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The Intra-household Allocation of Time and Tasks: What Have We Learnt from the Empirical Literature?

Nadeem Ilahi

Empirical evidence indicates that there are significant gender differences in intra-household time allocation in developing countries. Time and task allocation, by gender, is responsive to economic incentives, idiosyncratic shocks, agricultural commercialization, and access to basic services, including childcare. The existence and functioning of markets also affect intra-household time allocation in fundamental ways.

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Nadeem Ilahi
The World Bank

Abstract

This paper presents a synthesis of the empirical literature on intra household time use in developing countries. It discusses the importance of studying time allocated to various activities—market work for wages, work on the family enterprise and different kinds of housework—from a policy standpoint. It then reviews the empirical literature on five main areas: a) how economic incentives affect intra-household time-use; b) whether access to basic services (water, energy etc.) have gender differentiated impacts on time-use; c) if idiosyncratic shocks such as changes in employment and health affect time use by gender; d) how agricultural commercialization alters the allocation of time and tasks by gender and e) whether child care is an area that needs policy attention. Last, the paper also reviews the empirical literature on the determinants of child time allocation.

The findings of the review are that there are broad regional and rural-urban differences in the distribution of time by gender, but that the time allocation of men and women to responds to economic incentives and constraints. Whether labor and goods markets exist or not has important influence in determining how men and women alter their time allocation in response to exogenous changes in their environment. For instance, the gender-differentiated effects of changes in agricultural commercialization on time use vary according to how well labor and goods markets function. Thus economic reform that increases the access of individuals to labor, goods, credit, insurance and day-care markets will undoubtedly reduce the need for using female time resource as a “buffer”. Last, while economic factors play an important role in explaining gender differences in time use, they do not explain all. The importance of social roles should also be recognized.

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Introduction and Motivation

In one form or another, the determinants of time use have attracted a lot of attention in the empirical literature. Some obvious examples are investigations of the determinants of female labor supply and the allocation of children's time to school and labor. There are a number of sound conceptual and policy reasons for studying time use in developing countries. First, time is a resource. It is an important resource in a developing country context where the economic agent's (individual or household) interaction with the outside world (through market activities) is relatively more restricted than in developed countries. Since developing country households are largely self-sufficient in a number of dimensions, it is inadequate to just concentrate on market exchanges. For instance, if household members physically collect water from the nearest stream for use in the household, they are providing a substitute (albeit an inferior one) to water supplied through a pipe system. This activity is largely blind to those who look for market interactions and is in fact not recorded in national income accounts. However it forms an important part of the household's basic needs. That it does not show in official data is either due to the failure of fuel or water markets or a failure on the part of the economy to generate adequate remunerative employment opportunities for households to be able to afford such services. In this sense, not looking at the way household members allocate their time would be to overlook how the household economy in developing countries works.

Second, like any other resource in the household time is not equally distributed across members. There are significant differences not just along gender lines but also by age, social status, wealth etc. There is today an extensive literature on the intra-household allocation of resources in developing countries (see for instance Haddad et al, 1997). But most of what this literature tries to explain are differences in the allocation of consumption goods across household members. In so doing it questions the standard unitary model of the household that has been at the center-stage in economic modeling. However, precious little in this literature addresses the issue of intra-household time

allocation. The issue of what determines intra-household time-use is important for the same reasons the study of intra-household consumption is important.

Third, there is potential connection of the study of time use with the study of poverty. As already mentioned a significant part of the survival of poor households in developing countries is through home production. The primary resource used to attain this is time of household members. At the same time leisure (which is the flip side of “work”) is a good that individuals obtain welfare from. An important question then is whether we should worry about the shortage of this resource as an indicator of poverty as much as we think of a shortage of money as an indicator of poverty. This idea is explained in more detail below.

Last, development policy interventions be they poverty alleviation, safety nets, basic services projects, agricultural extension programs etc., have a lot to learn from the information that comes from time use. Whether there exist constraints on the time of some, or all household members can have crucial impacts on the success of projects. For instance, if household members spend a lot of their time travelling to work on foot then there is a high likelihood that the provision of rural roads would have high returns.

This paper presents a synthesis of the empirical literature on intra household time use in developing countries. It discusses the importance of studying time allocated to various activities—market work for wages, work on the family enterprise and different kinds of housework—from a policy standpoint. It then reviews the empirical literature on five main areas: a) how economic incentives affect intra-household time-use; b) whether access to basic services (water, energy etc.) have gender differentiated impacts on time-use; c) if idiosyncratic shocks such as changes in employment and health affect time use by gender; d) how agricultural commercialization alters the allocation of time and tasks by gender and e) whether child care is an area that needs policy attention. Last, the paper also reviews the empirical literature on the allocation of time and tasks of children.

Issues of Definition and Measurement

Definition

The analysis of time use is essentially an analysis of the allocation of time to various activities such as work for wages, work on the family farm or enterprise, “inside chores” in the household (childcare, cooking, washing etc.) and “outside” chores (fuel and water collection etc.). There is usually a reference period in which time allocation is studied. This can range from the last 24 hours to time spent in various activities over a year (usually measured in terms of months or weeks). While the first studies of time use mostly concentrated on the time allocation of females in north America, it is now more common in empirical work to consider the time of various members of the household (men, women and children).

Measurement

The method of measurement is more critical when it comes to time use than in other measurement typically undertaken in economics (Juster and Stafford, 1991). There are a number of ways time use data can be collected and the results one obtains are sensitive to the approach taken. There are two ways in which time use data are typically collected. One is the traditional survey method in which the respondent is asked of how much time he/she spent in activity j in the reference period (e.g. last 24 hours or last seven days). An alternative is the more detailed time diary method, usually based on a 24-hour recall. Here the emphasis is on the chronology of events over the past day. The two approaches differ in merits as well as cost. The latter, because it is more detailed tends to be more costly in the sense that it requires a certain amount of sophistication of the interviewer. It also requires more time for the respondent to recall in detail and so it can have cost overruns in data collection. The former approach of traditional survey is much less costly and it can be incorporated in most existing integrated household surveys without many problems.

The traditional and the time diary approaches differ substantially in their merits. The traditional survey method can miss activities that do not leave market traces (Juster and Stafford,

1991). From the standpoint of gender analysis, the traditional approach can understate the time women spend in “reproductive” or “care” activities such as childcare. This is because female respondents in developing countries tend to not classify childcare and other household chores as “work” activities. Even activities that leave a “market trace” such as wage labor can be misreported if they are not activities that have a fixed schedule over time (Juster and Stafford, 1991). Respondents usually recall the days in which the activity was predominant and then use the hours spent in that activity on that day as representative of typical time spent in that activity. Thus most frequently the result is “over reporting”. In some sense this is not just confined to labor and may hold for other “outside” activities such as fuel and water collection.

The existing evidence suggests that time diaries overcome a number of problems of the traditional survey method. By focusing on a chronology of events over a relatively short reference period, the time diary method tends to capture well a lot of non-routine activities that would be missed by the traditional approach. Evidence from North America suggests that when it comes to measuring labor supply, the time diary method does better than the traditional ways labor supply is measured (Juster and Stafford, 1991). Under the traditional approach, labor supply has spikes at 40-hours per week. The time diary method appears to give a better indication of “actual” hours. This is due to the fact that in the traditional approach, respondents give “conventional” number of hours that they were “supposed” to work rather than the actual hours which are variations around the 40-hours per week spike.

The time diary comes with its own set of problems. The most pervasive is “over-kill”. Since this method tries to record all activities, it runs the risk that respondents will confuse between multiple or simultaneous activities. If you take care of children while you cook, then there is a likelihood you’ll report both activities, a sort of “temporal double-counting” (Juster and Stafford, 1991). What is really happening is that there is usually a “primary” and a “secondary” activity and the two may

require different time inputs.¹ Even though some surveys tend to ask only about the primary activity there is still a tendency of respondents to over report time use. What ends up happening is that when time per day is tallied, it exceeds 24 for a large number of respondents. From the standpoint of gender analysis, there is an additional problem. Under this method childcare—which is predominantly supplied by women in the household—tends to be over reported because it is the most common multiple activity.

The manner in which existing data are collected creates another problem for the analysis of time use. Since most surveys are based on the premise that consumption is the indicator of welfare, they pay little attention to the measurement of leisure activities. Leisure as an activity does not simply include sleep time but also includes the time take in personal care and “lazing around” (Harvey and Taylor, 1997). We know from economic theory that individual welfare is a function of the both consumption and leisure. However the lack of attention given to the direct measurement of leisure in surveys means that it ends up being calculated as a “residual” term that inherits the measurement errors of the other time use components (such as the temporal double-counting). Now this will be problematic if one of our objectives, as will become clear below, is to use the lack of leisure as one metric of poverty.

The Stylized Evidence

A number of surveys exist today that allow us to develop a descriptive picture of time allocation across the developing world. We can use these surveys to not only see if there are regional patterns but also if time use differs by gender and if these gender differences are in turn related to age,

¹ Juster and Stafford (1991) argue that this problem can be overcome by defining a “time grid” that is very fine, so that the interviewer can observe instantaneous switching among multiple activities. This is not a feasible option in most surveys because of the formidable cost it would entail. Floro and Miles (1998) argue that joint activities ought not to be ignored because they give us important insights about the quality of life of the individual undertaking such activities. Further joint activities may also be indicators of a response to a shock to the household.

rural-urban location, seasons, wealth and other factors such as ethnicity. There are a number of studies that look at time use in Asia and Africa, but few that do so for Latin America.

