Appendix Table 3 Wage regressions, by gender (individuals aged >=10 years, not in school, who earn a wage or profit

	Men		*Women*	
Age	0.039***	(0.010)	0.037***	(0.009)
Age squared	0.000***	(0.000)	0.000***	(0.000)
Disabled (base not disabled)	0.045	(0.135)	-0.180	(0.182)
Marital status (base single)				
Monogamous	0.157**	(0.071)	0.183**	(0.081)
Polygamous	0.373***	(0.085)	0.135	(0.084)
Divorced	-0.111	(0.180)	0.216*	(0.115)
Widow/widower	0.252	(0.278)	0.057	(0.110)
Education completed (base none)				
Primary	0.211***	(0.068)	0.189**	(0.085)
Secondary 1st	0.333***	(0.084)	0.288**	(0.123)
Secondary 2nd	0.354**	(0.176)	0.268	(0.402)
Technical	0.615***	(0.103)	0.656***	(0.153)
University	0.742***	(0.096)	0.994***	(0.224)
Industrial sector (base manufacturing)				
Agriculture	-0.801***	(0.088)	-1.112***	(0.105)
Mines	0.727***	(0.137)	-0.039	(0.213)
Energy	0.266	(0.317)	-1.742	(1.314)
Construction	0.174	(0.107)	-0.415	(0.591)
Trade	0.301***	(0.074)	-0.014	(0.085)
Transport	0.266***	(0.097)	-0.011	(0.345)
Finance, IT	-0.089	(0.164)	-0.286	(0.308)
Public admin, educ., health	-0.067	(0.090)	-0.399***	(0.129)
Status in employment (base employee private sector, formal)				
Public employee	0.338***	(0.100)	0.219	(0.187)
Employee private sector, informal	-0.361***	(0.112)	-0.423**	(0.199)
Self-employed	0.218**	(0.097)	-0.082	(0.186)
Type of contract (base permanent)				
Seasonal	-0.309***	(0.070)	-0.165***	(0.062)
Daily and piece work	-0.048	(0.066)	-0.066	(0.063)
Rural (base urban)	-0.344***	(0.065)	-0.198***	(0.065)
Geographical area (base Conakry)				
Boke	-0.005	(0.074)	-0.025	(0.075)
Faranah	0.124	(0.079)	0.139*	(0.076)
Kankan	0.015	(0.085)	0.068	(0.085)
Kindia	0.041	(0.081)	-0.282***	(0.080)
Labe	0.153*	(0.090)	0.105	(0.096)
Mamou	0.376***	(0.098)	0.311***	(0.094)
Nzerekore	-0.010	(0.072)	0.012	(0.073)
Constant	5.210***	(0.219)	5.541***	(0.251)
Observations	4350		4356	
R^2	0.276		0.239	

Notes: The dependent variable is the logarithm of the hourly wage, spatially adjusted (using poverty lines) for differences in purchasing power across regions. Standard errors are in parenthesis. * denotes significance at the 10 percent level, ** denotes significance at the 5 percent level. *** denotes significance at the 1 percent level.

Source: Authors' estimates using Direction Nationale de la Statistique (2008).

Feminist Economics 16(3), July 2010, 79–112

TIME PRESSED AND TIME POOR: UNPAID HOUSEHOLD WORK IN GUATEMALA

Sarah Gammage

ABSTRACT

This study examines unpaid work in the household in Guatemala using data from a national 2000 household survey (ENCOVI 2000), which included a time-use module. The contribution highlights the importance of unpaid work in Guatemalan households in economic terms and concludes that in 2000, its value was equivalent to approximately 30 percent of Gross Domestic Product (GDP) for that year. The value of unpaid work is estimated using an opportunity cost approach applying market wages as well as different measures of replacement costs. The study then explores the nature of time poverty in Guatemala and examines the determinants of being both time and income poor, concluding that women are more likely to experience this condition. The study also finds that investment in small infrastructure and ownership of an electric or gas stove has the potential to reduce time and income poverty in Guatemala, primarily by alleviating women's time burdens and making their unpaid household work more efficient.

KEYWORDS

Poverty, time use, time poverty, unpaid household work

JEL codes: B54, D13, I32

INTRODUCTION

This study extends the literature on gender and time use in developing countries, particularly in Latin America, by estimating the contribution that unpaid household work makes to the economy in Guatemala and underscoring the importance of unmarketized activities. Quantifying the value of household production is relevant if we are to consider the full range of paid and unpaid work that secures household well-being. These calculations are likely to be important also for poverty analysis, as they highlight the fact that unmarketed household production and the provision of household services are essential for family welfare. Inasmuch as the sum of household production and income describes the potential consumption that all household members may enjoy, an understanding of time use and time burdens and the unequal distribution of unpaid household work is important

Feminist Economics ISSN 1354-5701 print/ISSN 1466-4372 online © 2010 IAFFE
http://www.tandf.co.uk/journals
DOI: 10.1080/13545701.2010.498571

in assessing the impact of antipoverty programs on individual and household well-being.

In Latin America, such poverty alleviation programs have increasingly focused on providing cash transfers linked to child and maternal well-being. These efforts require complementary household inputs of time and resources that may disproportionately use women's labor, as Mercedes González de la Rocha (2006) and Irma Arriagada and Charlotte Mathivet (2007) find in their analyses of conditional cash transfer programs in Mexico. In 2008, Guatemala instituted a conditional cash transfer program of its own, *Mi Familia Progresa* (My Family Progresses), to target the extremely poor in a number of key municipalities where income poverty rates are high. Evaluating the effects on women's time use of this particular program has implications for other developing economies, as *Mi Familia Progresa* is representative of the more than eighteen similar programs in Latin America as of 2010.

These programs have as part of their motivation the goal of reducing child labor in both paid and unpaid work. While this aim has the undisputed benefit of increasing investment in children's human capital and creating greater opportunities for learning (see, for example, T. Paul Schultz [2004] and Jere R. Behrman, Susan W. Parker, and Petra E. Todd [2005] for Mexico; and Ariel Fiszbein and Norbert Schady [2009] for a global analysis of these types of programs), the programs inevitably alter time and task allocation within and beyond the household. Time and task allocation changes directly as household members assume additional tasks or "co-responsibilities" associated with receipt of the benefits – taking children to medical checkups, attending parent–teacher meetings, attending nutrition and health education sessions, and assuming the roles of unpaid community educators and trainers. Time and task allocation also changes indirectly as children and young adults whose families are enrolled in these programs reduce their time in paid and unpaid work, potentially requiring other household members to increase their time in these activities (see Emmanuel Skoufias [2001] and Emmanuel Skoufias and Susan W. Parker [2001] for their analysis of *Oportunidades* in Mexico). This study suggests these programs should also be evaluated in terms of their impact on existing time burdens and whether they exacerbate intrahousehold inequalities that can also potentially undermine well-being.

One means of evaluating the efficiency of these conditional cash transfers would be to explore the value of time reallocated to paid and unpaid work by other household members whose time and task allocations change as a result of the receipt of these benefits. Unfortunately, time and income are not expressed or valued in the same metric. Consequently, valuing time, particularly time spent in home production, can provide critical information about the importance of home production relative to marketized production as recorded in a country's national accounts and

relative to investments in antipoverty programs that provide income transfers and subsidies to households. Additionally, estimating the value of home production also provides us with a benchmark to value the potential and actual impact of antipoverty programs on time and task allocation.

The analysis of time use in Guatemala using data from the 2000 household survey reveals that the estimated total value of unpaid work constitutes between 25.7 and 34.2 percent of GDP in Guatemala – with women and girls generating on average 70 percent of this value. This study argues that the relative gains of the *Mi Familia Progresa* program should be considered in light of the costs it may impose, especially where these costs are not gender neutral and where some household members assume disproportionate responsibility for these additional tasks. A full accounting of these costs would also include labor income foregone for the household and the value of time redistributed. Such a calculation will be particularly important for the time and income poor, who are already restricted in both leisure and money and for whom an increase in time use will increase time burdens.

This study employs three different methods to estimate a range of values for nonmarket work in the household: an opportunity cost approach using Heckman corrections to value the labor of nonparticipants in the market economy; a replacement cost approach using the cost of domestic labor; and a service cost approach that differentiates among activities and applies wage rates of those household services that can be contracted in to replace these discrete activities. In addition, the study implements a measure of time poverty – focusing on individuals in those households who are both time and income poor. The results are analyzed in light of the potential effects on women's time burden of *Mi Familia Progresa*, drawing attention to the need to consider the impact of changes in time use and time burdens associated with such conditional cash transfer programs.

WHY ANALYZE TIME USE IN LATIN AMERICA?

