… in rural areas people

[3] The personal interview methodology was very labour intensive, but was considered necessary to collect reliable diary data from respondents who are, in some cases, illiterate. Gersuny (1998) discusses the advantages of the diary methodology, which walks the respondent sequentially through the previous day's activities, in improving recall and imposing aggregate consistency of responses. An "abnormal" day is defined in the "Instruction Manual for Field Staff" (1998: 23) as "that day of the week when guest arrives, any member of the household suddenly falls sick, any festival occurs, etc." The "weekly variant" is "determined according to the pattern of the major earners holiday. If the major earner does not holiday, then school children's holiday will be taken. If even this is not applicable, then day of weekly hat (bazaar) may be taken".

continue their normal activities on holidays also." This paper therefore focuses on time use on "normal" days.

As Pandey (1999:1) notes, "India has lot of socio-economic, demographic, geographic and cultural diversities. To ensure that all aspects of diversities are captured, Haryana, Madhya Pradesh, Gujarat, Orissa, Tamil Nadu and Meghalaya were chosen to represent northern, central, western, eastern, southern and north-eastern regions respectively." Although one might wonder whether six states' data could fully capture the diversity of India, Hirway (2000:11) has argued that "cross-checking of the results has confirmed that the sample is fairly representative of the country." In any event, this data would be interesting even if this were not the case, i.e. even if the data were only seen as a sample of the approximately 233 million people inhabiting these states.

How does "the average day" differ, for men and women and why might that matter for children? Tables 1R and 1U summarize gender differences for rural and urban Indians, by age and school attendance status.[4] For children, these age groups are chosen because they roughly correspond to primary, upper primary, and higher than upper primary schooling.

<< Table 1R and 1U about here >>

Both tables 1R and 1U add together paid and unpaid labour in different types of tasks, and illustrate how gender specializations emerge with age in India – in both urban and rural areas, boys and girls differ much less in their time use when they are younger than when they are older. But after the age of 15 some gender differences are quite pronounced – Indian men spend, on an average, only somewhere between 15 to 25 minutes daily in Home Production (Coded as Activity Group 4 in the ITUS - Household Maintenance, Management and Shopping for Own Household). Task specialization in home production is most extreme in the cohort aged 19 to 44, when urban men spend, on average, about 5% (for rural men, it is 6%) of the time which comparably aged women use for home management.

Although the System of National Accounts (SNA) has been rightly criticized for its neglect of the importance of Caring Labour, Community Activities, Learning, Social and

[4] See also Baskaran (1999).

Personal Care activities[5], it is nevertheless true that economic survival requires every family to "put bread on the table" – to obtain some of the commodities which are the result of Primary Production (Farming, Animal Husbandry, Fishing, etc.), Secondary Production (Construction, Manufacturing) and Trade, Business and Services.[6] Using the ITUS data we can add together the paid and unpaid time spent in such productive activities by respondents and define it as "SNA Commodity Production" time. Including associated travel time, Indian men aged 19 to 44 report an average of 8.3 hours per day in rural areas and 8.5 hours per day in urban areas. Men 45 to 64 years old do about a half hour less, on average.[7]A key gender difference in SNA commodity production is the fact that in rural areas, in addition to doing almost all the housework, women do on an average about 3 ½ hours a day of it (compared to about 6 hours for men) – partly because Primary Production specifically includes the highly gendered activities: 140. Fetching of Water, and 143. Collection of Fuel/Fuel Wood/Twigs, as well as agricultural labor in the fields. Furthermore, among urban adults (older than 18 years), work outside the home in Trade, Business and Services is dominated by men.

To get the total 'work' day of men and women, one must certainly add home production time (Activity Group 4 - Household Maintenance, Management and Shopping for Own Household), but other elements are often contested.[8] For present purposes, all we need to

[5] Activity Codes 5 - Care For Children, the Sick, Elderly and Disabled for Own Household; 6 - Community Services and Help to Other Households; 7 – Learning; 8 - Social and Cultural Activities, Mass Media, etc.; 9 - Personal Care and Self-Maintenance

[6] Specifically, *Primary Production Activities* includes the major categories: 11. Crop Farming, Kitchen Gardening, etc.; 12. Animal Husbandry; 13. Fishing, Forestry, Horticulture, Gardening; 14. Collection of Fruit, Water, Plants etc., Storing And Hunting; 15 Processing & Storage; 16. Mining, Quarrying, Digging, Cutting, etc. Under *Secondary Activities*, the major headings are: 21 Construction Activities, and 22. Manufacturing Activities – each with numerous sub-headings. The *Trade, Business and Services* activities include: 31. Trade and Business and 32. Services – which (to give readers an idea of the detail of classification) includes 321. Service in Government and Semi Government Organizations (Salaried), 322. Service in Private Organizations (Salaried), 323. Petty Service: Domestic Servants, Sweepers, Washers, Pujari, Barber, Cobbler, Mali Massaging, Prostitution, (Wages) Watching And Guarding, 324. Professional Services: Medical and Educational Services (Private Tuition, Non Formal Teaching etc.), Financial Services and Management and Technical Consultancy Services, 325. Professional Services: Computer Services, Xerox/Photocopying Services, Beauty Parlours, Hair Cutting Saloons etc., 326. Technical Services: Plumbing, Electrical And Electronic Repair and Maintenance and Other Related Services, 327. Others, and 329. Travel To Work.

[7] The primary activities, especially agriculture, display some seasonality, with the average times varying across months.