The “Composition” of Male-Female Time and Tasks

Women work more than men in almost all regions. Here I take “total work” as the time allocated to all work activities, i.e. the flip side of time allocated to leisure. The total work of men and women in Peru are such that women spend 15-20% more time in all work activities than do men (Ilahi, 1999a). In Africa, 15 of the 17 studies summarized by Brown and Haddad (1995) find women work more than do men. In Nepal, women spend 50-80% more time working than men. One would also expect time use patterns to be different by rural-urban status. However relatively few studies provide a comparison of rural and urban time use. Ilahi (1999a) observes, as one would expect, that gender differences in time use vary by rural urban status also. Men work less than women in both rural and urban areas do but that rural men and women work a lot more than their urban counterparts. Urban women’s work time is not much different from that of rural men.

The composition of male and female work is also different. Women undertake most of housework while men do most of the work on farm or work for wages. The picture varies along a regional spectrum. In Africa, women spend longer hours in both agricultural and non-agricultural activities than do men. In Asia and Latin America the picture is one of division of labor by gender—men concentrate on income generating work and women on housework. In the hilly regions of Nepal women do most of “inside” and “outside” chores with men contributing little to these activities. In contrast, both men and women participate in own-farm agriculture, but men contribute more (Kumar and Hotchkiss, 1988). There is a similar type of specialization in rural Pakistan, but here it appears men do most of the firewood collection (Fafchamps and Quisumbing, 1998). In Peru, a similar pattern of specialization across tasks emerges also. Most of women’s work is in housework (the data do not allow a disaggregation of this category)—about 70%--with a small share of male time in this

category—about 28%. A larger proportion of male time is spent in self-employment and wage work activities than that of females.

Seasonality and Time Use by Gender

Time use is not constant over the cycle of the year especially in rural areas. In hilly Nepal there is a large variation in this by season (Kumar and Hotchkiss, 1988). In the April-June dry season women spend less time in agricultural work and more time in the collection of fuel and water. There are similar patterns in Pakistan reported by Alderman and Chishti (1991), though they don't provide comparative results for men. Fafchamps and Quisumbing (1998) present their summary results in the form of shares of men and women in the activities of the household. They find these shares vary substantially by season. In winter—associated with low overall labor use on the farm—there is a clearer division of labor across gender. In this season men work in farm activities and women do housework. This is altered in the late monsoon season when farm labor use is higher. Then, women contribute a quarter of work on own or others' farm (30% vs. 9% in winter) but men *reduce* their contribution to housework. It appears also that women tend to consume a slightly higher proportion of household leisure than do men in the peak season than in the lean season.

Time Poverty and Gender

Is there a correlation between poverty and time-use? Most quantitative measures of poverty are based on consumption (and some on income). The typical approach to counting the poor in developing countries is to rank the households by per capita consumption and then count the proportion that falls below the poverty line.² A problem with this measure of poverty is that it glosses over the issue of home production. A good example of this is the case of childcare. Let's say household A uses childcare provided through the market but household B utilizes the services of a

teenage female member of the household. A consumption based measure of well being would rank household A as better off than household B. This kind of discrepancy appears in most situations that have to do with home production (water, fuels, childcare, washing, cleaning etc.) but not all (own-farm production and consumption of food grains is, for example, properly accounted in most consumption aggregates). Ultimately the discrepancy arises from two things: the absence of infrastructure that provides basic services (water, energy etc.) and/or the absence of markets (say for childcare).³ The policy relevant issue then is whether the conventional (consumption based) measures of poverty present a “different” picture of poverty than what actually exists. It is probable that some of the households that fall among the poor according to the consumption metric are poor for different reasons. They are not poor because their consumption is low (as the example of childcare above illustrates) but because some members (mostly women) have high work burdens and low leisure (Bhushan and Chao, 1997). Thus what may appear to be gender-blind poverty on a consumption metric may in fact be gender-differentiated poverty. It would be important as a first step to see how conventional poverty and well being indicators correlate with measures of work burden.

Here I describe how total work as well as the composition of work vary by other measures of well being (income or consumption). In Jamaica, a comparison of time use of male and female heads reveals that the latter do not necessarily work more than the former (Handa, 1997). In Peru, the total work of women is highest in the bottom two consumption deciles. For men on the other hand there are no differences between the bottom two deciles and the rest. Peru is an example where some labor markets do exist. In areas where they don't (hilly Nepal) work burdens for both men and women rise with per capita income (Kumar and Hotchkiss, 1988).

In as far as the composition of work is concerned, the surveys in the Philippines indicate that high income is associated with low time in agricultural activities (Brown and Haddad, 1995). But this

² A poverty line may be defined as the money required for all household members to achieve minimum adequate caloric requirement. Alternatively it could be more arbitrarily drawn to facilitate international comparisons, such as the \$1 a day poverty line.

³ Note that the absence of infrastructure and markets are sufficient but not necessary for this discrepancy.

is partly due to the fact that the existence of active labor markets allows richer households to hire in more labor and thus household female work on the family farm is a substitute for hired in labor. This is not possible in the hilly regions of Nepal where labor markets are largely absent (Kumar and Hotchkiss, 1988). Here both men and women have to increase farm labor with increasing incomes (or vice versa). Total work increases more for men than for women. The burden of household chores on women does not alter much by income category. Ilahi (1999a) finds a similar pattern the share of housework in women's time does not vary between the poorer households (bottom two deciles) and the rest. Ultimately, the answer to whether the composition of time use is related to income depends on how well labor markets function. If they do, then as households get richer, the women (and men) in such households can consume more leisure and lower their work burdens at the expense of hired labor. In regions where hiring in of labor is not common, increases in income do not result in lowering of work.

One also has to be careful interpreting these as the effect of income on time use because income is an inherently endogenous variable. More time spent in work, *ceteris paribus*, would result in higher incomes. This suggests that when it comes to exploring the relationship between affluence and time use it is better to be careful in terms of the variable one uses. Under the circumstances of data paucity, the best variable may be an asset-based measure (stock) of wealth rather than income or consumption (flows). I discuss this point in detail below.

The Framework for analyzing time-use,

How good is the neoclassical model?

The theoretical basis for the analysis of time use has seen two distinct developments. In the 1960s and 1970s there was an incorporation of home production into models of labor supply. Later there have been studies that have analyzed the determinants of intra household allocation of resources (including time) from cooperative and non-cooperative bargaining frameworks, calling into question the earlier unitary or common intra-household-preference model. My objective in this paper is not to

provide an exhaustive review of the theoretical literature on time-use, but rather to assess how this literature has shaped the empirical approach to time-use.

Seminal work by Gary Becker (1965), which laid the foundation of what came to be known later as “New Household Economics” explicitly incorporated women’s time in home activities into the traditional analysis of labor supply and time spent working. Becker (1965), and later Gronau (1977), extended the conventional labor supply model of consumption and leisure by incorporating home production as yet another activity that requires human labor. They argue that women’s work at home can be valued in a way similar to market work, and that this work will respond to economic incentives such as changes in market wages, unearned income and productivity of work at home. While this work was quite insightful in completing our conceptual picture of what lies behind the determinants of women’s labor supply, it had a few shortcomings. First, because the interest of researchers was in studying the determinants of women’s labor supply it paid little attention of male behavior both inside and outside the household.⁴ Thus there was little said about gender issues per se. Second, the empirical focus was on applications to developed countries where women’s home production is perhaps less interesting in a policy sense—there are few market failures. There was little application to developing countries where women’s time in home production can be constrained by failure or absence of markets for basic services such as water and energy.⁵ Also, credit market imperfections in developing countries make the market labor and housework of household members a way for smoothing the effects of exogenous shocks. Last, the Becker-Gronau model is a “common preference” or a “benevolent dictator” model. Here the household acts as one (with no intra household differences) and therefore the model allows the analysis only from the standpoint of a representative individual.

⁴ This was also because the setting of these studies was developed countries where male labor supply and participation are not issues of interest.

⁵ Some exceptions are Khandker (1988) who considers the affect of school infrastructure on women’s (but not men’s) time allocation to home and market activities and Skoufias (1993) who models both male and female time use in home and outside activities but does not pay attention to provision of basic services.

Subsequently, there have been a number of empirical studies that have attempted to overcome the constraints of earlier work. Some have made the “collective” approach to home production in general and time allocation in particular the basis for the analysis. See for example the work of Udry (1996), Jones (1983) and others. However even till today there is an absence of clear conceptual work on a collective model of intra household time allocation. For instance, Haddad et al (1997) provide an excellent overview and synthesis of intrahousehold allocation of resources in developing countries but they say little about intra household time allocation. Their approach to the issue is one of setting their review in the context of labor supply (and completely ignoring the intra-household allocation of housework and leisure). They summarize whether the traditional unitary model holds up to the evidence when it comes to labor supply. The unitary model hypothesizes that the cross effects of an income compensated increase in the wife’s wage on husband’s labor supply must be identical to the effect of changes in husband’s wage on wife’s labor supply. Their review of the empirical literature argues for the rejection of the unitary or common preference model. They also find from the existing literature (Jones, 1983) that labor pooling (the basis for the unitary model) does not hold in empirical testing.