Few studies have been undertaken on time use in Latin America that attempt to value household work, even though as of 2010 time-use data are being collected in at least fourteen countries in Latin America.[1] Furthermore, the studies that value unpaid labor in the household in Latin America typically use an opportunity-cost approach valuing hours in unpaid work in the household at existing wage rates (without correcting for selection bias) or at the replacement cost of hiring a domestic servant (see Mercedes Aguilar and Isolda Espinosa [2004] and Mercedes Pedrero Nieto [2005], who provide an analysis of the value of time use for Nicaragua and Mexico, respectively; and Comisión Económica para América Latina y el Caribe [CEPAL 2007], which explores time use in a number of countries in Latin America). This study explores an additional method of valuing

unpaid work in the household to provide a range of potential values that illustrate the importance of these activities in the Guatemalan economy. Different valuations are provided as a sensitivity test to explore how the conclusions about the importance of unpaid work within the household may vary depending on the methodology employed to derive a value for these inputs into social reproduction.

In Latin America, as in many other regions of the world, there is a marked difference between women's and men's participation in productive and reproductive activities. Across Latin America, women's participation rates in productive activities average 54 percent, while the average for men is 79 percent.[2] In Mexico, Costa Rica, El Salvador, and Nicaragua, the difference in participation rates between men and women exceeds 20 percentage points (CEPAL 2009). In Guatemala and Honduras, men report participation rates 25 percentage points above those of women (CEPAL 2009). Conversely, within the household, women engage disproportionately in domestic tasks and undertake the majority of social reproduction, caring work, and household maintenance. Moreover, many women engage exclusively in reproductive activities or nonmarket production within the household. Among adults older than 15 years of age in fifteen countries in Latin America, 98 percent of people in urban areas and 99 percent of those in rural areas who engage exclusively in household activities are women (CEPAL 2007). In general, throughout Latin America, women are responsible for two-thirds of unpaid household work, while men report engaging in one-third of the activities related to household tasks (CEPAL 2007).

These inequalities in the distribution of work within and beyond the household contribute to total time burdens, where women work an hour and a half more on average each day than men in Latin America.[3] These differences also manifest in a visibly sex-segmented labor market with pronounced income and earnings gaps, where women typically earn less than men in the same jobs. For example, women in urban areas in Latin America earn on average 83 percent of men's wages per hour (Vivian Milosavljevic 2007).[4] If we control for different levels of education, women workers in Latin America with more than thirteen years of formal education earn the equivalent of 72 percent of men's earnings – reflecting the fact that there is more wage compression at the lower end of the income distribution and among workers with fewer years of formal education (Milosavljevic 2007).[5] Among salaried workers, women earn 78 percent of men's wages on average in urban areas in Latin America (Milosavljevic 2007). If we consider only own-account workers – that is, contract or self-employed workers – women earn on average 58 percent of men's earnings in Latin America. These averages conceal substantial variation within the region. For example, among unskilled own-account workers in urban areas, the ratio of earnings by gender varies between 44

percent of men's earnings in Mexico and 75 percent in El Salvador (CEPAL 2007).

The incremental rise in women's participation in the labor market, both globally and in Guatemala, is likely to increase women's total time burdens or to require replacing reproductive services within the household – either by hiring these services or requiring other household members, disproportionately women and girls, to take them on. Certainly, Elizabeth G. Katz, in her study of rural Guatemala, finds that the availability of labor for household (re)production in the home is a key determinant of both paid activities and unpaid activities in agricultural production: "[A] woman's primary obligation is to domestic labor. After fulfilling this primary obligation, either with her own labor or that of her daughters, she can divide her remaining time between income generation for herself and/or for her husband, depending in large part on the opportunities available for her in her community" (1995, 340). If these reproductive services are not replaced or commodified, then total time burdens borne by household members are likely to increase. Given the prevailing gendered patterns of time allocation in Guatemala, total time burdens are likely to increase for women, along with the risk that they will experience time poverty.

The need to consider time in poverty analysis and as an input into well-being is gaining credence in academic and policy circles (Clair Vickery 1977; Michael Bittman 2004a, 2004b; Jacques Charmes 2006; Araceli Damián 2005; C. Mark Blackden and Quentin Wodon 2006; Tania Burchardt 2008; Elena Bardasi and Quentin Wodon 2010). Time in itself is an important resource that can be distributed inequitably across individuals, especially in the context of scarcity of other resources. Where inequalities exist, it is likely that some people are time rich and others time poor, lacking sufficient time for leisure and recreation or for investment in their own human capital. It is also clear that both time and money can be used to secure consumption, and that time can be used to generate home-produced goods and services as well as income. As Vickery notes in her groundbreaking work on time poverty, it is reasonable to assume that attaining the poverty threshold requires the household to have "a minimal input of time regardless of the amount of money available, and a minimal input of money regardless of the time available" (1977, 29).

Time poverty can be understood in terms of the lack of adequate time to sleep and rest. Elena Bardasi and Quentin Wodon (2006) highlight that in direct contrast to consumption or income measures of well-being, where economists assume that "more is better," time by any measure is a limited resource – both across the life of an individual and in a given day. The more time an individual dedicates to paid and unpaid work, the less time is available for other activities, including rest and recreation. A person who lacks adequate time to sleep and rest may be considered to live and work in a state of "time poverty."

Developing a measure of time poverty calls into question how we might set a time poverty line and whether such a line is likely to be relative or absolute. But wherever we set the line, time poverty is likely to be a feature of the norms and expectations that assign gender roles and responsibilities and to reflect the social institutions within which households are formed and decisions to engage in paid and unpaid work are taken. As Michael Bittman and Nancy Folbre point out, "the structure of social institutions and altruistic commitments can lead to inefficient and unfair outcomes" (2004, 1). The existence of such inefficient or unfair outcomes draws attention to the lack of choice and emphasizes the importance of trade-offs. Even though individuals may value their caring work, if rigid gender roles assign responsibilities that are inflexible, then this caring work may come at the expense of what Amartya Sen (1999) refers to as other "doings" they may also wish to choose. When the burdens of caring or nonmarket production impede individuals' abilities to choose the lives that they value, or to achieve alternative functionings, their welfare and well-being are likely to be reduced.

Bardasi and Wodon (2010) in this volume extend and refine their earlier definition of time poverty by combining the concept of time poverty or "working long hours" with consumption poverty. This approach is relevant for poverty analysis because time is an input into the production or transformation of commodities. Gary Becker (1965) clearly acknowledged this idea by modeling household behavior as the outcome of utility maximization problem where the commodities consumed are produced by combining inputs of time and market goods. Similarly, Vickery (1977) has sought to reconceptualize poverty, explicitly including time in her analysis, to demonstrate that if a minimal level of consumption requires both money and household production, then the official poverty standards do not correctly measure household needs. She observes:

> A household's ability to translate the available time into consumption depends upon its productivity in both market and nonmarket work, so that the same amount of available time can represent vastly different levels of resources across households. A measure of the value of time spent in market work is available in terms of wages; the value of time spent outside the marketplace must be inferred (29).

As a result, the full quantification of household resources must include an estimate of earned income, nonmarket (household) production, and assets.

In elaborating their definition of time poverty, Bardasi and Wodon (2010) argue that individuals who are extremely time pressed are not able to allocate time for important activities and as a result are forced to make trade-offs. In this study, the authors distinguish between those households

that work long hours because of need and those that work long hours because of choice. Bardasi and Wodon's (2010) particular focus is on the time and income poor, defining the time poor as only those individuals who work long hours in paid and unpaid work and are income poor or would become income poor if they were to reduce their working hours up to the time poverty line.

The analysis of time poverty and time scarcity can shed light on the reduced set of opportunities that individuals who are confined to low-productivity activities may encounter. As Sen (1999) and Shahin Yaqub (2008) argue, time poverty can greatly affect individual capabilities. If an individual is time poor, this affects not only their current functionings but also their future ones – it limits their ability to rest, to enjoy recreation, and to invest in expanded capabilities and opportunities by acquiring new or more abilities, such as through formal education. Moreover, experiencing time poverty can contribute to the loss of human capital, compromising the health of individuals and undermining their well-being, as Corinne Siaens, K. Subbarao, and Quentin Wodon (2006) posit in their analysis of orphans' well-being in Rwanda and Shahin Yaqub (2008) notes in his analysis of capabilities over the life cycle. Experiencing time poverty is also likely to affect the quality of time devoted to paid and unpaid work, as well as its productivity (a finding that Bittman [2004a, 2004b] reports in his analysis of time use in Australia and Finland).

In countries where antipoverty programs target women to reduce current as well as intergenerational poverty, it is important to recognize that these programs may affect the gender distribution of time use. The plethora of cash transfer programs to improve the health and education of children in Latin America, which are conditional on "parental co-responsibility," seem premised on the notion that time is particularly abundant in poor families.[6] Since the majority of these complementary time investments, which include taking children to clinics, receiving nutrition and health education, and attending community meetings, fall on women, it is women's time that is considered to be most abundant and most flexible. As Cecile Jackson observes (1996: 493): "The combination of an instrumental interest in women as the means to poverty reduction ends, and the feminization of poverty discourse has led to a damaging erosion of the differences between gender disadvantage and poverty." Exploring the nature of time poverty and time scarcity can help to excavate the differences between gender disadvantage and poverty and provide critical information for policy and program design that does not exacerbate existing gender inequalities in time use.