[8] In one line of argument, "work" is an instrumental activity – one "works" in order to produce the goods and services that are the inputs into utility, while care for others is meaningful in itself. But, others see this distinction as negating the meaning and other "process" benefits that most people find in paid employment. On examining time use surveys across the world (Hirway, 1999), we discovered that sometimes care activities are grouped with "voluntary" work. In the context of ITUS, care activities have been classified under "extended

do is to note that rural men and women aged 45 to 64 are nearly exactly matched in average total time spent on SNA commodity production and home production (Activity Groups 1+2+3+4) with men working a total of 495 minutes per day and women working 494 minutes. At all younger ages, rural men do appreciably less on average than rural women – particularly among teenagers aged 15 to 18, when girls work almost two hours more per day, partly because on average rural boys spend 1.2 hours more per day in school.

However, urbanization makes a huge difference. The urban/rural difference for men in average total work hours per day is slight (+10 minutes for ages 19-44). But for rural women, work in primary or secondary production or in trading adds up to about 6 hours a day on average, whereas it averages well under 2 hours daily for urban women. Perhaps because unwaged agricultural work is not a possibility for urban women and opportunities for their paid employment are somewhat socially constrained, urban women's working time is largely restricted to the home. In total, urban women do substantially less total commodity production and housework than adult urban men (74 minutes per day less on average for ages 19 to 44, and 99 minutes less for ages 45 to 64). As a consequence, in all age groups, urban women have somewhat more time available for other activities than urban men – including more time available for informal instruction at home (coded as "Teaching, Training and Instruction of own Children" in the ITUS).[9]

2.1 Investing Time – Family Decisions and the Human Capital of Children

Each day, families must allocate the scarce resource of household time to the competing alternatives of direct production of goods and services, market work to produce cash income, investment in future productive capacity and "leisure".[10]

In the ITUS, every individual's principal status (e.g. working in the household, working as a casual labourer, student, etc.) is given – but we also have direct information on

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work" (Hirway, 1999) or "non-market household production" (Kulshreshta and Singh, 1999). On the issues involved in classifying various kinds of work in the ITUS, see Hirway (1999) and Hirway (2000).

[9] "Leisure" is an ambiguous category (see Osberg, 2008) but the broad activity groups 8 (*Social and Cultural Activities, Mass Media, etc.)* and 9 (*Personal Care and Self-Maintenance*) come closest - e.g. activities 863. Reading Newspaper and Magazines, 852. Watching Television and Video, 951. Talking, Gossiping and Quarreling, 961. Doing Nothing, Rest and Relaxation, not to mention the euphemistic 911. Sleep and Related Activities. Urban women over 45 report substantially more such time than younger women, and somewhat more, on average, than men.

[10] There is a large literature on education of children in India. In the interest of space, we do not survey this literature here, but see Motiram and Osberg (2007), Dreze and Sen (2002), PROBE (1999).

whether an individual actually attends an educational institution. Table 2 therefore distinguishes between school enrolment and actual school attendance. In both urban and rural areas, the fraction of children aged 6 to 18 who actually attended school on a normal day is about one fifth lower than the proportion identified as "student" – even if the higher enrolment of urban areas (about 75%) implies a somewhat larger absolute differential (15 percentage points).

Since enrolled girls often (but not always) seem to have better attendance patterns than enrolled boys, the distinction between school enrolment and actual attendance is an important one for the analysis of gender issues. For younger age groups and rural areas, gender differentials in enrolment overstate gender differences in actual school attendance. Among 6 to 10 year olds, for example, Table 2 shows that the urban boy – girl differential in enrolment is 4.2 percentage points, but the boy-girl difference in attendance is 1.7 percentage points (in rural areas, there is a 6.8 percentage point difference in enrolment but a 4.9 percentage point difference in attendance). In rural areas, female attendance is better than male attendance at all ages, implying a consistent pattern. Over all, among rural children 6 to 18, the male – female enrolment difference is 11.7 percentage points, substantially greater than the 8.8 percentage point attendance differential. However, urbanization is associated both with a general increase in enrolment and attendance rates, and with a switch of gender differentials. Among urban 15 to 18 year olds, the female enrolment rate very slightly exceeds the male enrolment rate, but the relative attendance of males is better than that of females, so the slight (1.6 percentage point) differential in attendance rates favours males.

<< Table 2 about here >>

This paper emphasizes school attendance, and the importance of urbanization for gender patterns of human capital investment. As Table 2 illustrates, in both rural and urban areas, roughly seventy percent of Indian children aged 6 to 10 attend school. In urban areas, the same proportion of both boys and girls remain in school for ages 11 to 14, and there is little gender differential in the drop to roughly forty percent remaining in school when aged 15 to 18. In the rural areas, however, gender differences in school attendance increase from five percentage points for 6 to 10 year olds to twelve percentage points among older age

groups. In combination with a strong tendency for rural teens to leave school, this implies that by the age of 15 to 18 only about a fifth of rural girls are attending school.

Our focus on gender bias in education has much in common with the concerns of Kingdon (2005), but she examines gender bias in enrolment (we emphasize attendance) and uses family budget data to stress the importance of differential expenditure on purchased educational inputs (we examine time inputs). Nevertheless, although the primary focus of both this paper and hers is gender differences in schooling, one should not forget that the differences in school attendance associated with parental socio-economic and educational background are considerably larger than gender differences – the 15 to 18 year old children of casual labourers in urban areas have, for example, a thirty five percentage point lower chance of school attendance, compared to wage workers, and the school attendance rate of rural girls aged 11 to 14 nearly doubles (increasing from 32% to 61%) if there is a literate adult female (defined as older than 15 years) in the household.

Because our ITUS data only capture the *quantity* of time allocated to investment in education,[11] we have no information on any school fees or tuition paid by parents, and hence only a partial estimate of the costs of schooling. We also have no data on the eventual future *productivity* in higher wages or other returns of the time invested in children's human capital. Nevertheless, we do observe that in deciding to send their children to school, Indian families invest substantial amounts of their children's time. Class time is just the beginning – children also must do homework, and travel to school, activities which the ITUS directly measures. Table 2 shows that although median class time is consistently about 5 ½ hours on a 'normal' day, the median child aged 6 to10 spends about 7 ½ hours on schooling, which rises to about 9 hours for those who remain in school when aged 15 to 18, when one counts homework and travel time.