An obvious absence from all this empirical literature and from Haddad et al’s review is the issue of housework—whether it belongs in the model, how it is distributed by gender; how it responds to changes in economic incentives, constraints and threat points. By just concentrating on the collective and bargaining approaches to labor supply alone, most second generation studies overlook the fact that a large number of activities in developing countries occur in the house; that they have little accounting in economic terms; and that some exogenous shocks to household (disease, infrastructure, employment shocks etc.) have impacts on intra-household labor supply as well as housework.

Do social norms/roles play a role?

One theoretical aspect of the determinants of time use that has received increasing attention in empirical work is social roles and norms. This literature also addresses the “unexplained” portion of the Becker-Gronau type economic models—that there is a large difference in the determinants of male female time use that is not explained by economic variables. Do social roles and norms cause a polarization of activities by gender? It is argued that women are predominantly found doing household chores and men are largely in income generating activities because those are largely the roles society prescribes for them. Social norms and roles may differ by ethnicity or culture and may differ for household members—fathers, mothers, daughters-in-law etc. Traditional economic theory and models do not explicitly account for these differences.⁶

As far as operationalizing the effects of social roles on time-use is concerned, it is possible to incorporate through dummy variables the social status of the individual in the household. Fafchamps and Quisumbing (1998) use dummies for the status of an individual within the household hierarchy—or relationship to head (daughter-in-law etc.)—to isolate the effects of roles. They find that daughters-in-law face a higher work burden than daughters in the household—confirming the commonly held view in South Asia that daughters-in-law are vulnerable as far as work burdens are concerned (because they are thought by the husband’s family as “outsiders”). In Mexico, Cunningham (1999) splits gender differences among heads of households further into single mothers and wives. She finds the role of single mothers is similar to that of male heads, but not that of wives.

Ethnicity is another factor that can influence social roles. However, incorporating the effects of ethnicity is more tricky. Kevane and Wydick (1998) use dummies for ethnicity to explain the role of ethnic social roles on time-use. Ethnic dummies may be inappropriate here because different social roles and norms may be one explanation for differences in time use along ethnic lines.

⁶ This is not completely accurate however. An appropriately defined “collective” framework that accounts for differences in roles through different threat points may be one way of incorporating roles in an economic analysis.

Overall, one can conclude that roles and norms are important determinants of time use and ignoring them would introduce bias in time use equations. It is worth noting at this point that what is important about the effect of social roles and norms on time use is that they can bias the effects on time-use of other more important policy related variables. One way to control for the effect of social roles and other unobservables is to use panel data in the estimation of time use.

Determinants of Time Use

Do economic incentives matter?

In this section I discuss the role of wages, unearned income and education in influencing male-female time-use. In addition to the effect of wages on own time use, it is also of interest from the perspective of gender analysis to assess cross-effects. For instance, what happens to male time-use in response to an increase in female wages? And vice versa. It should be noted at the outset that while there are a number of studies that analyze male and female labor supply in developing countries, very few include “non-market” activities such as housework as a dependent variable also. Fewer still are able to include the time men spend in household chores, primarily because of data limitations. Here I synthesize the main results from both types of studies.

How does female and male time-use respond to changes in wages? Economic theory of labor argues that a priori it is difficult to obtain the direction of this effect. This is because income and substitution effects of a wage increase work in opposite directions and in the end the result depends on which portion of his/her labor supply function the individual is located. The effect of wage changes on housework is negative. The evidence from empirical studies provides a mixed, sometimes region-specific picture. In south Asia, where rural labor markets function better than in Africa or Latin America, wage is closely related to female labor supply to market activities. Using panel data from India, Skoufias (1993) finds a positive and significant effect of wage on market labor supply of both men and women. For Bangladesh, Khandker (1988) finds own wage is positively associated with

female labor force participation. It is also negatively associated with housework.⁷ Ilahi and Jafarey (1999) and Ilahi and Grimard (1999) find predicted wage (corrected for sample selection) significantly increases female time allocation to income generating work in rural Pakistan. It also raises total work (i.e. reduces leisure). They are unable to provide comparative numbers for males because of data limitations. Ilahi (1999a) uses two-year panel data from Peru to estimate the determinants of male and female time use to market (income generating) activities and housework. There is little effect of wages on time-use for either gender.

The empirical evidence seems to point to very interesting cross effects of wage changes. Skoufias (1993) finds results that are consistent with an asymmetry of behavior. Female wage is positively associated with male time in housework—implying that men are pulled into the house when women work outside. However, increases in male wages are seen by women as “unearned income” i.e., male wage and female leisure are positively associated. Newman and Gertler (1994) find similar results for rural households in Peru. Due to a lack of data on male time use, Ilahi and Grimard (1999) and Khandker (1988) are able to test for half of this picture, i.e. the effect of spouse wages on female time allocation (and not vice versa). They find spouse wages induce a strong substitution away from income generating activities. Khandker (1988) finds it also raises leisure. Ilahi and Grimard (1999) who model time allocation to water collection also, find wage reduces women’s time in water collection and increases their time in housework. Interestingly they do not find spouse (male) wages to increase the demand for leisure. Part of this explanation may be that they consider rural households that tend to be poorer and therefore less able to afford leisure.

In theory, unearned, or non-wage income deters labor force participation by raising reservation wages. It also increases the consumption of leisure. In empirical estimation, existing studies use a number of variables to proxy for non-wage income. Overall there is support of the negative effect of non-wage income on income generating work. Alderman and Chishti (1991) use “transfer income” (remittances) and as an indicator of non-wage income. They find it reduces female

⁷ Khandker uses this as evidence for the economic model compared to the “social roles” argument.

labor force participation as well as the number of days worked. Ilahi and Grimard (1999) find non-wage income tends to lower time in water collection and income generating activities and increases time in housework with no appreciable effect on leisure. They also use the value of “home assets” (sum of net financial position, cash holdings, value of financial holdings and value of durable goods) and “productive assets” (sum of value of livestock, farm land and other non-farm commercial assets). Home assets only lower the probability of water collection. Productive assets have no effect other than strongly increasing the time in income generating activities. Ilahi and Jafarey (1999) find no effect of non-wage income on female time-use. Skoufias (1993) employs “value of the family farm” and “value of home” as proxies for non-wage income. He finds it increases housework and leisure of females but it lowers market work and raises home time of adult men. Khandker (1988) finds the husband’s premarital wealth and landholdings induce a clear substitution from work (housework and income generating work) to leisure.

While the various proxies for non-wage income are unrelated with wage income, and therefore qualify for use as indicators of unearned income, it is unclear if they are exogenous and therefore appropriate for use on the right hand side. In developing countries migration is an asset of households similar to land or other physical assets. It has been shown that households tend to use migration and remittances strategically to mitigate risk and overcome credit constraints (see among others, Lucas and Stark, 1985, and Rosenzweig and Stark, 1989). If remittances are indeed determined cooperatively between the migrant and the recipient family then it does not make sense to treat them as exogenous. For instance, in the context of time allocation, one way remittances can be seen as endogenous is if there is an exogenous decline in the demand for labor. If this results in a reduced time allocation to income generating activities, there may be intra-clan consumption smoothing motive for the inflow of remittances. *Ex post* it would seem that time in income generating activities and non-wage income (of which remittances is a part) are negatively correlated. In the absence of panel data it is difficult to control for the endogeneity of remittances and other transfers in and out of the family. The use of other proxies is also not always appropriate. Some authors (Khandker, 1988 and Skoufias, 1993) use

landholding (a stock) as a proxy for non-wage income (a flow). Others (Ilahi and Grimard, 1999) have used value of the non-farm self-employment enterprise. The problem with the use of these variables in the context of time allocation is that they play two sometimes confounding roles. One, they are indeed a proxy of wealth and non-wage income. But they are also a part of the production function of the household farm. In this sense they also serve as indicators of the “internal demand” for labor on the family farm, especially if labor markets do not function well. Thus at the end of the day, it is not clear what this variable would be measuring. What then is the most appropriate variable to use as an indicator of non-wage income? It appears that a “stock” variable that captures non-wage and “non-production” aspects of household wealth may be best suited for this purpose.

Education increases the returns to labor by augmenting human capital, however, theory is ambiguous on its role in time use. In fact it seems that education does not belong in the determinants of time use. However, education is an important indicator of human capital and thus is an active tool of policy makers. The question some ask is the following. If policy enhances the human capital of men and women, how would that translate into time-use. Would individuals with more education tend to work more because every hour of their labor fetches more or would there be income and substitution effects similar to changes in wages? The answer to this question is further complicated by the fact that education is inherently a choice variable, though in a pure sense it is a stock of past choices. In the literature on returns to education, Heckman and others argue that it should be treated as an endogenous variable. In the context of labor and time use there has been little discussion of this point because intrinsically education as a variable does not belong in time use equations. Given the fact that there is an interest in including education on the right hand side of time-use equations, what is the most appropriate way of doing so? An instrumental variable approach would serve the purpose, however its effectiveness would depend, as always, on the appropriateness of the instruments. Of course school supply variables, as well as quality variables can serve as exclusion restrictions in the instrumental variable estimation. Few studies of time-use attempt to consistently account for the role of education by using such an approach.