Public policies and programs have evolved in many contexts, frequently without attention to their impact on family life, time and task allocation, or the possibility they may impose significant constraints or burdens on certain members of the household (Bittman and Folbre 2004). Moreover, as Susan

Himmelweit notes (2002: 53): "[P]olicies that increase the output of one sector by diminishing that of another may not succeed in meeting their aims, unless compensatory provision is made for the specific outputs lost." This observation holds particularly true for Latin America, where little use has been made of the time-use data to evaluate social programs and policies that may alter time use and potentially affect the production of essential household goods and services.

Finally, it is especially interesting to note that social programs that attempt to reduce poverty or upgrade productive activities in developing countries seldom focus on improving access to time- and labor-saving interventions in the household such as gas or kerosene stoves, domestic water storage, piped-in water, or even refrigerators and washing machines. It is not beyond the realm of the possible to design antipoverty and/or local development programs that also address energy consumption, using appropriate technology interventions of this type precisely because they are labor-saving. Where time is an important input into securing well-being and time poverty or time scarcity may pose a binding constraint for the income and consumption poor, the failure to address this dimension of poverty reduces opportunities to improve well-being and to foster greater gender equality.

THE TIME-USE MODULE IN GUATEMALA

This study uses a household survey and time-use data from Guatemala for 2000 to value household production based on a model for time use laid out in the Appendix. The data are drawn from a time-use module included as part of the National Survey of Living Conditions (*Encuesta Nacional sobre Condiciones de Vida* [ENCOVI]) in 2000. The ENCOVI is a nationally representative multipurpose sample of 11,170 households in urban and rural areas. Because of the number of questions and detailed answers required, the survey was undertaken in two rounds. Round one included modules on household composition and fertility, health, education, migration, time use, and economic activities as well as information about housing, social capital, adverse events, and participation in organizations. Round two gathered household-level information on expenditures, consumption of home-produced goods, income from sources other than employment, ownership of durable goods, household enterprises, agricultural activities, and savings and credit, as well as individual-level data on anthropometrics.[7]

The time-use module was administered to all households in round one and collected information on time use for all persons in the household over 7 years of age. Information was collected directly from those persons over 12 years of age. For children aged 7 to 11, the data were collected in the presence of the adult who spent the most time with the child in order to verify and confirm the estimates of time use provided by the children. The

time-use survey recorded the previous day's time dedicated to paid and unpaid work, household maintenance, education, rest and recreation, and making household payments and purchases. The survey collected information on simultaneous activities for all of these tasks, allowing for the possibility of up to four activities to be undertaken simultaneously and assigning equal importance to these activities.

The data were not collected through time diaries, in which individuals record their time use contemporaneously, but were gathered by enumerators through a series of questions about activities undertaken the previous day. Questions were asked in a specific order according to the type of task undertaken (paid and unpaid work, household maintenance, studying and recreation, etc.) but enumerators were not required to record the answers in a 24-hour diary nor locate them within a specific period during those 24 hours. As a result, approximately 18 percent of the sample reported using more than 24 hours in a day, most likely indicating that some tasks were undertaken simultaneously.

The activities were divided into paid and unpaid work, and the enumerators asked the respondent about the time spent in activities that were undertaken for a wage or those activities undertaken on the household farm, spent taking care of animals, or performed without payment for a household business. This section of the survey also asked individuals about time spent producing garments and textiles and weaving or sewing or in making repairs to the house or to tools and household items. Questions also focused on the amount of time spent commuting to paid work. The second section, which pertained to studying, included questions on homework and on the time needed to travel to and from school. The third set of questions concerned household maintenance activities, including all activities related to cleaning, washing, cooking, ironing, hauling water, collecting fuel-wood, and caring for children as well as the removal and disposal of household waste. The next set of questions was devoted to making purchases for household supplies and paying bills associated with household consumption and well-being, including repaying loans. The final section covered other activities, among them personal care, bathing, dressing, exercising, and going to the beauty salon or the hairdresser. Questions were also asked about the amount of time respondents devoted to recreation and sports, participation in unpaid community work, political meetings, and social gatherings, as well as to reading, eating, relaxing, watching television, and sleeping. There were two key omissions in categorizing activities. The section on unpaid caring services contained no questions regarding time spent caring for the sick or the aged. Moreover, respondents were not queried about time spent accessing and receiving medical services. The final section on other activities was intended to elicit time use in activities that had not been covered previously, but enumerators used it only sporadically.

After completing the questions, the enumerator was instructed to sum the time spent and ensure that it did not exceed 24 hours. If the total time accounted for exceeded 24 hours, the enumerator was either to verify that the time spent was correctly recalled or to record those activities undertaken simultaneously. Unfortunately, the recording of simultaneous tasks was inconsistent and, as a result, the codes developed for multitasking cannot be used to identify the importance of these activities or develop adjusted measures of time use that sum to 24 hours.

For the purposes of this study, unpaid work is defined according to the categories in Table 1. Although the survey recorded time dedicated to each activity for each person over 7 years of age, the analysis of the value of unpaid work undertaken here is only for those persons between 12 and 65 years of age, under the assumption that the productivity of these household tasks diminishes markedly outside of this age range. As a result, the estimate of the contribution of unpaid work to GDP is likely to be conservative. Moreover, as noted above, the list of activities included in Table 1 does not include all of the unpaid work undertaken in the household, the most notable omission being caring services provided to the elderly and the sick. The definition of unpaid work in the household applied here does not include those social services rendered to the community, such as voluntary time spent working in

Table 1 Definitions of unpaid work in the household in Guatemala, 2000

Domestic tasks	*Care services*	*Unpaid production for own consumption*	*Other unpaid household services*
Cleaning	Caring for children	Unpaid activities on the family farm or processing agricultural products	Repairing the house
Cooking and washing dishes			Purchasing goods
Washing and ironing clothes			Making household payments
Disposing of trash			
Hauling water			
Collecting fuel-wood			
		Weaving, embroidery, and sewing clothes for the family	
		Caring for domestic animals	

Note. These tasks exclude unpaid work in the household that produces goods and services that are sold in the market.

Source. Time-Use Module, *Encuesta Nacional sobre Condiciones de Vida* (ENCOVI 2000).

community organizations, participating in collective decision-making fora, repairing or maintaining paths and roads, or visiting the sick and disabled, because these activities do not conform to a strict definition of unpaid household work.[8]

THE VALUE OF HOUSEHOLD PRODUCTION IN GUATEMALA

Over the last three decades, a vast literature has considered the determinants of women's participation in the labor market; most of this has focused on married women or women with partners and has attempted to explain why women in a union have lower participation rates than single women (see James J. Heckman and Robert J. Willis [1977]; James J. Heckman and Thomas E. Macurdy [1980]; Mark R. Killingsworth and James Heckman [1986]; Claudia Goldin [1990]; Daniela Del Boca, Marilena Locatelli, and Silvia Pascua [2000]; Francine Blau and Lawrence Kahn [2005]). These articles critically examine women's participation in the context of a stark gender division of labor within and beyond the household. Many of these studies conclude that women's labor market participation is less sensitive to changes in their own wage rates than those of their partners or husbands, a fact explained by the gender division of labor within the household, where women substitute between paid work, household production, and leisure, whereas men substitute between paid work and leisure.

It is clear that throughout the world, women have markedly lower labor market participation rates when compared with men. This is also the case in Guatemala, where participation rates for men aged 15–65 in 2006 were 88 percent and for women in the same age group, 47 percent (CEPAL 2009). This difference is smaller in rural areas, where 60 percent of women and 87 percent of men in this age group are economically active. Moreover, in Guatemala, as in other parts of the developing world, women cluster in own-account and unpaid family work, for which wages or earnings are poorly recorded. In urban areas, 59 percent of all workers aged 15–65 are salaried, as compared to 38 percent who are categorized as own-account and unpaid family workers. In rural areas, the proportion of salaried workers is substantially lower, with 38 percent of all workers classified as salaried whereas 61 percent are defined as own-account and unpaid family workers. In rural areas, the gender differences are also stark: 74 percent of women who are economically active are own-account or unpaid family workers, while only 54 percent of men fall into this category. Women's participation in market work or their disproportionate concentration in household activities is likely to be greatly affected by childbearing and reproductive responsibilities, since total fertility rates in Guatemala are among the highest in Central America at approximately 4.2 children per woman.

Women concentrate in low-productivity activities, making up 65 percent of such workers compared with 53 percent of men. Gender gaps in pay and earnings prevail. Women earn, on average, 66 percent of male wages. In low-productivity activities, women earn 49 percent of male earnings (CEPAL 2009). It is highly likely, therefore, that if we use current wages for domestic tasks or estimate Mincerian wage equations, which would allow us to derive the opportunity cost of undertaking unpaid work, these estimates would suffer from substantial selection bias.