Although the ITUS data contain no direct indicator of educational quality, many authors (e.g. Motiram and Osberg 2007; Dreze and Sen, 2002; Filmer and Pritchett, 1998) have emphasized the very uneven nature of schooling in India. An indirect indicator of such

[11] Although Duraisamy (2002) provides estimates of the rate of return to education in India between 1983 and 1994, and argues that the returns to female schooling in India typically exceed the rate of return for males, Heckman et al. (2006) emphasize the complexities involved in providing an unambiguous estimate of "the" rate of return to years of education. Furthermore, Dreze and Sen (2002, especially Chapter 5) are representative of a large literature which emphasizes the huge variance in quality of schooling in India, and the low quality of much of the public school system.

inequality may be the substantial variation in homework time – for example, among 15 to 18 year old boys in urban areas only about a third (33.9%) of all children (even fewer in rural areas) did any homework at all, but the median time of the 80% (= 33.9/42.4) of students aged 15 to 18 years old who did do homework was over 2 ½ hours! As well, when schools differ substantially in quality or availability, one can expect that student travelling time will be highly unequal, as some children will be able to attend the local school, while others must travel long distances in search of higher quality, or any available, schools. In the 15 to 18 age group, the median travel time (i.e. over positive travel times) was an hour a day.

Total time invested in human capital is the sum of the time spent in informal education within the home and in formal schooling (class time plus homework plus travel time). As Tables 1R and 1U document, adults in India report spending hardly any time at all in learning activities – e.g. an average of less than a minute a day for rural men and women over 45. The importance of schooling for children is also indicated by the fact that 6 to 10 year old children who attend school spend on an average about 400 minutes more each day in learning than non-attendees, and the difference increases as children age.

For both adults and children, therefore, school attendance is the key determinant of time invested in learning – but what is the opportunity cost of that time? What do non-attending children do with the time they do not spend in school? In rural areas more child labour in agriculture can account for 114 minutes for boys 6 to 10 (90 minutes for girls – about a third of the differential), but school time mostly comes out of leisure (i.e. "Social and Cultural Activities" and "Personal Care and Self-Maintenance"). In urban areas, the fraction of school time explained by foregone leisure is even larger since young children spend very little time in productive labour whether they are in or out of school.

As children age, the opportunity cost of their school time increases, and school non-attendees do substantially more work – but in a highly gendered fashion. Boys who do not attend school do about the same amount of housework as adult men (see Table 1) – 18 to 20 minutes a day in urban areas and 25 to 27 minutes in rural areas – but boys who stay in school are evidently almost entirely protected from the burdens of housework at all ages. In both urban and rural areas, schoolboys do on average only 4 to 8 minutes of daily housework. However, the same is not true for girls who attend school, who average 40 to 60 minutes

housework daily, on top of roughly the same amount of school work as boys. And in both rural and urban India, girls aged 15 to 18 who do not attend school do almost as much work around the home as adult women. Clearly, as girls age they face more pressures to work around the home, whether in school or not, than boys, in both urban and rural areas.

However, because urban girls aged 11to 14 and 15 to 18 do very little SNA commodity production, whether attending school or not, there is a relatively low opportunity cost, in foregone commodities, to their families of their school attendance time. In rural areas, on the other hand, girls who do not attend school increase their work time in the fields substantially – by an average of 2 ¼ hours for 11 to 14 year olds and over 3 hours daily for 15 to 18 year olds – as well as substantially increasing their home production time. Whatever the future benefits families may perceive to educating girls, the immediate cost in foregone labour time of girls is substantially higher in rural than in urban India.

Furthermore, Section 1 noted that urban women in India are almost completely responsible for family housework, but – because they work relatively little outside the home – spend substantially less time in commodity production than urban Indian men. Is it possible that the greater time available to urban women (perhaps because their income earning options are constrained) enables them to invest more in the informal education of their children? When they are quite young (6 to 10), urban school girls report spending more time in learning activities than urban schoolboys, a difference that is not apparent in rural areas. Could it be that urban mothers who are disadvantaged by labour market discrimination try to give their daughters what they did not get themselves – that there is a certain intergenerational dialectic to gender disadvantage? Or is gender preference so deeply ingrained that mothers favour their schoolboy sons in extra informal instruction, in addition to shielding them from the daily duties of housework?

2.2 Informal Instruction in the Home

The ITUS records directly, for each child aged 6 or over, both time spent in informal learning in the home and in school attendance. To our knowledge, the ITUS offers the only available evidence in developing countries on the role which informal parental instruction[12] may play in human capital acquisition. Historically, education outside school has sometimes

[12] As clarified later, we use the term "parental instruction" somewhat broadly to refer to instruction by adults in the household.

been crucially important to literacy attainment. In Scandinavia in the seventeenth century, for example, nearly universal literacy was achieved, as Johannson (1988: 137) notes, "almost completely without the aid of a proper school system in the countryside. The responsibility for teaching children to read was ultimately placed on parents and godfathers[13]". (Swedish parents and godparents took this responsibility seriously, given that as Lutherans they perceived the possibility/certainty (?) of eternal damnation of the souls of the children who did not learn their catechism before confirmation, typically at age 13 or 14.)