Most empirical work on the role of education in time-use throws in years of schooling or dummies for literacy to assess how education affects the different components of male and female time. Most of the studies summarized herein find education is negatively associated with female participation in income generating activities and in most cases it increases their leisure (Alderman and Chishti, 1991; Khandker, 1988; Skoufias, 1993; Ilahi and Grimard, 1999; Ilahi and Jafarey, 1999). This is a somewhat surprising result since education is usually thought of as capital that yields return through employment. If the more educated are more likely to withdraw from the labor force and take more leisure than their less educated counterparts then are we calling into question the role of education as capital? In other words is education a luxury good rather than human capital? The answer to this question is no. It lies in the subset of the population that is usually considered in empirical analysis. Most time-use data from developing countries are from rural areas. In rural settings the returns to education through employment are not as high as they are in urban areas. Further it is mostly the richer households that invest in education. That members of these households also tend to consume more leisure than those in poorer ones shows up in empirical estimates as a *false* negative association between labor force participation and time in income generating activities and education. This result is particularly stark for females in rural South Asia. However if we consider urban samples, the picture is not the same. Employing the urban sample of the Peru LSMS, Ilahi (1999a) finds the conventionally held view of the relationship between education and time in income generating activities holds. Education does not increase the leisure of urban men and women and it results in a substitution from time in self-employment (where the returns to education are low) to wage work (where they are high).

Do changes in access to basic services alter time use patterns?

In rural areas of developing countries the infrastructure for the provision of water and energy is poor or non-existent. As a consequence rural folk are forced to allocate their time to acquire these basic goods from either community sources (such as wells or taps) or open access areas (such as

forests and rivers). In most settings the burden of provision of these services to the household largely falls on the female members, though there is some evidence that men may also be involved.⁸ Since these are “outside chores” that are time and, most often, energy intensive, a few obvious questions are of interest. First, do “outside” chores constrain women from allocating time to income generating work more than they do men? Second, do they increase the total work burden of women more than men?

The existing empirical evidence is largely mixed. The earliest systematic work on this is by Kumar and Hotchkiss (1988) who use a sample of households from hilly regions of rural Nepal. They find that a deterioration in access to forest wood (measured by the time it takes to collect a standard head load of firewood from the forest) tends to increase the total time women spend in collecting firewood and lowers their time in on-farm activities. Both estimated coefficients are large and statistically significant. It leads the authors to conclude that forest degradation can have potentially serious gender differentiated effects on time allocation and also on general household nutrition and welfare, through reduced farm output.

Two questions arise from their analysis. First, is it safe to take the indicator of scarcity—time taken per head load of energy—as an exogenous indicator of fuelwood scarcity? Households in which the value of women’s time is high may have invested in timesaving fuel technology. If so, then the “scarcity” variable is inherently endogenous and inappropriate for use as a right hand side variable. Second, are the region and the economy that the data in the Kumar and Hotchkiss (1988) study are taken from representative of rural settings in developing countries? No, the region of Nepal that Kumar and Hotchkiss (1988) consider is more a special case of a peasant agricultural system with little hired labor. Thus it is not surprising that increased demands on women’s time through a worsening of

⁸ There is some evidence that certain activities are also carried out by men. For instance Fafchamps and Quisumbing (1998) and World Bank (1999) who analyze intra-household time use patterns in three rural districts in Pakistan and Nicaragua respectively find that water collection is in the domain of women while wood collection for energy are largely male activities.

access to forest energy results in a reduction in their time on the farm. What is not clear from their analysis is whether the same would hold in settings where labor markets function well.

In their paper on the determinants of female time-use in rural Pakistan, Ilahi and Jafarey (1998) extend the analysis of Kumar and Hotchkiss (1988) by taking these two issues into account. First, they treat fuel scarcity as endogenous and conduct an instrumental variable analysis. Distance to firewood source is the crucial identifying exclusion restriction that enters the fuel scarcity function but not the time allocation equations. Further their sample is drawn from all regions of rural Pakistan, thus it includes regions where markets for rural labor exist and function reasonably well. Their results indicate that while a worsening access to firewood increases the time women have to allocate to collection activities, there is no countervailing drop in time allocated to income generating work⁹. The overall result of Ilahi and Jafarey (1999) is that when the analysis is extended to account for endogeneity of collection productivity and diverse agricultural systems, the widely believed negative impacts of deforestation or fuel scarcity on female time allocation may be overstated.

Water collection is perhaps a more important task in the scheme of household chores than is firewood collection. The findings on the effects of water collection on female time-use are somewhat different. Ilahi and Grimard (1999) employ a framework similar to that in Ilahi and Jafarey (1999). They find a deterioration in the access to water in rural Pakistan is positively related with the total time women have to allocate to water collection but also that it is negatively associated with time allocated to earning activities. This is understandable when one considers the fact that in general household demand for water is likely to be quite inelastic (it has little substitutes) whereas that for firewood may not be since it has a number of substitutes (coal, kerosene, dung etc.).

Most of the literature on the issue focuses on female time-use and it employs cross section data. For the purposes of gender based analysis it is more interesting to explore the determinants of time-use of both men and women. Also, estimation based on cross section data can be affected by

unobserved heterogeneity and ideally one should use panel data to control for this. Both lacunae are largely a consequence of data limitations. Ilahi (1999a) attempts to overcome this by modeling the effect of lack of access to basic services (water and energy) on female and male time-use using panel data from Peru. Unfortunately, the data do not include enough detail on collection activities (such as time taken, distance to source and source of collection) to construct instruments for the analysis. All that can be constructed are dummy variables that indicate whether the household has access to in-house water or if it uses gas/electricity, firewood, coal or something else for energy. The crudeness of these variables is somewhat overcome by the fact that unlike previous work we are dealing with panel data where the results would control for unobserved heterogeneity. The results in Ilahi (1999a) show a weak association between household infrastructure dummies and time use. The infrastructure variables do not have an effect on the total time household members spend in housework.

Interestingly, women in households using firewood, or without in-house water supply do not have significantly higher work burdens than women who do not.¹⁰ In terms of the *composition* of work, the results indicate that women in rural households with fuelwood or coal as the source of energy tend to devote a smaller share (about 10%) of their time to self-employment activities. They also allocate a greater share to housework compared to their counterparts who use modern fuels. The results with respect to water are somewhat different. Here it seems men are the ones who respond to changes in provision of these services. In households that do not have in-house water, men have a lower propensity to participate in wage work and they tend to allocate a greater share of their time to self-employment activities, such as agriculture. This suggests that there may be complementarities between farm work and water collection, which men are able to make use of.

⁹ Interestingly what they also find is that wage can also be used as an instrument to reduce wood collection but that this would only work for those who collect from open access sources (rather than own or other private sources).

¹⁰ Note the estimation controls for the effect of wealth on time use in these regressions through variables such as value of durables and value of agricultural assets.

Do idiosyncratic shocks (sickness, local unemployment) alter time-use?

Health and Sickness

Within the framework of the neo-classical household model, sickness and disease incur costs on the household. These may be direct costs—primarily the cost of medical inputs purchased from the market. There may also be indirect time costs. First, in order to maintain incomes and to complete household chores, non-sick members have to substitute for the work of sick individuals by reducing their own leisure—a “substitution” effect.¹¹ Second, sick members require direct attention from non-sick members—a “care” effect. For these two reasons, the sickness of adults and children would have different effects on household time use. Sick adults require time input for both the first and second reasons, while sick children who do not do any work would require time of other household members for the second reason only.

Here we focus on indirect time costs—i.e. how sickness and disease alter the time use of the non-sick household members. From the perspective of gender analysis, the following hypotheses are of particular interest: Does the burden of care for the sick and infirm fall disproportionately on women? Or do both men and women share equally? Does child sickness differ from adult sickness in affecting time use? Does sickness and disease in the household induce a substitution of work patterns whereby women allocate more time to housework and care and less to income generating work, and men do the opposite?

Sickness and disease are not purely exogenous variables in the household setting. Household choices affect the health and general well being of members. One manner in which household choices affect sickness and health is time use. The allocation of time of household members to the production of household public goods (cleanliness, hygiene etc.) can affect the incidence of sickness. Further, more time allocated to income generating activity results in higher income and greater consumption of

¹¹ Note this would be true even if the infirm adult does not participate in income generating activities and only does housework. The time of remaining household members would have to be re-allocated and their total time increased. Only in the case of children, infants or the elderly who contribute nothing to the household economy—in terms of either income generation or housework—would these costs be zero.

nutrition and health inputs. Thus it is likely that using observed indicators of health as explanatory variables in time allocation equations would yield biased estimates of time allocation (see Pitt and Rosenzweig, 1990; Strauss and Thomas, 1998).

The recent empirical literature that explores the effects of health and sickness on labor and time-use outcomes controls for this endogeneity.¹² These studies use instrumental variable estimation to control for the endogeneity of health (Pitt and Rosenzweig, 1990; Schultz and Tansel, 1997; Ilahi, 1999a and 1999b).¹³ Some of the more recent studies are also able to control for unobserved heterogeneity by using panel data. Pitt and Rosenzweig (1990) who control for household level fixed effects do not find the mother's time is significantly affected by the sickness of the very young. Though they do find gender-differentiated effects on the time use of children (these are discussed in detail below in the section on child time use). Ilahi (1999a and 1999b) traces the effects of sickness on adult time-use. Sickness and disease are assumed to be household-level effects, i.e. they are generated as household rather than individual level processes.¹⁴ The results indicate that sickness does not alter total adult time (the opposite of leisure) in the household. However it effects the *composition* of time. For women, the "care" effect of sickness dominates the "substitution" effect, which would drive them to work more in income generating activities.