The fundamental problem of selection bias is that we observe only those people who are currently working, and not those who wish to work or who are excluded from work by reservation wages higher than those currently available.[9] It is likely that at different moments over the life cycle reservation wages change, reflecting different preferences for studying or having children; those social norms and expectations that dictate responsibilities within and beyond the household (for men and women); and the role of social programs, unemployment insurance, and changes in the perceived utility of leisure. Economic theory maintains that if the reservation wage is higher than the salary available in the market, the individual will choose not to enter the labor market. However, in many cases this decision does not reflect "choice." It is important to recognize that women are frequently restricted in their participation in the labor market by norms and social sanctions that dictate gender roles and responsibilities, defining the extent of their productive and reproductive tasks (Sen 1999; CEPAL 2007; Lourdes Colinas 2008). James Heckman (1974, 1976) developed a means of correcting for the selectivity bias using a procedure that estimated the determinants of the decision to participate to correct for the unobserved variables in the labor supply equation.

The analysis for Guatemala is based on earlier work by John F. Cogan (1981) and Frank Cörvers and Bart Golsteyn (2003) that corrects for selectivity bias. Applying Heckman corrections, we can compare the opportunity cost of work with that of replacing domestic services in the market. In order to undertake the valuation exercise, we assume that work within the household is fully substitutable. When a household substitutes paid work for unpaid household labor, there is frequently an observable cost – that of employing a domestic worker at the market rate. However, the household can choose to replace this domestic labor in two ways: (1) by contracting someone to replace the activities of one or many members of the household, or (2) by contracting specific services to substitute for particular activities such as cooking, gardening, plumbing, and others. The first case is referred to as the replacement cost, and the second is the cost of service or of specialization.

The use of values for household work that are derived in the market present us with various problems. As we know, there is a high level of specialization within the household and in the market. There are types of

household work that one individual cannot replace or that cannot be replaced at the same quality. Additionally, there are contexts in which no substitutes are available – in remote rural areas, with limited cash reserves, there are fewer opportunities to substitute paid for unpaid household labor. In short, there are frequently no perfect substitutes for household work. Moreover, the estimates derived from using market wages will be particularly sensitive to the occupation chosen for the appropriate replacement cost. Furthermore, if the wages in the chosen occupation are lower than in other occupations (because it is a feminized occupation), then productivity in the domestic sphere may be underestimated. In this study, domestic worker is the occupation used to derive the replacement cost estimates.

As Martin Murphy (1980) documented, in theory, applying a service cost would overcome the problem of specialization inherent in using the replacement cost. Unfortunately, this approach also has weaknesses. First, this approach assumes that household tasks can be broken down in such a way that they can be contracted out. But specific services are usually not available for short periods. Also, there are transaction and coordination costs associated with looking for multiple workers to substitute for specific activities that make this assumption difficult to uphold. Second, many domestic tasks require abilities that can be found in more than one occupation in the market. If this problem can be overcome, there is the additional problem of determining the appropriate wage, given the qualifications and experience of the workers in this category of occupation. For example, in the case of household repairs, should we use the wage rates for carpenters, bricklayers, or plasterers, or a weighted average of wage rates for all of these activities? Beyond the methodological problems, there are the problems presented by the surveys themselves. The Guatemala data for 2000 do not report occupation codes that are sufficiently detailed to attribute a cost of service. For this reason, I used the 2006 survey, which has a greater number of occupation and industry codes, and deflated wages to reflect 2000 prices using an index of real median wages (ENCOVI 2006).

In addition to defining and capturing the full range of activities undertaken in the household, there are some further methodological challenges that time-use surveys pose, particularly with regards to measurement. One of the key challenges is how to cope with simultaneity and the potential overestimation of time use when multiple tasks are being undertaken. For example, how do we measure time use when someone is cooking, taking care of children, and listening to the radio? Which task is the most important? How much time is really being dedicated to each of these activities?

One way of dealing with simultaneity is to limit the total number of hours in a day to 24, and subtract the time spent in individual activities. The remainder should be the total time spent in simultaneous activities, which can be allocated to each simultaneous activity in proportion to the total

time that was actually reported to have been spent in simultaneous activities. This approach, while tractable, assigns the same weight to each of the activities without allowing for the possibility that one activity may take precedence over another. If someone is caring for an elderly person or a child while they are watching the television as well as ironing, not all of these activities have equal weight or will be undertaken at the same level of productivity as if they had been undertaken solely. To correctly adjust for simultaneous tasks, we would require information on the intensity of time use. Clearly the efficiency and the output from each task are different if these tasks are undertaken simultaneously or sequentially.

Another way of accounting for simultaneous tasks is to weight the various tasks according to their importance. This method requires that the interviewee rank the tasks in terms of their importance or the attention devoted to each. However, ranking or weighting requires a complex survey instrument and increases the cost of collecting the time-use data. Given these measurement challenges, it is not surprising that many time-use studies restrict themselves to the principal activity and do not explore the relative importance of simultaneous activities.

Unfortunately, the omission of simultaneous tasks in many time-use studies means that the measurement of the time allocated to domestic tasks may be inexact and incorrect and may in fact further underestimate the gender asymmetries in time use. Michael Bittman and George Matheson (1996) underscore this point in their analysis of time use in Australia. These authors conclude that the tendency among many different studies to report broad equality between men and women in total hours of work within and outside the household is incorrect precisely because many of these studies ignore simultaneous tasks and discard much of the information reported about these tasks in time-use surveys.

The existence of simultaneous tasks may provide relevant information about production within the household and time pressures that have implications for individual well-being and consumption of leisure time. Beyond the measurement issues, the mere existence of simultaneous tasks can reveal changes in production possibilities within the household due to technological innovation – the presence of appliances that enable tasks to be undertaken simultaneously or increase the productivity of individual tasks. For example, microwave ovens, washing machines, and dryers increase the productivity of discrete tasks and enable several tasks to be undertaken at once. The presence of simultaneous activities can also signal the intensification of work and work effort or the absence of sufficient leisure time (Maria Floro and Marjorie Miles 1998).

As noted previously, the Guatemala survey data did collect information on simultaneous tasks, allowing for up to four tasks to be undertaken together. Unfortunately, the data were recorded in such a way that few observations have consistent measures of which tasks were undertaken

simultaneously. Were we to work only with those observations that report simultaneous tasks, the sample size would be greatly reduced. However, when summing that amount of time dedicated to market and nonmarket work, including leisure and rest, we find that approximately 18 percent of the sample report using more than 24 hours in a day. While some of this may be measurement error – particularly among rural populations, whose lives are not demarcated by clocks – it is most likely that this reflects aggregation problems summing the time dedicated to simultaneous tasks. Women disproportionately report using more than 24 hours when compared with men: approximately 23 percent of women and 13 percent of men report using more than 24 hours in a day. In order not to lose observations and to preserve the information that these interviewees report, I *ex post facto* restricted the total number of hours in a day to 24 to correct for measurement error in reporting simultaneous tasks. This means that in those cases where more than 24 hours of activities are reported, the time attributed to each activity was arbitrarily reduced in proportion to the total time reported and restricted to 24 hours. This may underestimate the time allocated to some tasks, particularly as this adjustment was undertaken for all activities and not just those activities reported as simultaneous activities – because of the inadequacy of the coding for simultaneous tasks.

Table 2 provides some descriptive statistics for the sample of men and women between 12 and 65 years of age who are economically active. The rural–urban gaps are particularly obvious, since urban workers have

Table 2 Descriptive statistics for the economically active aged 12–65 in Guatemala, 2000[a,c]

	Women			*Men*		
	Urban	*Rural*	*Total*	*Urban*	*Rural*	*Total*
Average age	30.0	28.5	29.5	32.1	30.4	31.2
Years of formal education completed	7.9	3.6	6.3	7.7	3.6	5.5
Actual wages (Quetzales/hour)	8.38	3.73	6.91	10.66	4.40	7.29
Total household income per hour in productive and reproductive work (Quetzales/hour)[b]	2.46	0.78	1.48	5.08	1.74	3.12
Hours of paid work per day[b]	8.55	8.38	8.50	9.88	9.36	9.60
Hours of unpaid work in the household per day[b]	3.27	3.30	3.28	0.88	0.93	0.91
Sum of hours of paid and unpaid work	11.82	11.68	11.78	10.76	10.30	10.56

Notes:
[a]Individuals who report working >1 hour/week and receiving a wage or payment for their work.
[b]The total number of hours reported has been restricted to 24 hours to adjust for measurement error in reporting simultaneous tasks.
[c]Averages are weighted by expansion factors to be nationally representative.
Source: ENCOVI (2000).

on average approximately four more years of formal education. In both urban and rural areas, women workers tend to have completed slightly more years of formal education than men. It is also clear that women earn less per hour than men. In general, women earn from 80 to 95 percent of the male hourly wage – but this may overestimate earnings of own-account workers, who seldom report net earnings. Another measure in the table is total household income per hour. This figure represents the total income earned and received through transfers in the household divided by total female or total male hours in the sum of productive and reproductive work. This is a figure that represents the contribution of productive and reproductive work undertaken by men or women to generating household income. There are few differences between the paid hours worked in rural and urban areas for each gender; however, men clearly report working longer paid hours and fewer unpaid hours than women. This measure reveals that total household income per hour for women is 48 percent of the same total for men in urban areas and 45 percent of the total for men in rural areas. This income measure reflects that a woman's time dedicated to the sum of paid and unpaid work exceeds that of men's on average by approximately 1 hour per day if they are economically active and 2 hours per day it they are not economically active.