The ITUS data record both the time each adult spent on "Teaching, Training and Instruction of Own Children" (activity 521) and the time at which children within the household report receiving informal adult instruction (specifically – activity 721. Studies, Homework and Course Review Related to General Education). Hence, we can match records by time of day within household, and discern both which child got informal instruction and which adult provided it.[14] We use this to examine both the role which informal parental instruction may play in human capital acquisition and to examine the determinants and the extent of intra-family inequality in parental time invested in children's human capital. Overwhelmingly, only one adult at a time is involved – i.e. there is strong within-family specialization. As Table 3 indicates, informal parental instruction is much more common in urban areas – about 6% of rural, and 18% of urban, households report this activity on a randomly selected normal day. Perhaps because adult female time is less often directly productive in urban areas, or perhaps because adult urban males work slightly longer hours, there is a gender reversal in informal instruction between rural (58% male instructors) and urban (58% female instructors) areas.[15]

<< Table 3 about here >>

[13] Johannson does say "godfathers" but should he have said "godmothers"? If women and children spend more time in the home together, one might think that the role of women in informal instruction is generally likely to be greater than that of men. On the other hand, in our Indian data, in rural areas, men provide more of the informal education. We have no historic Swedish time use diaries to provide conclusive evidence.

[14] "Household" is defined in the ITUS as "A group of persons normally living together and taking food from a common kitchen…the members of a household may or may not be related by blood to one another." The two common structures are a joint family and a nuclear family. Informal instruction can (and is) done by parents, but also by other members of family (e.g. grandfather, elder brother).

[15] One would expect that informal instruction affects and is affected by the school success of children. Unfortunately, the data does not allow us to investigate this phenomenon.

When informal instruction happens, families evidently take it seriously, with median time invested being a full hour. Unfortunately, we do not observe what kind of instruction is being given i.e., whether it is school homework or traditional knowledge, but given the description of the activity (Studies, Homework and Course Review Related to General Education), we suspect that it is likely to be related to the former. Moreover, because the time use diary methodology samples an individual day, it is not possible to distinguish the periodicity of episodes with ITUS data. (We cannot, for example, distinguish between the hypotheses that (a) 42% of rural households help with homework, but only for one day each week or that (b) 6% of rural households help with homework every day of the week.) Nevertheless, the difference between urban and rural families in relative frequency is apparent. About 90% of the time, it is the head of household, or spouse thereof, who instructs children – but in the remaining 10% of cases, it is married children within the household or older siblings.

Scheduled Castes (SC) and Tribes (ST) are historically disadvantaged groups in India. The population shares of SC and ST households in rural areas are 18.44% and 19.18%, respectively. The corresponding figures for urban areas are 4.91% and 10.08%, respectively. Given these shares, we can observe that in both rural and urban areas, SC and ST households are underrepresented among the households where informal instruction occurs, which is unsurprising.

We want to examine whether there is gender bias in this informal instruction, yet we know that the probability of *any* such instruction varies substantially across households. If, for example, informal instruction is mostly "help with homework," then it is children who are going to school who are likely to get it, and families who do not enrol all their children in school are less likely to do it at all, or to instruct children who do not attend. In our estimation results below, we focus only on the children who are attending school, but we have checked whether the estimation suffers from sample selection bias, by using the two-stage regression procedure suggested in Wooldridge (2002, pp. 581-585), which we describe below.

To estimate the possible role of gender bias in informal instruction, we use the following "household fixed effects" model. Let h ($=1,\ldots,H$) index a particular household and c ($=1,2,\ldots C$) denote the birth order of a child (i.e., eldest, next to eldest, and so on) among the

children within a household who are attending school.[16] Each child attending school can then be uniquely identified by the index *hc*.[17] Whether a child (*hc*) who is attending school receives informal instruction or not depends upon his/her personal characteristics (e.g. age, gender) and the characteristics of the household that she resides in (e.g. caste status, educational status of the household head). Formally,

[1] $$I_{hc} = f(X_h, Z_{hc}, u_{hc})$$

where I_{hc} =1 if the child *hc* receives informal instruction and 0 otherwise. X_h is a vector of "household fixed effects" - variables characterizing the household (*h*) that the child lives in, which vary across households, but are common to all the children living within the household – some may be observed in the data (e.g. monthly household expenditure, caste status etc.) but some may be unmeasured (e.g. whether the father is an alcoholic). Z_{hc} is the vector of characteristics that varies across both children of various birth orders and across households (e.g. age, gender). u_{hc} is a random error term. If we assume this relationship has a linear form, we get:

[2] $$I_{hc} = a + bX_h + cZ_{hc} + u_{hc}$$

a, b, and *c* are vectors of regression coefficients.

We can estimate the above equation using standard panel data techniques. Since different households can (and in our sample, do) have different number of children attending school, the panel is unbalanced. We present two different estimations – a "within/fixed effects" estimation and a "random effects" estimation. Taking means on both sides of equation (2), we get:

[3] $$\bar{I}_h = a + b\bar{Z}_h + \bar{u}_h$$

where $\bar{I}_h = \sum_c I_{hc} / C_h, \bar{Z}_h = \sum_c Z_{hc} / C_h, \bar{u}_h = \sum_c u_{hc} / C_h,$ are the means of *I, Z* and *u* within the household, and C_h is the number of children attending school in household *h*. We obtain

[16] Note that this need not be the birth order of the child within the household (e.g., the eldest child in the household might not be attending school, in which case he/she would not be considered in the regression). The eldest child might also be married or attending an educational institution in a different region, and therefore counted as part of a different household.

[17] It is possible for two or more children within a household and who are attending school to be of the same age. In this case, we break the tie by assigning the child with the lower serial number (which uniquely identifies each member of a household in the ITUS) the lower birth order.

the within/fixed effects estimator by performing an OLS on the following "demeaned" equation:

[4] $$(I_{hc} - \overline{I}_{h}) = c(Z_{hc} - \overline{Z}_{h}) + u_{hc}$$

The random effects estimator is a weighted average of the within/fixed effects estimator and the OLS estimator from [3] (which can be termed as a "between effects" estimator). The advantage of the fixed effects estimator is that it is consistent, even in the presence of omitted variables (among household fixed effects), although it is less efficient than the random effects estimator.