The picture for the effect of sickness on time use in urban areas is somewhat different. Two effects are significant. First the sickness of an adult tends to drive both men and women to allocate a

¹² Strauss and Thomas (1998) caution that controlling for the endogeneity of health is different from controlling for measurement error that creeps in when self-reported measures of health and sickness—which most recent empirical studies use—are employed. This measurement error is likely to be correlated with income, education and labor market outcomes. In general, those who are richer and healthier (and more educated) are also more likely to report a higher incidence of disease because of their greater awareness of health problems compared to their poorer and less educated counterparts. This would then create a false positive association between the incidence of disease and wealth (or education). Strauss and Thomas acknowledge that there is little that can be done to overcome this problem in survey data; the alternative of using independent measures of sickness (in an experimental way) is just too costly for a typical integrated household survey. Also see Behrman and Deolalikar (1988).

¹³ Unfortunately, Schultz and Tansel (1997) do not utilize the gender information available in their Cote d'Ivoire and Ghana data sets.

¹⁴ The instruments for adult and child sickness (estimated separately) are taken as functions of community availability of basic infrastructure, ethnic origin, household median age and composition, maximum education and quality of abode.

greater share of their time to self-employment activities. This implies that adult sickness possibly has a stronger income reducing effects in urban areas where the “shock” to the household income of the sickness of an adult may be greater. Secondly, it appears that urban men do reallocate their time in response to sickness in the household—they are more likely to work as wage workers if a child is sick and less to that activity if an adult is sick.

Unemployment

How do layoffs and involuntary quits affect the intra-household allocation of time? The unexpected unemployment of a family member can force a sudden reallocation of resources and time. The interesting question from a gender perspective is whether the effect of job loss on intra-household time-use is symmetric across gender. Or put another way, does female layoff affect male work pattern the same way as male layoff affects female activities? The underlying reason for testing the effects in this manner is that there are reasons to expect there may be asymmetries in the adjustment of time allocation to unemployment shocks. If women in the household put a higher premium on the household’s consumption smoothing than do men, then they are more likely than men to a) sacrifice their leisure, and/or b) increase the share of income generating work in their total time whenever there is an employment shock to the opposite sex.

There are problems associated with conducting a “clean” test of this hypothesis. Ideally, what we need is an indicator for whether a member of the household was laid off from his/her job, or whether they experienced a wage cut. However, even quite sophisticated labor surveys do not make a distinction between voluntary and involuntary job losses. The distinction is extremely important for our purposes because the former will be endogenous and the latter exogenous. One of the few datasets from developing countries that do differentiate between voluntary and involuntary quits is the Mexican Urban Labor Survey. Cunningham (1998) uses this panel data to model transitions, i.e. how men and women in the household respond to changes in the business cycle; specifically the “involuntary” quitting of a spouse. She finds that intra-gender differences are important. Wives

respond to economic shock by taking up informal sector jobs as secondary workers. But single mothers differ from wives in that their labor force behavior resembles that of primary earners (men in joint households).

Such distinctions between voluntary and involuntary job losses are not available in other data sets. In the absence of this distinction in the Peru survey, Ilahi (1999a and 1999b) calculates unemployment shocks at the cluster level, i.e. separate unemployment rates for men and women. Gender-specific cluster unemployment rates are defined as proportion of men (women) in cluster not employed divided by total number of prime age (18-60 year old) men (women) in cluster.^{15,16} Both men and women increase their total work burden (lower their leisure) when employment of the opposite sex falls. However contrary to our priors, the effect for men is larger in magnitude than that for women and it is statistically significant, while that for women is not. This suggests that men smooth unemployment shocks through their leisure more than do women. How does the composition of work change? Declines in employment at the cluster level result in an increase in the participation of both men and women in self-employment activities,¹⁷ though the effect for men is stronger in magnitude. There is no statistically significant effect of changes in employment on housework of either men or women, though the estimated coefficients are both negative.

Does agricultural modernization/ technical change alter time use?

Technical change and the subsequent modernization of agriculture has been the most significant development in developing country agriculture in the last 30 years. Most of this has come about through the introduction of high yielding varieties of seeds, but more recently, it has also come

¹⁵ Aggregating the unemployment rate to the cluster level does not completely get rid of the voluntary vs. involuntary quits problem. However it does tend to disconnect from the individual level by indicating that general changes in cluster level unemployment rates over time are indicative of changes in labor market situation.

¹⁶ Ilahi (1999a and 1999b) restricts the analysis to rural Peru. This is because clusters in the urban sample are a lot more integrated (with each other) in terms of labor demand than are rural ones.

¹⁷ Since the author controls for the share of formal-informal sector employment, it is unlikely this is due to a labor demand effect on adult time use.

in the shape of improved marketing for agricultural output that has increased the returns to farming and farm output, particularly in Latin America. Technical change in agriculture is hardly ever gender-neutral. This is because existing roles in agriculture are such that men tend to spend a greater proportion of their time in agriculture and women in home-based activities. Most often, men tend to control farm generated incomes in most regions. Africa is one exception where women have independent access to their own plots, but most of the crops grown on these are “food” crops for family consumption.

How does technical change in agriculture alter time-use patterns by gender? Lø's quickly trace the potential effects technical change can have on time use.¹⁸ First, by improving the returns to certain types of farm output, technical change increases the returns to farm inputs (land and labor). This results in an increased demand for both. Second, it results, *ceteris paribus* in increasing farm incomes which has the result, among others, of increasing the households demand for leisure. It is the countervailing effects of these two effects that need to be weighed when judging the impacts of technical change on time use. Empirical work on the subject is rare. Rarer still is a complete examination of the various components of time use by gender.¹⁹

The effects of technical change in agriculture differ by the regions one considers. In regions where rural labor markets function relatively well (south Asia and parts of Africa) hired labor absorbs the increased demand for labor. This results in an increase in “wage” labor versus “own-farm” labor. Regardless, existing evidence seems to suggest that if labor markets exist then there is little effect of technical change on time use. Kennedy and Cogill (1988) compare time-use patterns of women in households that adopt a new crop (sugar) and those that do not. They find that women in the two

¹⁸ It is important to note that from the standpoint of farm households, technical change itself is an endogenous process. Those who adopt and those who don't are not randomly distributed in a given population. Few studies that try to trace the labor/time use impacts of technical change take this factor into account.

¹⁹ In the studies summarized below, Kennedy and Cogill (1988) provide summary data on time allocated to housework. Their analysis is not couched in a multiple regression framework, but rather it is based on a comparison of means of different categories. Jones (1983) and Katz (1985) focus on time allocation between the various income generating activities. Katz (1985) does consider the housework time of daughters. None of these studies provide a comparative picture of male-female time-use.

types of households do not exhibit different time-use behavior. They tend to spend about the same amount of time in home care activities and women in sugar households do not devote much time to sugar production. Most of the “increased” demand for labor in sugar is taken up by hired labor. Labor markets function reasonably well in labor abundant rural settings of south Asia as well. While little direct evidence is available from this region, it is likely that technical change there has resulted in similar time use patterns as the ones cited in Kennedy and Cogill (1988).

The story is somewhat different in regions where labor is relatively scarce and markets for farm labor do not exist. Here the increased demand for farm labor has to be met through a reorganization of household labor resources.²⁰ That there is an increased return to overall farm output means that there has to be a wider sharing of the benefits of technical change in the household. How this sharing occurs has to do with the intra-household labor arrangements. The final outcome is most likely the result of a bargaining outcome between members that control the land and productive resources (mostly men) and those that supply their labor (mostly women and children). Existing studies do attempt to look at this issue with a bargaining lens. Jones (1983) considers the case of west Africa where married women do not have independent access to cash crop (high paying) production, though they have independent access to their own non-farm income generating activities. For working on their husband’s cash crops, women receive a “compensation”. Jones argues that this is usually set, through a bargaining process, to be higher than the opportunity cost of labor in women’s own income generating activities, and less than the returns to own cash crop production of women (calculated from a control of widowed farmers). Jones argues that women tend to “hold out” striking a contract till they get a good deal from their husbands and that husbands who owe bride wealth to in-laws tend to have lower threat points (offer better wages).

Katz (1995) studies the consequences of introduction of non-traditional agricultural export (NTAE) crops in the Central Highlands of Guatemala. She finds women transfer a significant portion

of their time and land to the new male-oriented income generating opportunities. They are “compensated” or reciprocated in the form of tradable goods at the end of the season. Women’s ability to allocate their labor on their husband’s farm is dependent on the availability of others in the household (mostly older daughters) to substitute for their lost housework. Thus the introduction of the new crop alters the time-use patterns of different members of the household. Interestingly, Katz (1995) finds that work on the husband’s NTAE crop does not alter the time women devote to their own income generating activities—a consequence possibly of keeping the threat point alive or of the desire on the part of women to have a source of income “independent” of the new technology which could be risky in yield.²¹ The lesson from these studies is that it is quite difficult to assess how technical change alters male-female time use and that it depends upon bargaining positions of men and women and on the environment specific to the region in question.