Figure 1 provides a graph of the amount of time dedicated to paid work and unpaid work in the household. It is clear that women work more hours in the sum of paid and unpaid work when compared to men. Men

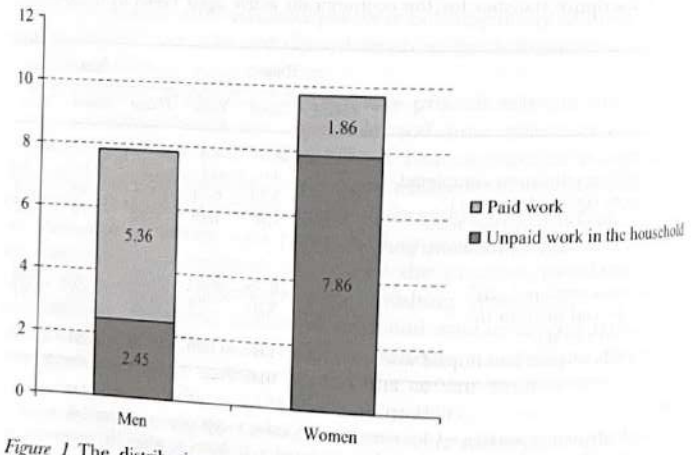

Figure 1 The distribution of paid work and unpaid work in the household in Guatemala in 2000 (men and women aged 12–65)
Source: ENCOVI (2000).

undertake more work for pay and less unpaid work in the household, while the opposite holds for women. On average, women work approximately 2 hours more per day in the sum of paid and unpaid work.

Table 3 reports the results of the Heckman regression to control for selectivity bias. The results confirm that hourly wages for women and men increase with each year of formal education completed. We estimate the following wage equation:

$$w = \beta_0 + \beta_1 Age + \beta_2 (Age)^2 + \beta_3 Education + Rural + u_1$$

and we assume that the wage is observed if:

$$\gamma_0 + \gamma_1 Income + \gamma_3 Married + \gamma_4 Child0-3 + \gamma_5 Child4-7 + \gamma_6 Indiv\_65 + \gamma_7 Dom + \gamma_8 Age + \gamma_9 (Age)^2 + \lambda_{10} Education + u_2 > 0$$

where w is the hourly wage; *Education* is the highest level of formal education completed; *Rural* is a (0,1) dummy variable for whether the household is located in a rural area; *Married* is a (0,1) dummy variable for whether the individual is married or living in a couple; *Child*0–3 indicates the number of children in the household between 0 and 3 years of age; and *Child*4–7 reports the number of children in the household between 4 and 7 years of age. *Indiv_65* is the number of individuals over 65 years of age and *Dom* is a (0,1) dummy variable that captures whether the household hires in domestic workers.

The results for the wage equation are interpreted as though we observed wage data for all men and women in the sample; the coefficients on age and education level represent the estimated marginal effects of the regressors in the underlying participation equation. The results confirm that hourly earnings for women and men increase with each year of formal education completed. A rural–urban gap in wages is clearly visible: men and women living in rural areas earn less than their counterparts in urban areas. The results of the regression to correct for selectivity bias underscore that married women or women in unions are less likely to participate in the labor market when compared with men in these groups. The presence of children in the household between the ages of 0 and 3 reduces the probability that a woman works and increases the probability that a man is working. Women and men older than 65 years of age are less likely to undertake paid work. The presence of domestic workers in a household increases female participation and reduces male participation in the labor market. This result reflects both income and substitution effects. Domestic workers substitute more directly for the work of women in the household, and the increased income earned by women working outside the household allows male earners to reduce the amount of hours dedicated to paid work.

Table 3 Wage equations for men and women aged 12–65 in Guatemala, 2000 (Heckman corrections, standard errors)

Variables	*Means (s.d.)*	*Women* (1)	*Women* (2)	*Women* (3)	*Men* (1)	*Men* (2)	*Men* (3)
Hourly Wage Equation							
Age	29.87	0.055***	0.265***	0.255***	0.050***	0.172*	0.454
	(14.17)	(0.010)	(0.056)	(0.060)	(0.011)	(0.098)	(0.117)
(Age^2)		–	-0.003***	-0.003***	–	-0.002	-0.005***
			(0.001)	(0.001)		(0.001)	(0.001)
Level of education completed	2.80	2.130***	2.032***	2.047***	2.449***	2.415***	2.536***
	(1.23)	(0.116)	(0.106)	(0.116)	(0.098)	(0.104)	(0.134)
Rural	0.54	-1.200***	-1.045***	-0.963***	-3.096***	-3.056***	-2.271***
	(0.50)	(0.305)	(0.276)	(0.296)	(0.259)	(0.290)	(0.368)
Constant		-2.358**	-4.808***	-4.409***	-1.466	-3.124	-9.248
		(1.207)	(1.371)	(1.489)	(0.719)	(1.951)	(2.273)
Selection Regression							
Log household income (subtracting individual income)	7.01	–	–	0.014	–	–	-0.086***
	(1.36)			(0.010)			(0.015)
Married/partnered	0.54	-0.333***	-0.624***	-0.599***	0.888***	0.445***	0.406***
	(0.50)	(0.027)	(0.031)	(0.033)	(0.047)	(0.054)	(0.064)
Number of children aged 0–3	0.70	-0.054***	-0.062***	-0.062***	0.080***	0.070***	0.064***
	(0.86)	(0.015)	(0.015)	(0.016)	(0.021)	(0.022)	(0.024)
Number of children aged 4–7	0.50	0.075***	0.036**	0.043***	0.029	0.039	0.058*
	(0.69)	(0.018)	(0.019)	(0.019)	(0.026)	(0.027)	(0.030)
Number of individuals over 65	0.15	-0.066**	-0.080***	-0.074***	-0.015	-0.117***	-0.120***
	(0.42)	(0.028)	(0.029)	(0.029)	(0.037)	(0.038)	(0.040)
Whether the household has domestic workers	0.01	0.650***	0.633***	0.686***	-0.183	-0.131	-0.031
	(0.12)	(0.097)	(0.098)	(0.103)	(0.135)	(0.140)	(0.147)
Age		0.017***	0.132***	0.128***	0.018***	0.192***	0.201***
		(0.001)	(0.005)	(0.006)	(0.002)	(0.007)	(0.008)

(continued)

Table 3 (Continued)

Variables	*Means (s.d.)*	*Women* (1)	*Women* (2)	*Women* (3)	*Men* (1)	*Men* (2)	*Men* (3)
(Age^2)		–	-0.002***	-0.002***	–	-0.002***	-0.003***
			(0.000)	(0.000)		(0.000)	(0.000)
Level of education completed		0.109***	0.087***	0.092***	-0.025***	-0.108***	-0.108***
		(0.011)	(0.011)	(0.012)	(0.016)	(0.017)	(0.019)
Rural		-0.255***	-0.230***	-0.214***	0.420***	0.465***	0.447***
		(0.026)	(0.027)	(0.028)	(0.034)	(0.035)	(0.039)
Constant		-0.690***	-2.142***	-2.221***	-0.082***	-2.040***	-1.528***
		(0.056)	(0.087)	(0.114)	(0.073)	(0.110)	(0.155)
Inverse Mills		-1.369	-1.854***	-2.243***	-3.389***	-3.852***	-0.882*
		(0.884)	(0.575)	(0.666)	(0.763)	(1.231)	(1.372)
Wald Chi^2		892.46	1,853.79	1,153.54	123.72	2,004.23	1,587.97
N		11,721	11,721	10,908	10,804	10,804	8,187
N subsample		6,834	6,834	6,453	1,914	1,914	1,797

Notes: ***, **, and * indicate significance at 10, 5, and 1 percent level, respectively.
Source: Author's estimates using ENCOVI (2000).