Table 5 presents estimates from a linear probability model for both rural and urban areas.[18] Table 4 presents the descriptive statistics of the variables used in the regression. Because a Hausman specification test (the standard practice for choosing between fixed effects and random effects models) suggests that in both rural and urban areas, we should prefer the fixed effects model, we emphasize those results below. As mentioned earlier, the age groups 6-10 years, 11-14 years, and 15-18 years are chosen because they roughly correspond to primary, upper primary and higher than upper primary schooling levels. In rural areas, younger children are more likely to receive informal instruction. The coefficients on the dummies for age groups 6-10 years and 11-14 years are positive and statistically significant at 1% and 10% significance levels, respectively. In urban areas, the same result holds for children in the age group 11-14 years – the coefficient on this dummy is statistically significant at 5%. This result could reflect three factors. First, parents might believe that younger children are relatively in higher need of informal instruction. Second, given their own educational levels, parents might be relatively better equipped to provide informal instruction to younger children. Finally, older children are involved in other activities to a greater extent and therefore less likely to be involved in learning at home.

Both the gender dummy and the dummy for whether the child is the son or daughter of the head of the household (i.e. and not a distant relative) are not statistically significant at normally used probability levels. However the coefficient for child of head of household is about five times larger than the gender dummy in both rural and urban areas. If compared to

[18] We do not present results for a probit estimation given that there are some serious problems with "fixed effects" estimation of probit models.

the (statistically significant) size of age effects, the gender dummy coefficient is always less than half as large.[19]

Since these are results from a linear probability estimation, the relative size of coefficients has an easy interpretation. Eliminating discrimination within the household (i.e. a change of the gender dummy from 0 to 1, i.e. girl to a boy) changes the likelihood of informal instruction by a very small amount – less than one percentage point, in both rural and urban areas. Overall, these results provide very weak evidence for discrimination against girls with regards to informal instruction.

As mentioned above, since we focused only on children attending school in the above regression, it could suffer from sample selection. To check whether this is the case, we employed the following procedure (Wooldridge, 2002, pp.581-585). In the first stage, we performed a pooled probit estimation of the probability of attendance, using as controls, individual level variables (e.g. age, age-squared, gender), household level variables (e.g. monthly per-capita expenditure, dummies for education level of the household head), and availability (total schools per-capita) and quality of schooling facilities for the state in which the child resides.[20] In the second stage, the inverse mills ratio from the first stage regression was added as an additional control to the above panel regression. In both rural and urban areas, the inverse mills ratio is statistically insignificant even at 10%, suggesting that sample selection is not a serious issue with the panel data model that we estimated.[21]

Rosenblum (2008) has recently presented persuasive evidence that although Indian families may typically want to have a male child, the sex composition of first-born births is within standard frequencies – implying that there is little evidence of sex selective abortion

[19] Almost all the data that is available on children in the ITUS is categorical (e.g. boy or girl, nature of relation to the household head etc.). Hence the controls in the regression are all dummies. We performed a regression with a continuous variable (age) and the results were similar. Given the importance of birth order highlighted in some studies (e.g. Das Gupta, 1987), we used the birth order (which is a non-dummy variable) as a control variable and got similar results.

[20] Motiram and Osberg (2007) investigate supply side and demand side factors that influence attendance and human capital accumulation of children in India. The quality measures that we use here are the same as the ones used in Motiram and Osberg (2007), viz., the percentage of primary schools that have a Pupil-to-Teacher Ratio higher than 50 and the percentage of primary schools with no building or a "kucchha" building - made of material like bamboo, grass etc. (this variable is separate for rural and urban areas).

[21] We have not presented these results here in the interests of space, but they are available upon request from us. Note that this procedure works because we are essentially *testing* whether sample selection bias exists. Fortunately, we do not find evidence for this. Otherwise, we cannot use this two stage method for *correcting* sample selection bias. For a discussion of the issues involved, see Wooldridge (2002, pp. 581-585).

for the first birth, and that the gender of the first born child is a random event. However, he also finds that the boy/girl frequency of subsequent births is consistent with the hypothesis of sex-selection for younger siblings, and that there is evidence that families often "keep going until they have a boy" – i.e. the completed family size of first-born boy families is less than that of first-born girl families. Rosenblum also argues that outcomes for subsequent boy or girl births depend on the gender of those previously born. In future work, we will therefore split our sample into two groups: first-born boy families and first-born girl families, and compare the determinants of child informal instruction, separately in these two types of families. This can, to a certain extent, address the concern that the gender of a child in the above estimation could be endogenous.[22]

3. Conclusions and Policy Implications

This paper has documented the substantial gender differences in daily tasks between men and women in India, and has particularly noted the difference that urbanization makes. In both urban and rural India gender specialization in housework is strong and starts early, as teenage girls are introduced to household chores while teenage boys – particularly those still in school – are largely exempt. However, a general moral to be derived from our results is that urbanization is good for Indian women. In all countries, few work harder than a farm wife, and our data show that Indian women in rural areas spend substantial time in primary production, in addition to doing essentially all the housework. In urban areas, the option of employment or self-employment for women in primary, secondary or trade activities is much less open – which may have the effect of improving the educational opportunities of their daughters.

This paper has provided evidence that in rural areas gender differentials in school enrolment overstate gender differences in attendance. As Table 2 indicated, the school attendance of Indian children declines as they age, and in rural areas the decline is steeper and significantly more biased against girls. However, in both attendance and school enrolment, girls have better opportunities in urban areas. In urban areas in India, the school attendance of boys and girls is essentially the same.

[22] A better way to handle this would be to use an instrument for the gender of a child, but we are not aware of a variable that could serve this purpose.