Should we worry about childcare?

The care and upbringing of children is perhaps the single most important activity that adults undertake in the household. For biological, or more importantly sociological reasons, the care of children is sharply divided along gender lines—it is mostly in the domain of women’s work. From the standpoint of economic development, childcare is important for two reasons. First, the input in early years into the upbringing of children is critical in their long-term development. Thus the *quality* of the childcare may matter as much as its quantity. Second, time allocated to childcare is usually at the expense of other activities.²² It is widely believed that the time mothers spend with children is a substitute of their time in income generating activities. Thus if increasing the labor force participation rates of women is a policy goal, then childcare may be an important constraint. Note however that in

²⁰ Of course as was noted above, adoption is endogenous and it could be that a lack of surplus labor (which results in a higher cost of labor) results in lower tendencies for adoption. No study presents the analysis from this standpoint.

²¹ One has to be careful here in interpreting this result. Katz (1995) uses time spent in new crop production on the right hand side of the remuneration to women’s labor equation. It is not clear if this variable is exogenous.

²² It is also an activity that is most likely to be simultaneous, i.e. undertaken jointly with other activities.

the context of economic theory these two reasons are not mutually exclusive. When earning opportunities for adult women improve, they may spend less time caring for their children, but this may be higher quality time, complemented with purchased market inputs (outside care). This is essentially Becker's quality-quantity tradeoff.

Here I discuss the following. Is the time women (and men) in developing countries allocate to childcare significant in magnitude? Does it vary by gender and the characteristics of other members of the household? Does it lower female labor force participation? Whether it also affects the time allocation of other household members such as adolescent girls? And, what the policy lessons are.

For an activity that can potentially have significant effects on the long-term welfare of both the care giver and the child, childcare has received surprisingly little attention in the empirical literature in developing countries. What is more rare is a comparison of time allocated to childcare by different members of household (men vis-à-vis women; old vis-à-vis young etc.). The few studies that do provide numbers on childcare time find it is not that high for women and that very few men do childcare. Brown and Haddad (1995) summarize the mean time spent in childcare by men and women in the various surveys conducted by the International Food Policy Research Institute (IFPRI). While these surveys are usually not representative of the countries in which they are administered, they do provide a sense of the magnitudes. The surveys that do ask about male time in childcare find that very few men report spending any time in this activity (Brown and Haddad, 1995). In almost all cases, the time women spend in childcare does not exceed 2 hours per day (Philippines, Bangladesh, Kenya and Botswana) and in most cases it hovers around one hour per day.²³ There is however a problem in documenting the time spent in childcare by just asking about how much time is allocated to it. One is most likely to get an under-reported figure because childcare is the most common "joint" activity in the household. Women are likely to cook, wash, clean etc. while they tend to their children. They are

²³ Specifically, the time allocated to childcare by adults is 1.7 hours per day in the Philippines and 0.55 hours per day in Kenya. Where gender-disaggregated numbers are available, women spend 0.86 hours per day in childcare in Bangladesh and 1.14 hours per day in Botswana. Few men, if any, engage in the activity (Brown and Haddad, 1995).

more likely to report the joint time as cooking, washing or cleaning rather than childcare. Thus if we need to get an accurate picture of how much time is allocated to this activity, we would have to account for the “jointness” of childcare. Few datasets do this, but one exception is the timeuse module in the Nicaragua LSMS. In Nicaragua, once the jointness of time in childcare is accounted for, the time adult women allocate to childcare is about three hours per day (World Bank; 1999). In comparison, very few men report having spent any time in that activity.

Other household members also allocate significant amounts of time to the activity.²⁴ In Brazil, children in the 6-15 age group spend a significant amount of time in the care of younger siblings (Deutsch, 1998). In fact, the availability of children in this age group in the household is negatively associated with the household choosing outside care (Deutsch, 1998; Fong and Lokshin, 1999).

Does the need for childcare lower the propensity of adult women to participate in income generating activities? There could be two channels through which this could happen—short term and long term. In the short term, the lack of childcare alternatives may induce mothers to stay away from labor force activities. But in the long run, the lack of alternative childcare could discourage the accumulation of human capital among potential mothers who may realize that since their future participation in the labor force is going to be low, there is a lesser incentive to invest in education. Most of the empirical studies concentrate on the former and not the latter. Further, the majority of studies on female labor force participation use the presence of young children in the household as an indirect indicator of the demand for childcare. They then test whether the estimated coefficient on this variable is significant as a test for the importance of childcare in affecting labor force participation rates of women.²⁵ An exception is Gutierrez (1998) who assesses how the mother’s care time responds

²⁴ In most data where each members of the household is not directly asked about the time they allocate to childcare, we can only get this information indirectly. This is done, for instance, by assessing how the presence of other adult or adolescent females in the household affect a woman’s probability of working in income generating activities (Ilahi and Grimard, 1999; Connelly et al, 1996 etc.).

²⁵ Almost any study that deals with female participation in income generating activities uses the number of children on the right hand side of the equation. See among others, Skoufias (1993), Alderman and Chishti (1991) and Connelly et al (1996). The overwhelming result in this literature is that young children do lower the mother’s tendency to participate in the labor force.

to unexpected changes in health status of the child. She finds that mothers absorb the shock through their leisure—i.e. by increasing childcare and not reducing time in income generating work.²⁶

Few studies bring in community and private supply of childcare facilities in the participation equation to do a direct test of this effect. This is partly due to the fact that such services exist only in countries where educational attainment and labor market rewards for women are high and some type of outside care is available. Examples of countries that have these characteristics are Brazil, Russia and Romania. Here the availability of outside care is positively associated with the probability that the mother participates in the labor force (Deutsch; 1998, Lokshin, 1999).²⁷ Regardless of whether outside care is available or not, the availability of informal care is crucial in determining female participation in income generating work. In Mexico and Russia, the presence of “mother substitutes”—namely children and adults who take over from the mother when she leaves for work—significantly increases the propensity of female labor force participation (Wong and Levine; 1992, Lokshin; 1999, Connelly et al; 1996). In Nicaragua, the time adult women allocate to childcare is inversely associated with the presence of other adult women in the household (World Bank, 1999).

What are the policy lessons? The ongoing demographic transition in developing countries (shrinking household size and increasing participation of adult women in the labor force) can have critical impacts of time allocated to childcare. Shrinking family size means that the “others” in the household who typically take over the task of caring for the young when the mother goes to work will become increasingly scarce. The willingness to pay for outside care will increase, which means that alternative mechanisms for childcare (outside formal or informal care) would have to come about in order to accommodate these changes.

²⁶ The presence of a health care facility in the community does not alter the results.

²⁷ There is an econometric problem associated with assessing the effect of outside childcare availability on labor force participation. This is because not only the latter but also the former is endogenous. The mode of childcare chosen and the number of hours it is utilized are choice variables. Thus there is a need to control for this endogeneity or the estimated coefficients would most likely be biased (Blau and Robins, 1988). Of the studies reviewed in this section, only Deutsch (1998) and Lokshin (1999) carefully account for the endogeneity of childcare.

What can policy makers do to expedite this transition? The answer depends on how developed the care and labor markets are. Where these markets are developed, policy intervention that tinkers with prices (subsidies) may be the best way to proceed. Some studies have tried to answer this question by conducting simulations on econometric results. Lokshin (1999) and Fong and Lokshin (1999) ask whether the government should subsidize wages (for women with children) or the price of formal childcare, if its objective is to increase female LFP. They find that care subsidies would yield an increase in maternal employment larger than a wage subsidy would. The care subsidy would also be a lot more effective in increasing household demand for formal care than a wage subsidy. Deutsch (1998) finds that even in a relatively poor community in Brazil, the willingness to pay for outside care is quite high and that there is a process of self-selection whereby those that have high remuneration in the labor market tend to choose high cost (and high quality) outside care. These results indicate that there exists a willingness to pay for outside care but for some reason, care markets do not seem to work as often as they should. This market failure is probably more “costly” to society in countries with relatively more developed labor markets and with a large section of the female population that has high educational attainment and potential earnings and is therefore likely to be willing to pay a lot for childcare (like Romania and Russia).

While the evidence from countries where labor and care markets are relatively developed suggests an active role for government policy, it is not clear whether the same policy solutions would also work in the relatively lesser developed countries. This is because of demand and supply. If the remuneration from employment for women is low, the child care market is likely to be nascent enough to be competitive (i.e. is too costly). Then the cost-benefit calculus for the typical adult female may be that the opportunity cost of working is too high. Such women are likely to rely on the help of “mother substitutes”, with potentially harmful effects on the “mother substitutes” such as lower educational enrolment among young girls.

The challenge for policy makers in the lesser developed countries is to foster through vouchers, licensing etc. the development of a private market that is cost-effective for the individual

user. Deutsch (1998) argues that public provision is too costly to meet this objective. Regardless, the provision of cheap outside childcare alternatives in lesser developed countries can have other benefits for “mother substitutes” also, such as improvements in completion of secondary enrolment among young girls.

What determines child time use/schooling?