Table 4 Aggregate estimates of the value of unpaid work in the household in Guatemala, 2000[a,b]

	Opportunity cost (average current wages)	*Opportunity cost (Heckman corrections)*	*Replacement cost*	*Service cost*
Total (millions of US$)	4,951.6	6,234.2	5,350.8	6,597.4
Men	1,521.2	1,788.9	1,504.3	1,910.9
Women	3,430.4	4,445.3	3,846.5	4,686.5
Total[c] (percentage of GDP)	25.7	32.4	27.8	34.2
Men	7.9	9.3	7.8	9.9
Women	17.8	23.1	20.0	24.3

Notes:
[a]The total number of hours has been restricted to 24 to adjust for measurement error in simultaneous tasks.
[b]Men and women between 12 and 65 years of age.
[c]GDP was estimated using 2001 GDP and deflating to 2000 prices to correct for changes in the methodology used to calculate the national accounts in 2001.
Source: ENCOVI (2000).

Table 4 summarizes the estimates of the value of unpaid work, for men and women in Guatemala, expressed in US dollars for 2000. The opportunity cost of unpaid work is measured using the Heckman corrections and average wages. The replacement cost is estimated using the wage rate for a domestic worker of the same gender in either a rural or urban location. The service cost or specialization wage breaks the activities down into discrete services that can be contracted in the labor market such as childcare, cooking, cleaning, household maintenance, etc.[10] The hourly wage rates from these activities were estimated using data from the 2006 household survey, which reports 2-digit Standard Occupation Codes. The service costs were weighted according to the proportion of time declared for each activity where the total number of hours was restricted to 24.

The estimates reported in Table 4 converge on the same order of magnitude: between 26 and 34 percent of 2000 GDP. Between 69 and 72 percent of the value attributed to unpaid work in the household is generated by women, revealing a pronounced gender division of labor and segmentation of activities within the household. It is notable that the opportunity cost estimated using the Heckman corrections and the service cost coincide. The opportunity cost calculated using current wages and those calculated using the Heckman corrections represent the floor and ceiling of these valuations. Current wages represent the realized returns available in a labor market that is highly segmented by sex, ethnicity, and locality, in which the levels of formal education reflect previous investments in the educational system and are lower than levels of education attributed to younger individuals who may not currently be working.[11] The Heckman estimates attribute wages to hours worked for a reserve of potential workers

with higher levels of formal education, many of whom are still in school or not currently working. As a result, the wage distribution generated by the Heckman regressions provides estimates for the lower tails of the distribution that are lower than wages currently observed in the market for those with few or no years of formal education. It is important to note that the fact that caring activities and simultaneous tasks are not measured accurately in the Guatemala survey means that it is likely that these estimates are biased downwards and that the "true" value of unpaid household work is likely to be greater than the range of estimates presented in Table 4.[12]

These values for unpaid work in the household in Guatemala are consistent with estimates by other authors for countries in the region. For example, Maria Eugenia Gómez Luna (2002) values unpaid work within the household in 1996 in Mexico using an opportunity cost approach. Gómez Luna finds that the value of unpaid work within the household is approximately 22.6 percent of GDP. Pedrero Nieto (2005) conducts a similar exercise using a service cost approach, finding that the value of unpaid household work in 2002 in Mexico is approximately 21.6 percent of GDP – a value that exceeds the GDP generated in retail, restaurants, and hotels, as well as manufacturing. Aguilar and Espinosa (2004) use the household survey data in Nicaragua for 1998 to estimate the value of reproductive work at current wages using an opportunity cost approach, and find that it is approximately 30 percent of GDP.

GENDER, TIME, AND INCOME POVERTY

This section develops an analysis of time and income poverty in Guatemala. As Bardasi and Wodon (2006, 2010) observe, establishing a time poverty line can be quite arbitrary. The literature on income and consumption poverty contains some fundamental guidelines about the lack of income and consumption that translate into the lack of adequate nutrition or the inability to purchase a basket of basic goods deemed essential for survival. Yet it is important to note that these lines are typically based on the potential for each individual to achieve the array of goods required for survival without actually determining whether they are in fact acquired by each individual. When we refer to time poverty, the arguments that motivate poverty or insufficiency are even less clear, especially if we consider the importance of time allocated to recreation and rest above that considered strictly necessary from a health perspective.

As a result, Bardasi and Wodon (2006, 2010) choose a relative line that depends on the social, cultural, and economic context of the country in which the analysis is being conducted. In these articles, the authors use time poverty lines that correspond to 1.5 or 2 times the median for the sum of total hours worked. In this example, we use a line of 12 hours per day

dedicated to the sum of reproductive and productive work. This line corresponds to a little more than 1.5 times the median and falls within the range of the number of hours that Bardasi and Wodon (2006) suggest.

Figure 2 reveals how time poverty varies by certain characteristics. Men are less likely to experience time poverty than women: slightly fewer than 15 percent of men experience time poverty, compared with almost 33 percent of women. Individuals who report speaking an indigenous language at home are slightly more likely to experience time poverty than those who report speaking a nonindigenous language at home. Interestingly, urban populations are more likely to experience time poverty than rural populations – reflecting the challenges of survival in urban contexts in developing countries and perhaps the expectations for achieving the type of lifestyle and income sufficiency that living in an urban context implies. This result may also reflect that gender roles and responsibilities are shifting in urban contexts as more women enter paid work. Unfortunately, although women's paid work increases, their unpaid work does not appear to be reduced equivalently; this contributes to greater time burdens, particularly for those households in lower income quintiles. Interestingly, even though women work far fewer hours in paid employment in rural areas and specialize disproportionately in unpaid work, men also report a higher number of hours in unpaid work in rural areas. The higher number of men's hours in unpaid work in the household is also likely to indicate household survival strategies that require greater inputs of unpaid household labor to secure well-being.

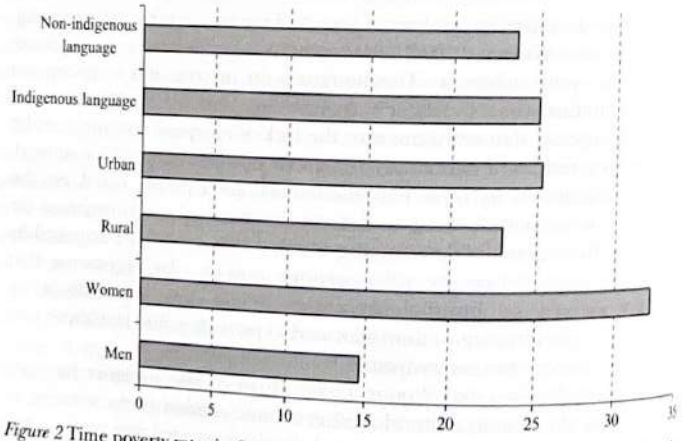

Figure 2 Time poverty rates in Guatemala, 2000 (percentages reflect portion of each group affected)
Source: ENCOVI (2000).

Figure 3 graphs the distribution of time poverty by household income quintile, revealing that even though there are individuals in all the income quintiles who work more than 12 hours a day, time poverty is slightly greater for women in the lower income quintiles. The opposite is true for men – indicating that as income rises, men are more likely to report working more than 12 hours per day. The figure also reveals that more women than men in each income quintile report working a total number of hours in excess of the time poverty line.

Table 5 reports the Foster-Greer-Thorbecke measures for time poverty for individuals aged 12–65 years. It is clear that the headcount measure of time poverty is greatest among urban residents and for women; similarly, the poverty gap and poverty gap squared also reveal that time poverty is more severe for women and urban residents. There is no greater propensity to time poverty among the income poor or extremely income poor, indicating that being time poor does not necessarily coincide with being resource poor in other dimensions.

As Bardasi and Wodon (2006, 2010) underscore, there are trade-offs between generating income and experiencing time poverty. For the wealthy, the decision to experience time poverty may be considered elective, since they could sacrifice income and not experience time poverty. The income or consumption poor who are also time poor do not face a similar choice: they are constrained in both time and economic resources,

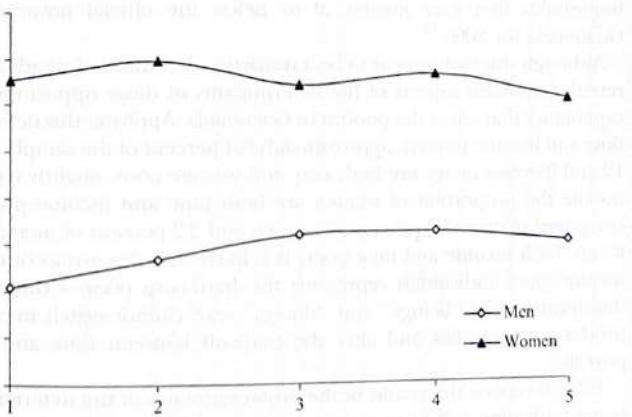

Figure 3 Distribution of time poverty in Guatemala by income quintile (percentage of men and women affected in each quintile)
Notes: Men and women aged 12–65. Quintile 1 is the lowest income quintile and quintile 5 is the highest income quintile.
Source: ENCOVI (2000).