The opportunity cost of girls' school attendance time is the labour time which their families forego in home production and in primary, secondary and tertiary activities. In both rural and urban areas, girls who do not attend school substantially increase their work around the home, but because urban girls who are out of school do relatively little primary, secondary or tertiary work, while rural girls who do not attend school do substantial amounts of such work, the opportunity cost of girls' school attendance time is higher in rural than in urban areas. An important strength of time use data (such as the ITUS) is the possibility it presents of perceiving this urban/rural difference in the opportunity cost of girls' school attendance time.

As well, perhaps as a consequence of limited opportunities for paid work by women, there is substantially more informal instruction of children in the home in urban areas, and the majority of it is done by women. Because we were not able to observe the content of this informal instruction, we must be cautious in assessing whether there is gender bias, in some overall sense – but at least in probability of receipt of such instruction we find little evidence of gender favouritism in informal human capital investment. We conjecture that if the mothers of one generation are frustrated by barriers to their own opportunities, they may try to give to their daughters what they did not get themselves – which may partly explain our results for urban areas.

Like in other developing countries, urbanization has occurred in India at a rapid pace, mostly driven by rural-urban migration. Urban population as a share of the total population increased from 25% to 28% during the decade 1992-2002 and is expected to reach 500 million by 2017 (World Bank, 2009). The crisis facing Indian agriculture (Motiram and Vakulabharanam, 2007) is only going to provide further impetus to this phenomenon. Our findings on the implications of urbanization have to be looked at in this context. If we are correct in thinking that the constraints faced by urban women in the labour market are partly responsible for the low opportunity cost of female school attendance time in urban areas, a policy implication of our work is the importance of ensuring that efforts to reduce barriers to female employment in urban India are accompanied by enhanced attention to the prevention of child labour. One would not want improved access to employment to mean that urban girls are taken out of school to take up newly available jobs. Rural work of all kinds is less subject

to labour market regulation and rural women in India are less constrained to the home in their working hours – but that largely means an increase in their daily tasks and a decrease in their daughters' opportunities.

An additional policy implication that has been explored in detail in Motiram and Osberg (2007) which is relevant in the present context is that improvements in the quality of schooling, especially in rural areas would increase school attendance of children. Finally, policies that lead to a reduction in certain gendered activities (e.g. the reduction in time spent on collection of water, through the provision of ready access to drinking water) would lead to higher attendance among girls and higher human capital investment within families.

Table 1R
Average Time Allocation: Rural

	1	2	3	4	5	6	7	8	9
	Primary	**Second**	**Trade**	**Home**	**Care**	**Comm**	**Learn**	**Soc/Cul**	**Person**
Boys 6-10									
Not Attending	116.6	3.1	8.7	12.9	11.3	1.5	47.5	279.1	959.2
Attending	2.5	0.4	1.8	2.7	3.9	0.2	448.3	174.1	806
Difference	*114.1*	*2.7*	*6.9*	*10.2*	*7.4*	*1.3*	*-400.8*	*105*	*153.2*
Girls 6-10									
Not Attending	94.3	2.1	6.5	58.2	30.2	2.4	32.9	242.4	970.9
Attending	3.7	0.3	0.9	12.9	10.8	0.4	445.5	164.1	801.5
Difference	*90.6*	*1.8*	*5.6*	*45.3*	*19.4*	*2*	*-412.6*	*78.3*	*169.4*
Boys 11-14									
Not Attending	203.7	25.9	21.5	27.2	10.4	0.2	38	186.2	926.8
Attending	6.2	0.7	2.6	7.9	3.2	0.5	498	149.4	771.5
Difference	*197.5*	*25.2*	*18.9*	*19.3*	*7.2*	*-0.3*	*-460*	*36.8*	*155.3*
Girls 11-14									
Not Attending	141.9	23.9	7.7	171.9	22.4	2.4	22.8	119.8	927.4
Attending	8.6	0.5	3.8	38.3	5.3	0.8	492.8	113.2	776.7
Difference	*133.3*	*23.4*	*3.9*	*133.6*	*17.1*	*1.6*	*-470*	*6.6*	*150.7*
Boys 15-18									
Not Attending	291.8	59.1	48.7	24.5	3.4	0.5	21.1	91.7	899.2
Attending	11.7	0.9	4.2	5.3	0.5	0.5	545.5	109.1	762.1
Difference	*280.1*	*58.2*	*44.5*	*19.2*	*2.9*	*0*	*-524.4*	*-17.4*	*137.1*
Girls 15-18									
Not Attending	185	31.1	10.4	265.8	19.2	2.4	10.2	64.5	851.4
Attending	13.4	0.6	2.6	52.9	3.3	1.7	525.4	80.9	759.4
Difference	*171.6*	*30.5*	*7.8*	*212.9*	*15.9*	*0.7*	*-515.2*	*-16.4*	*92*
Men 19-44	350.4	62.6	87.0	20.0	9.7	1.4	11.2	50.6	847.1
Women 19-44	205.2	18.8	13.6	331.0	53.1	0.6	3.3	31.9	782.5
Difference	*145.2*	*43.8*	*73.4*	*-311.0*	*-43.4*	*0.7*	*7.9*	*18.7*	*64.6*
Men 45-64	363.5	43.2	67.3	21.4	6.0	1.4	0.8	43.4	893.0
Women 45-64	221.9	13.8	15.0	243.6	31.1	1.0	0.6	30.2	882.8
Difference	*141.6*	*29.4*	*52.3*	*-222.1*	*-25.1*	*0.4*	*0.2*	*13.2*	*10.1*
Men 65+	210.8	19.9	28.5	20.8	9.8	1.1	0.1	47.9	1101.1

Women 65+	93.9	3.7	4.4	136.7	34.5	2.5	0.1	28.4	1135.9
Difference	*117.0*	*16.2*	*24.1*	*-115.9*	*-24.7*	*-1.4*	*0.0*	*19.5*	*-34.8*