The labor and school outcomes of children have received increasing attention recently, especially with the “emergence” of the problem of child labor. A host of empirical studies from almost all regions of the world have tested the determinants of children’s time allocation. However, in this empirical literature there is a tendency to narrow the discussion and analysis of the determinants of children’s activities to two non-leisure activities—market labor and schooling.²⁸ Market labor typically includes both work for wages and work in a production process in the household that results in marketable output. Only children who are “economically active” are classified as child laborers (Basu, 1998). However, it is widely known that work at home constitutes a large part of children’s work—especially that of girls (Mason and Khandker, 1997; Grootaert and Patrinos, 1999; Ilahi 1999b). Among studies that model the determinants of children’s work and schooling, few make a distinction between boys and girls. While a number of these studies include dummy variables for sex,

²⁸ There are a number of reasons why there has been a focus in the empirical literature on children market labor and schooling. First, both are important outcome variables that policymakers like to target. Second, there is an implicit presumption that only work “outside” the home and that too for wages ought to be considered as “child labor”. However the second point goes to the heart of the definition of what child labor is. The boundary where children’s time in work activities becomes actual labor is a thin one. For instance, should children’s work in the household’s enterprise (including agriculture) be considered “labor”? Is housework any less burdensome than outside labor? Grootaert and Kanbur (1995) discuss these issues in detail. A conservative definition of child labor arising from this debate is that only work for wages outside the home should be considered child labor. The presumption behind this interpretation is that any labor inside the home is directly monitored (or monitorable) by parents and it’s arduousness is therefore internalized in the decision-making of the parents. Thus parents would be able to make a rational decision of the extent to which children are to be made to work. Assuming of course that the parents who make decisions in this case are altruistic toward their children. This may not be true in many developing countries. For instance imperfect markets for credit may constrain parents from investing in the education of their children (and obtaining a higher return in the future) and borrowing to replace forgone earnings from child labor. The more liberal interpretation of child labor tends to include time spent in household enterprises and chores in addition to economically active work (both for wages and in

few explore the systematic differences that exist in the opportunities and constraints that affect the work of boys and girls.²⁹ Not only is ignoring the determinants of children's housework likely to ignore an important aspect of their work, but it is also likely to introduce a gender bias in our understanding of children's work. For instance, the findings in Mason and Khandker (1997) indicate that overlooking the value of time allocated to home activities is likely to drastically understate the value of children's work, particularly girls. This in turn will yield wrong prescriptions for policy programs that attempt to encourage schooling by compensating families for the foregone value (opportunity cost) of children's time.

Here I synthesize the empirical literature that does look separately at the determinants of boy-girl time-use. Note, however, that very few of such studies explicitly incorporate time allocated to housework as a dependent variable. I discuss the evidence on how changes in adult wages and employment alter boy-girl time-use; if idiosyncratic shocks (such as sickness and unemployment) affect boy-girl time-use; whether income (and poverty) is correlated with children's time use by gender.

Before discussing the key results with respect to child time use it is important to recognize that children are not a homogeneous category. For one there are large differences by age and in terms of their time use very young boys and girls resemble each other more than their older siblings of the same sex. This regularity emerges in most data.³⁰ These are perhaps the only result where the cohort or age effects are not more prominent than gender effects. Mason and Khandker (1997) find a polarization of activities as children age--those who attend school tend to devote more time to that activity and those who work tend to work more. There are little differences in this along boy-girl lines. Ilahi (1999b)

household enterprise). The presumptions here is that work at home or in the family enterprise can be as hard as work outside.

²⁹ Among the exceptions are Canagarajah and Coloumbe (1998), Skoufias (1993), Mason and Khandker (1997) and Ilahi (1999b).

³⁰ Exceptions are Skoufias (1993) who finds that as age increases boy work increases at an increasing rate (or leisure falls at a decreasing rate) with little effects for girls. Canagarajah and Coulombe (1998) find the opposite—market labor of girls in Ghana rises at a decreasing rate with age with there being little effects for boys.

finds that in Peru age significantly influences the time use of both boys and girls so that as important a distinction as gender may be the age of the child. Work on the family farm or enterprise is positively associated with age for both boys and girls—it increases at a decreasing rate with age. So does housework with the results being no different for boys and girls. The only gender-related difference is that age significantly lowers the grade-for-age attainment of girls while that of boys stays unchanged with age.

Is the time of adults, particularly mothers, a substitute of the time of children (especially girls) in housework? What happens when women enter the labor force? This question has important policy implications. Exogenous factors that affect the time of mothers (such as employment shocks) could affect the housework and school time of children. A question then is: does the burden of work fall equally on boys and girls? Testing for these effects is hampered by the fact that the labor force participation decision of adult women (and their time allocation) is endogenous to the household. It would be a big leap to assume that adult time-use decisions are made independently of those of children. Because of this endogeneity, variables that directly capture the labor force behavior of adults cannot be included on the right hand side of children's time-use regressions. Either one has to correct for the endogeneity by using instrumental variables (or by defining a structural simultaneous equations model), or use other (exogenous) variables that directly influence adult labor force participation as indicators of their behavior. The former option is infeasible because it requires the use of exclusion restrictions, which in turn effectively means finding variables that influence adult time use but are orthogonal to child time use and vice versa. This leaves one with using the latter approach.

The evidence from around the world is surprisingly scarce. But from what exists, only a nuanced picture emerges. Child time use is intimately associated with the nature of labor markets for adults and children. Where such markets exist, there appears to be an association between adult and child time (usually between the mother and the daughter). Where they do not, the association is absent or weak. In India where rural labor markets for adults function reasonably well, Skoufias (1993) finds an increase in female wages reduces the school time of boys and girls, but significantly only for girls.

Note that there are opposing income effect—as mother’s income increases her demand for child school increases—and substitution effect—children have to step in for mother’s forgone housework—at play here. It appears that the substitution effect dominates.³¹ Female labor supply in developing countries is often in the upward sloping region of the labor supply function (and it is in the data that Skoufias utilizes). Thus an increase in female wage can be seen as increasing female labor supply to market activities and a subsequent “pulling in” of children (especially girls) into housework. The results do indicate a positive effect of female wages on boys and girls housework but it is not statistically significant. In their multi-country econometric study, Grootaert and Patrinos (1999) find a similar relationship between girl and mother’s time use. On the other hand Ilahi (1999b), using a random effect specification, does not observe such a clear pattern in his analysis of time-use in Peru. Female wages have little effect on boy-girl time-use. This is partly explained by the fact that very few women in the Peru sample are observed as “working” for wages. Most of women’s work is on the family’s farm or enterprise.

Male wages tend to have more of an “income effect” on children’s time-use. This is understandable partly because unlike with the time of adult women, children’s time is unlikely to be a substitute of adult male time in rural settings where explicit child labor does not exist. Male wages are positively associated with the school time of both boys and girls.

A related way of judging how boy-girl time use is affected by adult employment is to explicitly use adult employment on the right hand side of the time use equations. Of course, since adult employment is endogenous, Ilahi (1999b) uses a cluster level variable that captures the proportion of adult females employed full time as an indicator of employment. He finds that as local female unemployment rate falls, the time urban boys and girls allocate to housework rises significantly, but that the magnitude is much larger for girls. This evidence of direct substitution between mother and child time does not hold however for children’s time in income generating

³¹ Most of the results in Skoufias (1993) are robust to cross section and random effect (panel) specification of time use functions.

activities or in grade for age schooling attainment. Combined together the results seem to suggest that child leisure falls as adult female employment increases, with the increase in work coming through an increase in housework only. Duryea (1998) uses panel data from Brazil to assess how the advancement of children through school is affected by the job loss of the father. She finds there is a slowdown in advancement when the father loses his job, but that there is little difference in this between boys and girls.

One way in which children's time use could be affected by housework requirements is through changes in health states in the household. The sickness of the very young could increase the "tending" requirements, which may fall on children particularly girls. The sickness of prime age adults could result in a drop in household income and children may be expected to increase their market labor to smooth the shock. A priori one would expect the sickness of the very young to increase housework time of older children and to reduce their school and labor time. On the other hand one would expect the sickness of a prime age adult to increase the market labor, and possibly housework of children at the expense of their schooling. Pitt and Rosenzweig (1990) explore how mothers and young boys and girls alter their *relative* time use in response to illness of an infant in the household. Recognizing that health is endogenous, they instrument for illness. Their results show clear gender-differentiated effects of infant sickness on intra-household time-use. Teenage girls in the household are significantly more likely (than teenage boys and mothers) to increase their participation in housework, to decrease their time in income generating activities and in school whenever the very young fall sick. Ilahi (1999b) who also instruments for sickness (of both adults and children) finds differences along rural and urban lines. In urban areas where children tend to spend a lot more time in housework than in rural areas, the sickness of a young child increases the care burden on boys and girls. The effect is greater in magnitude for girls. However, adult sickness does not affect child time use. In rural Peru, on the other hand, where children spend a greater proportion of their time in household-based income generating activities child sickness lowers the child labor of girls with no effect on boys. Adult sickness has much stronger gender-differentiated effects on child time use in rural Peru. Here girls

tend to make up for lost income by increasing their participation in income generating work, with there being no effect on boy time use.