Table 5 Foster–Greer–Thorbecke indices of time poverty in Guatemala (men and women aged 12–65)

	FGT(0)	*FGT(1)*	*FGT(2)*
Nationally	23.56	4.46	1.49
Men	13.85	2.36	0.91
Women	32.38	6.37	2.01
Urban	25.25	4.92	1.63
Rural	22.36	4.13	1.38
Not income-poor	23.84	4.60	1.57
Income-poor	23.29	4.33	1.41
Extremely income-poor	23.83	4.45	1.48

Notes: FGT(0): headcount ratio (i.e. proportion who are poor); FGT(1): average normalized poverty gap; FGT(2): average squared normalized poverty gap.

Applies official poverty lines of 363.92 Quetzales per person per month in rural areas, 489.23 Quetzales per person per month in urban areas, and 605.40 Quetzales per person per month in metropolitan Guatemala City.

Source: ENCOVI (2000).

and reducing their time poverty is likely to increase their income or consumption poverty or that of their household.

What follows is an analysis of the determinants of both time and income poverty in Guatemala using a probit estimation. Applying the intersection approach (Sabina Alkire and James Foster 2007), I define as being particularly disadvantaged those individuals who are time poor and live in households that have income at or below the official poverty line in Guatemala for 2000.[13]

Although this may appear to be a restrictive definition of disadvantage, it reveals important aspects of the determinants of those opportunities and capabilities that affect the poorest in Guatemala. Applying this definition of time and income poverty, approximately 5.4 percent of the sample between 12 and 65 years of age are both time and income poor. Slightly more than double the proportion of women are both time and income poor when compared to men: 7.4 percent of women and 3.2 percent of men aged 12–65 are both income and time poor. It is likely that this group of time and income poor individuals represents the hard-core poor – those acutely disadvantaged in "beings" and "doings" who cannot switch into higher-productivity activities and alter the trade-off between time and income poverty.

Table 6 reports the results of the probit estimates of the determinants of being both time and income poor in the sample. It is clear that time and income poverty increases with age, but at a decreasing rate. An individual with more years of formal education is slightly less likely to be income and time poor. Being married or partnered increases time and income poverty by 3.2 percent for men and 4.0 percent for women. The number of

Table 6 Determinants of time and income poverty in Guatemala, 2000[a] (standard errors)

	Time and Income Poverty		
	Men	*Women*	*Total*
Variables[a]			
	dF/dx	dF/dx	dF/dx
Age	0.004*** (0.001)	0.020*** (0.001)	0.011*** (0.001)
(Age^2)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Level of education completed	-0.005*** (0.002)	-0.021*** (0.003)	-0.014*** (0.002)
Married/partnered	0.032*** (0.007)	0.040*** (0.008)	0.033*** (0.005)
Woman (#)	–	–	0.084*** (0.004)
Number of children aged 0–3	0.011*** (0.002)	0.051*** (0.004)	0.029*** (0.002)
Number of children aged 4–7	0.012*** (0.003)	0.039*** (0.004)	0.026*** (0.002)
Number of individuals aged >65	-0.004 (0.006)	-0.013*** (0.008)	-0.009** (0.004)
Number of people of working age without employment	-0.027 (0.014)	0.004 (0.019)	-0.011 (0.011)
Number of people of working age earning an income	-0.003** (0.001)	-0.016*** (0.002)	-0.009*** (0.001)
Whether the household is connected to piped water (#)	-0.009# (0.005)	-0.016** (0.008)	-0.012*** (0.004)
Whether the household has an electric or gas stove (#)	-0.024 (0.005)	-0.074*** (0.008)	-0.046*** (0.005)
Whether the household uses fuel-wood (#)	0.033*** (0.005)	0.078*** (0.008)	0.052*** (0.005)
Whether the household is connected to the electric grid (#)	-0.004 (0.005)	-0.018*** (0.008)	-0.010*** (0.005)
Whether the individual speaks an indigenous language at home	-0.003 (0.004)	0.007 (0.007)	0.001 (0.004)
Whether the household is in a rural area	-0.023*** (0.005)	-0.035*** (0.008)	-0.028*** (0.004)
Chi^2	406.45	1775.24	2710.89
Pseudo R^2	0.0807	0.1668	0.1661
Observed probability (in sample)	0.062	0.169	0.1175
Predicted probability (at x-bar)	0.048	0.124	0.079

Notes:

**significant at 5 percent, ***significant at 1 percent.

(#) dF/dx is for a discrete change of the dummy variable from 0 to 1

z and P>|z| correspond to the test of the underlying coefficient being

[a]For individuals aged 12–65.

[b]The variable "whether the household hires domestic labor" was dropped as the absence of domestic workers in the household perfectly predicted time and income poverty.

Source: Author's estimates using Encuesta Nacional sobre Condiciones de Vida data (ENCOVI 2000).

children under age 7 increases income and time poverty for both men and women – but the probability that women will experience income and time poverty in this situation is twice that of men's. The regression reveals the extent to which having members of the household over 65 years of age, or individuals who are of working age but not employed, can substitute for time use in unpaid household work, reducing the probability of being time and income poor.

The regression also explores the impact of small infrastructure on time and income poverty. Being connected to piped-in water and to the electric grid, and having an electric or gas stove, reduces the probability of being both time and income poor. Using fuel-wood, which household members typically collect and carry home themselves and use in open fires that need to be carefully tended, increases the probability of being time and income poor. Finally, reflecting the descriptive statistics, being in a rural area reduces the probability of being both time and income poor. This mirrors the findings on time poverty that demonstrate that households in urban areas are slightly more likely to experience time poverty than households in rural areas.

IMPLICATIONS FOR THE DESIGN OF ANTIPOVERTY PROGRAMS

The findings in this study on the value of unpaid work in the household and the analysis of time poverty are relevant for the identification of the poor and the design of antipoverty programs. The previous section concluded that 32 percent of women in Guatemala were time poor in 2000, according to the definition of time poverty used here. Almost 17 percent of women were both time and income poor.

As noted earlier, Guatemala, following the example of similar programs initiated by governments in the region, recently instituted a conditional cash transfer program called *Mi Familia Progresa* in April 2008. The *Mi Familia* program is targeted to municipalities in Guatemala with high rates of extreme poverty and is proxy means tested using a questionnaire that identifies the most needy households on the basis of housing materials, access to electricity, sanitation, and potable water, as well as by the number of children and infants in the household. Beneficiary households receive a monthly lump sum of 150 Quetzales (US$ 18.40) on the condition that children aged 6 to 15 remain in school with no more than 20 percent of school time reported in absences in each month. Additionally, households with children aged 0 to 6 or with pregnant women receive another lump sum of 150 Quetzales on the condition that the children attend regular healthcare and nutrition check-ups. All households sign an agreement with the

authorities that administer the program to ensure that these "co-responsibilities" are undertaken. There are also training and capacity-building events for recipient households to increase mother's knowledge of health and nutrition requirements of children. Money is transferred directly to mothers through the BANRURAL, a rural financial institution. In 2010, about 480,000 households receive *Mi Familia* benefits.

A simple analysis of averages demonstrates that the transfers to secure behavioral changes under such a program may be less than the average value of the unpaid household work displaced and reallocated. If, as Skoufias and Parker (2001) find in their study of a similar conditional cash transfer program in Mexico, the participation of boys and girls in paid and unpaid work is significantly reduced, then the adult labor reallocated to compensate for this reduction in child labor is not trivial – even if we assume that adult labor is more productive and efficient in both paid and unpaid tasks than child labor. If children reduce time in unpaid work by about 10–15 percent (an estimate in line with Skoufias and Parker [2001] and Parker and Skoufias [2000] in their studies of the impact of the Mexican conditional cash transfer program *Progresa/Oportunidades*), then this would correspond to about 3.33 hours per week in unpaid household work per child. If approximately three children in a household with an average number of 4.6 children attend school between the ages of 6 and 15, the amount of unpaid work previously undertaken by these children in a week corresponds to a little less than 10 hours. Let us assume that an adult taking on these additional tasks is more efficient than a child or a teenager. If total adult time increased by a little over an hour a day, or 8 hours per week in additional household tasks and co-responsibilities, then under two of the valuations of time spent in unpaid household work (the Heckman and Service Cost valuations) a transfer of 300 Quetzales would not exceed the value of time reallocated as a result of the program.[14] Applying hourly values for time in unpaid work from the other two scenarios (Current Wages and Replacement Costs), the transfer of 300 Quetzales exceeds the monthly value of time reallocated by between 53 and 42 Quetzales (US$ 5.16–6.55 per month).

For the portion of the sample that is both time and income poor, however, even small increases of time spent in unpaid work may greatly affect individual and household well-being, reducing leisure and rest and potentially affecting the quality of home production. A careful analysis of the time-use impact of these transfers should be included in the program evaluation, and the findings should affect the design of the transfer – particularly any additional income support or subsidies – to reduce the implicit "cost" of benefit receipt. Moreover, these simple calculations highlight that efforts should be made to reduce the gender incidence of these costs and to question the underlying assumption that women's time is more fungible than men's and that the timing and sequencing of their tasks

as well as their overall time burdens can be influenced without affecting their welfare or that of their family members.