Note:

All times in minutes/normal day

1 – Primary Production Activities (Farm, Fish, Collect, Dig); 2 – Secondary Activities (Construction, Manufacturing); 3 – Trade, Business and Services; 4 - Household Maintenance, Management and Shopping for Own Household; 5 - Care For Children, the Sick, Elderly and Disabled for Own Household; 6 - Community Services and Help to Other Households; 7 – Learning; 8 - Social and Cultural Activities, Mass Media, etc.; 9 - Personal Care and Self-Maintenance

Table 1U
Average Time Allocation: Urban

					Activity				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	Primary	**Second**	**Trade**	**Home**	**Care**	**Comm**	**Learn**	**Soc/Cul**	**Person**
Boys 6-10									
Not Attending	6.2	5.5	58.6	15.7	11	0.3	62.5	366.9	913.3
Attending	1	0.3	1.7	1.9	2.6	0.1	470.5	204.5	757.4
Difference	*5.2*	*5.2*	*56.9*	*13.8*	*8.4*	*0.2*	*-408*	*162.4*	*155.9*
Girls 6-10									
Not Attending	4.9	2.2	24	30.2	18.4	4.4	83.1	343.2	929.7
Attending	0.5	0.5	3.1	5.6	4.5	0.2	487	181.3	757.3
Difference	*4.4*	*1.7*	*20.9*	*24.6*	*13.9*	*4.2*	*-403.9*	*161.9*	*172.4*
Boys 11-14									
Not Attending	14	80.3	64.5	18.7	5.1	0	56.3	313.2	887.9
Attending	0.9	1	2.5	3.8	0.9	0.1	504.8	193.1	732.8
Difference	*13.1*	*79.3*	*62*	*14.9*	*4.2*	*-0.1*	*-448.5*	*120.1*	*155.1*
Girls 11-14									
Not Attending	15.6	28.5	36.1	139.3	16.8	0.6	51.7	254.9	896.4
Attending	1.5	1.2	2.6	26.8	2.5	0.3	510.5	172.3	722.3
Difference	*14.1*	*27.3*	*33.5*	*112.5*	*14.3*	*0.3*	*-458.8*	*82.6*	*174.1*
Boys 15-18									
Not Attending	29.5	139.8	164.3	19.8	3.3	0.2	37.2	191.7	854.3
Attending	0.8	0.3	10.5	7.7	0.7	0.1	544.3	155.3	720.3
Difference	*28.7*	*139.5*	*153.8*	*12.1*	*2.6*	*0.1*	*-507.1*	*36.4*	*134*
Girls 15-18									
Not Attending	21.1	36.8	87.2	217	14.3	1.9	40.3	172.4	848.9
Attending	2.9	1.3	3.6	56.7	1.5	0.8	531.7	126.3	715.1
Difference	*18.2*	*35.5*	*83.6*	*160.3*	*12.8*	*1.1*	*-491.4*	*46.1*	*133.8*
Men 19-44	39.4	125.5	347.4	18.1	10	0.4	27.4	99.7	772.1
Women 19-44	24.5	23.5	47.2	361.2	65.2	0.7	17.9	109.5	790.4
Difference	*14.9*	*102*	*300.3*	*-343.1*	*-55.3*	*-0.3*	*9.5*	*-9.9*	*-18.3*

Men 45-64	45.3	105.4	333.2	25.1	7	1.1	0.5	103.1	818.2
Women 45-64	36.1	19.3	59.5	295.2	30.1	0.6	1.4	115.5	882.3
Difference	*9.2*	*86.1*	*273.7*	*-270.1*	*-23.1*	*0.5*	*-1*	*-12.4*	*-64*
Men 65+	33.4	30.7	98.5	24.2	17.9	1.7	0.1	157.1	1076.4
Women 65+	9.1	7.3	15.4	121.5	27.1	0.5	0.4	100.9	1161.2
Difference	*24.3*	*23.5*	*83.2*	*-97.3*	*-9.2*	*1.2*	*-0.3*	*56.2*	*-84.7*

Note:

All times in minutes/normal day

1 – Primary Production Activities (Farm, Fish, Collect, Dig); 2 – Secondary Activities (Construction, Manufacturing); 3 – Trade, Business and Services; 4 - Household Maintenance, Management and Shopping for Own Household; 5 - Care For Children, the Sick, Elderly and Disabled for Own Household; 6 - Community Services and Help to Other Households; 7 – Learning; 8 - Social and Cultural Activities, Mass Media, etc.; 9 - Personal Care and Self-Maintenance

Table 2
School Attendance, Enrolment & Time Spent*

	Attendance							
	Ages 6-10		Ages 11-14		Ages 15-18		Ages 6-18	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Enrolment (%)								
Total Urban	90.4	86.2	87.6	85.6	53.1	54.2	75.5	74.3
Total Rural	83.9	77.1	78.1	62.5	39.2	24.0	67.9	56.2
Attendance (%)								
Total Urban	69.8	68.1	72.5	70.5	42.4	40.3	60.3	58.7
Total Rural	71.1	66.2	66.5	54.0	30.5	19.2	56.7	47.9
Urban								
% of all children with positive class times**	69.8%	68.1%	72.5%	70.5%	42.4%	41.5%		
Median, all positive class times	300	320	315	330	315	325		
Median, all homework times	60	60	75	75	0	0		
% of all children who do any homework***	58.7%	59.0%	62.5%	61.4%	33.9%	32.2%		
Median, all positive homework times	120	120	130	135	160	180		
% of all children who travel to school	63.1%	62.2%	65.7%	64.1%	40.6%	37.1%		
Median, all travel times	30	30	30	30	0	0		
Median, all positive travel times	40	40	45	45	60	50		
Median Total (class+homework+travel) Time	450	480	480	510	525	510		
Rural								
% of all children with positive class times	70.1%	66.2%	66.5%	54.0%	30.5%	19.2%		
Median, all positive class times	330	330	330	330	330	330		
Median, all homework times	40	0	60	0	0	0		
% of all children who do any homework	55.4%	49.9%	56.5%	45.1%	26.5%	15.7%		
Median, all positive homework times	110	110	120	120	165	150		
% of all children who travel to school	60.1%	54.1%	56.5%	45.4%	26.6%	16.9%		
Median, all travel times	20	15	20	0	0	0		
Median, all positive travel times	30	30	40	40	60	60		
Median Total (class+homework+travel) Time	450	450	495	495	540	540		