Last I discuss how gender differentiated time use of boys and girls varies by income or wealth in general and poverty in particular. Here once again income cannot enter as an exogenous variable because it may be a function of household time use itself. Alternatives available to the analyst are wealth or non-wage income. Note that not all measures of wealth may be appropriate.³² Skoufias (1993) uses the value of the home assets and finds that it has little effect on boy-girl time use. Canagarajah and Coulombe (1998) who use non-wage income (corrected using instrumental variables) find a weak association between child labor and non-wage income. Ilahi (1999b) uses a measure of stock of household wealth. He finds that in Peru as in most Latin America, even though the average school attainment of boys and girls is the same, there are significant differences in the determinants of their grade-for-age in a panel context. Changes in household wealth are positively associated with the attainment of girls but not boys. Similarly, wealth is negatively associated with income generating activities of rural girls and housework of urban ones. No such pattern exists for boys. These results point to interesting implications for social protection. Exogenous shocks that lower household income (and wealth) may adversely affect girl time use and school a lot more than they would boy time use.

While household wealth may influence child work and schooling, the effect may also depend on who in the household holds the wealth. There is very little systematic evidence on how the intra-household distribution of wealth influences child labor and educational attainment. One exception is Galasso (1999) who finds for Indonesia that as the share of household assets owned by the mother increases, girl child labor falls but that of boys does not. However, when the sample is split further along ethnic lines, mother's assets at marriage have about an equal effect on the child labor of boys and girls.

³² As discussed earlier, the value of the household farm or enterprises may be inappropriate. This is because it affects labor supply (through an income effect) and the demand for labor at the same time and it is difficult to tell which results is at play.

The analysis of the determinants of child time-use by gender has one explicit policy application. In many developing countries policy makers are interested in “targeting” child labor/education through the use of “demand side” interventions in education.³³ Essentially this means giving a cash (or non-cash) grant to a child’s family with the understanding that the child will a) not work and b) go to school up to some minimum level of attendance.³⁴ The traditional approach to this problem is to see child labor as market labor (and not housework). Under this presumption, the idea is to use the direct (school) costs and indirect costs (opportunity cost of child time) as the level of compensation. In practice it is quite difficult to determine the compensation levels through “pre-program” survey data. First direct costs are difficult to identify. If one were to use the “price of schooling” on the right hand side of the demand for schooling then one has to use cluster level proxies, because self-reported prices are likely to be endogenous (Grootaert and Patrinos, 1999). Also, there may be a “clouding” of price and quality effects that leads to attenuation—the true negative effect of price on demand is reduced by the positive association between quality (which is positively related to price) and demand.³⁵ Not surprisingly then many empirical studies on the subject do not find reasonable estimates for the coefficient of direct costs. Second, indirect costs are difficult also. This is because many children observed in typical data do not work for wages, but rather work in the family enterprise. The former creates a corner solution problem and the latter requires a more detailed calculation of the marginal return to child labor through the estimation of a production function.

One way around these problems is to use actual program data. Here one typically has information of the “compensation” to the family and if one can control for the problem arising from endogenous program placement and endogenous participation, one can get a sense of whether demand side intervention are able to reduce child labor and increase child schooling. Ravallion and Wodon

³³ Examples of this are the *Bolsa Escola* program in Brazil and *Progresá* in Mexico.

³⁴ A somewhat related intervention is the school voucher program that typically concentrates on creating a market for schools. Parents are given vouchers which they can use to send their kids to the school of choice. The vouchers are redeemed by schools for finances from the government. The underlying idea here is to tinker with the demand for education to create competition for the supply of schooling. This type of demand side intervention does not have implications for children’s time-use.

(1999) use the Food-for-Education program from Bangladesh as a case study. They correct for the endogeneity (of placement and participation) and overcome the corner-solution problem by using cluster wages for the opportunity cost of child time. From the theoretical standpoint they argue that such a subsidy should increase schooling unambiguously. This is because the own substitution and income effects of a price drop are in the same (positive) direction. However, the effect on child labor is ambiguous a priori because it depends on the cross effect of price of schooling on demand for leisure. If schooling and leisure are complements then a drop in the price of schooling should increase schooling, increase leisure and reduce child labor (through the time constraint). Their empirical results show that the displacement of child labor is smaller in magnitude than the gain in schooling. An extra 100kg of rice reduces boy child labor by twice as much as it reduces girl child labor. However the positive effects on schooling are about the same by gender.

The problem with this approach is the same as the one associated with the larger empirical literature on child labor. It overlooks housework (by lumping it with leisure) as the fourth competing activity. Thus in reality there are four activities—market work, housework, schooling and leisure—and lumping leisure and housework together can lead us to erroneous policy suggestions. The theoretical results that Ravallion and Wodon find no longer hold for the effect of the subsidy on child labor since little is known of the complementarity/substitutability of housework and schooling. From an empirical standpoint it is possible under restrictive assumptions to eke the opportunity cost of time in housework. Mason and Khandker give estimates for Tanzania using different assumptions for the value of child time.³⁶ Thus in principle it is possible to empirically evaluate the effects of such programs on the allocation of child time by appropriately valuing housework.

³⁵ See Mason and Khandker (1997) for details.

³⁶ I.e. assessing it at the value of the working mother's wage or child wages or other. See Mason and Khandker (1997) for details.

Conclusion

This paper reviewed the empirical literature on the gender dimensions of allocation of time and tasks in developing countries. The motivation for such a synthesis was two-fold. One to improve our understanding of how changes in the exogenous environment of the household alters the allocation of tasks and time of adults and children. Two, to use this to inform the design of instruments of social protection as well as general poverty reduction.

Time use and poverty are intimately related. Households that rank poor on a consumption metric are also those where women have high work burdens. These work burdens fall as household income increases provided market for labor exists. In labor scarce regions where there is little hired labor, work burdens do not fall (leisure does not increase) with income.

The empirical literature on the determinants of intra-household time-use finds that the more traditional measures of economic conditions—wages, non-wage income, demographic composition of household etc.—do have an effect on time use by gender. The existence of markets—not just for labor but also for other services—play a role in defining the regional picture of time-use as well as a rural-urban one. Women and men respond well to economic incentives in situations where markets exist.

The paper also reviews the role of other factors that are typically not studied in the allocation of time. First it considers the studies that relate household access to basic services (energy and water) to male-female time use. Unfortunately, male time use in such activities is not available in most data sets and few collect information on “access” to such services. From the evidence it appears that decline in access to energy (say through deforestation) does alter the work patterns of women—they increase their time in collection and increase their total work burdens (lower leisure), but do not alter their time in income generating activities. Of course these results are also contingent on whether markets for labor and energy exist. Where they do not, the effect on women’s income generating activities is also negative. The effect of deterioration of water services is more stark. Here because water is inelastically demanded, there is a strong effect on collection and a decline in income

generating activities. Again these results are also contingent on a regional picture—the effects are strong in rural Asia and Africa but not so in Latin America or in urban regions.

The paper also explores the effects of exogenous shocks on intra-household time use. One such shock is illness. The findings in the literature are that illness in the family alters the time use of rural women (Latin America) towards housework and away from income generating activities. Rural men remain unaffected. In urban areas the effect on men is more pronounced. For children, the effects show larger gender disparities—girls in both Asia and Latin America have to take a greater burden of care through increased housework and reduced schooling than do boys. The effects of employment shocks on household time use by gender are more mixed. Here it appears gender roles (wife or single mother) play an important role in determining the response of women. Single mothers behave more like male heads than do wives. In other instances, males exhibit a greater tendency to smooth the shocks through their labor to informal labor market than do women.

The existence of functioning labor and goods markets is also important in the relationship between modernization of and technical change in agriculture and intra-household time-use. In regions where labor markets exist, there is little effect of time-use, partly due to the fact that any increased demand for labor is absorbed through hiring in. However in regions where such markets do not exist, intra-household bargaining determines the allocation of tasks and time. If new technology is male-biased (in that it is in crops that are typically grown by men) then women are able to “negotiate” an arrangement whereby they may also be able to share the benefits of technological improvements. However, it appears unlikely that they benefit as much as men do.

The existence of markets for labor and childcare are critical in time allocation also. In countries where the returns to female labor are high and where outside markets for childcare function, female participation in income generating activities is high and there is a sorting into childcare whereby better paid women choose costlier (and better quality) childcare. Overall there appears to be a high willingness to pay for childcare. In countries where outside provision of childcare is not available, the burden of care falls on “mother substitutes” such as young girls. Here it becomes critical

for public policy to foster the provision of outside care as it would lead to positive externalities in the form of higher secondary attainment of girls.

Empirical studies on children's time allocation have taken a rather narrow approach. They have tended to ignore housework as an activity. This is an activity to which young children devote at least as much time as they do to "outside" labor and the gender dimensions of this are stark—girls spend a lot more time in housework than do boys. While housework may not be as bad for the children as may be "outside" labor, it still may be deterrent to their educational attainment. Ignoring it is likely to lead to wrong approaches to child labor eradication and schooling projects. The existing evidence on child time-use by gender indicates that girls tend to take a larger share of the household adjustment from shocks and poverty.

Last, empirical evidence suggests that social norms and roles influence time-use also. Here the evidence suggests that when gender is disaggregated further, the time-use differences are more enlightening than when a straightforward male-female distinction is used. In Latin America, single mothers behave more like male heads and less like wives. In South Asia, one's role in the family is important in the determination of tasks and time that one allocates to various activities. Since gender and social roles do play a role, empirical analysis that does not account for such differences would yield biased results if it does not correctly control for such characteristics. One solution of course is to use panel data and completely control for all unobservable factors, including social and gender roles.

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