Note:

* In a small percentage of cases, although a child is not attending school, he/she has a positive homework or travel time. This could be due to error or because although a child is not attending school, he/she studies at home. Since both of these detract from the main focus of the paper, if a child does not attend school, his/her homework and travel times are set to zero.
** Calculated by dividing the number of children who have positive class time by the total number of children of that gender and in that age group (sample weights are used). All the percentages below are calculated in the same manner.
*** For this figure, it might be more meaningful to express it as a percentage of all children attending school (rather than percentage of all children) in a particular age-gender group. These figures are 84.1%, 86.6%, 86.2%, 87.1%, 80.0% and 77.6% for urban areas. The corresponding figures for rural areas are 79.0%, 75.4%, 85.0%, 84.1%, 86.9% and 81.8%, respectively.

Table 3

Time Spent by Households and Adult Individuals on Teaching, Training and Instruction of Own Children*

	Rural	Urban
% of Households which spend any time**	5.45%	17.14%
Of the Households which spend any time:		
% where 1 Adult is involved	90.10%	85.88%
% where 2 Adults are involved	9.83%	13.84%
% where more than 2 Adults are involved	0.07%	0.27%
Of the Households which spend any time:		
% of Scheduled Tribe	8.14%	1.88%
% of Scheduled Caste	11.46%	6.20%
% of Non-Scheduled Caste or Tribe	80.40%	91.91%
Median time spent by households (minutes)***	60	60
% of adult individuals who spend any time****	2.41%	8.03%
Of the adult individuals who spend any time:		
% of Men	57.55%	41.80%
% of Women	42.45%	58.20%
% of Non-Literate	14.05%	6.09%
% of Literate	85.95%	93.91%
% of Head of Household	47.63%	40.28%
% of Spouse of Head of Household	32.93%	49.67%
% of Married Child	8.42%	2.00%
% of Spouse of Married Child	5.49%	5.04%
% of Unmarried Child	2.36%	1.55%
% Others	3.16%	1.45%
Median time spent by adult individuals (minutes)*****	60	60

Note:

* Adults are older than 18 years of age and children are 6-18 years of age.
** Percentage of households in which at least one adult spends some time on teaching, training and instruction of own children. Percentages calculated over all households which have at least one child. In the sample, there were 6451(2841) rural (urban) households which have at least one child. Of these, 382 (462) rural (urban) households had at least one adult providing instruction. In rural areas, 348 (90.11%), 33 (9.83%) and 1 (0.07%) of the 382 households where instruction at home occurred, it was done by 1 adult, 2 adults and more than 2 adults, respectively. The corresponding figures for urban areas are 380 (82.25), 80 (17.32), and 2 (0.43), respectively.
*** Calculated over positive values.
**** Calculated over individuals who live in households which have at least one child.
***** Calculated over positive values.

Table 4
Descriptive Statistics of the Variables Used*

Variable	Rural		Urban	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**
Dummy Variable for whether a child receives informal instruction or not	0.028	0.166	0.085	0.278
Age (in years)	12.249	3.584	12.711	3.612
Dummy Variable for whether a child is in the age group 6-10	0.383	0.486	0.321	0.467
Dummy Variable for whether a child is in the age group 11-14	0.303	0.460	0.308	0.462
Dummy Variable for whether a child is in the age group 15-18	0.314	0.464	0.371	0.483
Dummy Variable for whether a child is a boy	0.545	0.498	0.537	0.498
Dummy Variable for whether a child is the son/daughter of the head of the household	0.878	0.327	0.903	0.297

Note:

The samples are the same as the ones used in the regressions – children aged 6-18 who are attending school. The sample sizes are 11703 and 5123 for rural and urban areas, respectively.

Table 5
Linear Probability Analysis of a Child Receiving Informal Instruction

Dependent Variable =1 if a child receives informal instruction, and 0 if not

	Rural		**Urban**	
	Fixed Effects	**Random Effects**	**Fixed Effects**	**Random Effects**
Intercept	0.020 (0.01)	0.025 (0.00)	0.109 (0.00)	0.082 (0.00)
Dummy for age group 6-10	0.008 (0.01)	0.016 (0.00)	0.011 (0.17)	0.046 (0.00)
Dummy for age group 11-15	0.004 (0.10)	0.009 (0.00)	0.015 (0.03)	0.031 (0.00)
Dummy for Child of the head of household	0.010 (0.20)	-0.001 (0.81)	-0.031 (0.23)	-0.010 (0.47)
Dummy for a Boy	0.002 (0.31)	0.002 (0.43)	-0.006 (0.30)	-0.008 (0.12)
Sample Size	11703	11703	5123	5123
R^2 within	0.002	0.001	0.003	0.002
R^2 between	0.003	0.010	0.006	0.036
R^2 overall	0.001	0.006	0.006	0.021
Prob>Chi^2 for Hausman test*		0.00	0.00	0.00

Note:

p-values in parentheses. Sample restricted to children who are attending school.
* Rejection of the Null Hypothesis indicates that fixed effects model is to be preferred, which is the case here for both rural and urban areas.

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