Although time-use surveys are being undertaken in a number of Latin American countries, they are infrequently used for public and social policy design and evaluation, and their analysis has been largely confined to academic circles and used for descriptive purposes. In particular, there have been few attempts to use time-use surveys to expand or augment existing measures of poverty, to understand household survival strategies, or to evaluate the efficacy of income and conditional cash transfer programs. This oversight is glaring in a continent where income and consumption inequality are high, where home production is particularly important to household well-being, and where time use and time poverty may be unequally distributed and experienced by men and women.

IMPLICATIONS FOR DATA COLLECTION AND MEASUREMENT

The data collection methodology for the time-use module was undertaken with the explicit goal of collecting time-use data at low cost. As a result, sampling for activities undertaken on the previous day increased the likelihood of missing key activities. Expanding the frame of reference to an entire week might be particularly helpful. Another potentially useful innovation would be to develop pictorial diaries that allow individuals to record data on their time use contemporaneously. Since formal levels of education are low and illiteracy rates are high, these diaries should be pilot-tested to make sure that illiterate populations understand and can use them well. Finally, the poorly recorded nature of simultaneous tasks calls for a better approach to measuring and recording such activities. One approach would be to develop a series of weights derived from focus groups on multitasking and from direct observation to supplement the survey data. In this way, weights could be applied to simultaneous activities to reflect the relative importance and productivity of these tasks when total time use is fixed at 24 hours a day.

CONCLUSIONS AND RECOMMENDATIONS

The estimates of the value of unpaid work in the household supplied by men and women for Guatemala underscore that it corresponds to a substantial share of the GDP. Applying the different approaches described here, that value sums to between 26 and 34 percent of GDP in 2000. The estimates also reveal a sharp gender segmentation in time and task allocation within and beyond the household, where women

generate approximately 70 percent of the total value of unpaid household work.

It is obvious that the time burdens associated with unpaid household labor in Guatemala are related to the type of household, its location, and the availability of resources to substitute for household labor. Poorer, rural subsistence households report much greater time spent on unpaid household labor but less time spent in employed or waged work than urban households.

The analysis of the intersection of time and income poverty highlights that women aged 12–65 are much more likely to experience both time and income poverty than men. Furthermore, women with young children, whose time is disproportionately spent in childcare and household reproduction, are more likely to experience time and income poverty – a finding that should be taken into careful consideration when designing social programs and interventions, such as the conditional cash transfer programs, that require parallel time inputs from poor households.

The probit analysis of the determinants of income and time poverty reveals that infrastructure and appliances that can substitute for human labor can substantially reduce time burdens for women, most likely by improving their efficiency in performing household tasks. Given these findings, it is interesting to consider why social policy and programs tend not to focus on improving the efficiency and productivity of household tasks with a goal to reducing time burdens or redistributing household tasks more equitably. The "black box" of household production and consumption continues to be largely closed. Time-use surveys have the potential to unlock that black box and shed light on the gender division of labor within, as well as beyond, the household. They should be seen not as instruments that are applicable only in developed countries, but as evaluative tools that can be deployed and used to interrogate social and economic policy worldwide.

Sarah Gammage
International Labour Organisation
Avenida Dag Hammarskjöld 3177, Vitacura, Santiago, Chile
e-mail: gammage@oitchile.cl

ACKNOWLEDGMENTS

I would like to thank Lourdes Colinas, Marzia Fontana, Matthew Hammill, Juan Carlos Moreno-Brid, Juan Luís Ordaz, Monica Orozco, Mercedes Pedrero Nieto, Indira Romero, Lina Salazar, Imraan Valodia, and Marceline White for their valuable comments on earlier versions of this study.

NOTES

[1] These countries include Argentina, Bolivia, Brazil, Chile, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Mexico, Nicaragua, Panama, Uruguay, and Venezuela.

[2] These estimates were calculated for seventeen countries in Latin America and weighted by the working age population (CEPAL 2007).

[3] Own estimates based on data from CEPAL (2007).

[4] These data are from national household surveys in the region.

[5] These data summarize the situation in fifteen countries in Latin America and express the hourly gender wage gap; see Milosavljevic (2007).

[6] Programs like *Oportunidades* in Mexico, *Red Solidaria* in El Salvador, *Bolsa Familia* in Brazil, *Familias en Acción* in Colombia, and PATH in Jamaica exemplify conditional cash transfer programs that require inputs of time from beneficiary families.

[7] For further information, see ENCOVI 2000.

[8] Not including community labor may substantially underestimate the time spent in unpaid work, particularly in indigenous communities where communal labor is particularly important. This category of unpaid work was excluded from the analysis undertaken for this study because the labor was not undertaken in the household for the direct benefit of household members.

[9] Reservation wages are the minimum wages for which a person currently outside the labor market would accept a job and enter the labor market.

[10] I used the following industries and sectors to provide a close approximation of the labor services provided in the household: hotel and restaurant services; education, social, and healthcare services; agriculture; clothing manufacture; construction; community, social, and personal services; and private household services. Additionally, I used a variety of occupation codes to identify workers with few or no qualifications, using the number of years of schooling reported in the questionnaire.

[11] Returns to schooling captures the economic return for each year of formal education completed reported in the household survey.

[12] Other studies noted similar results: Andres Zamudio [1995]; James Heckman and Xuesong Li [2004]; Juan Luis Ordaz [2007].

[13] The intersection approach counts as poor only those who meet the criteria for poverty in each of the different dimensions. This differs from the union approach, in which an individual is considered poor if he or she is poor in at least one of the multiple dimensions considered. In this case, we are looking at only two dimensions of poverty: income and time (see Alkire and Foster [2007]). The income poverty line applied here monetizes a basic basket of consumption items for urban and rural areas.

[14] All values are expressed in 2009 prices.

REFERENCES

Aguilar, Mercedes and Isolda Espinosa. 2004. *El uso del tiempo de los y las nicaraguenses* [Time use of Nicaraguans]. Managua, Instituto Nacional de Estadística y Censos (INEC), Programa para el Mejoramiento de las Encuestas y la Medición de las Condiciones de Vida en America Latina y el Caribe (MECOVI). http://www.inide.gob.ni/Pobreza/publicacion/usodeltiempo.pdf (accessed June 2010).

Alkire, Sabina and James Foster. 2007. Counting and Multidimensional Poverty Measurement. Working Paper 7, Oxford Poverty and Human Development Initiative Working Paper Series, University of Oxford, UK.

Arriagada, Irma and Charlotte Mathivet. 2007. Los programas de alivio a la pobreza Puente y Oportunidades. Una mirada desde los actores [Poverty alleviation programs Puente and Oportunidades]. Social Policy Series, 134 *(LC/L.2740PIE)*, Santiago de Chile, Comisión Económica para América Latina y el Caribe (CEPAL).

Bardasi, Elena and Quentin Wodon. 2006. "Measuring Time Poverty and Analyzing its Determinants: Concepts and Application to Guinea." *Economics Bulletin* 10(10): 1–7.

———. 2010. "Working Long Hours Without Choice: Time Poverty in Guinea." *Feminist Economics* 16(3): 45–78.

Becker, Gary. 1965. "A Theory of Allocation of Time." *Economic Journal* 75(299): 493–517.

Behrman, Jere R., Susan W. Parker, and Petra E. Todd. 2005. Long-Term Impacts of the Oportunidades Conditional Cash Transfer Program on Rural Youth in Mexico. Discussion Paper 122, Ibero-America Institute for Economic Research, Georg-August-Universität, Göttingen, Germany.

Bittman, Michael. 2004a. "Parenting and Employment: What Time-Use Surveys Show," in Nancy Folbre and Michael Bittman, eds. *Family Time: The Social Organization of Care*, pp. 152–70. New York: Routledge.

———. 2004b. "Parenthood without Penalty: Time-Use and Public Policy in Australia and Finland," in Nancy Folbre and Michael Bittman, eds. *Family Time: The Social Organization of Care*. pp. 224–39. New York: Routledge.

Bittman, Michael and Nancy Folbre. 2004. "Introduction," in Nancy Folbre and Michael Bittman, eds. *Family Time: The Social Organization of Care*, pp. 1–4. New York: Routledge.

Bittman, Michael and George Matheson. 1996. All Else Confusion: What Time Use Surveys Show about Changes in Gender Equity. Social Policy Research Centre Discussion Paper Series, University of New South Wales, Australia.

Blackden, Mark C. and Quentin Wodon, eds. 2006. Gender, Time Use and Poverty in Sub-Saharan Africa. World Bank Working Paper 73. Washington DC: World Bank.

Blau, Francine and Lawrence Kahn. 2005. Changes in the Labor Supply Behavior of Married Women 1980–2000. National Bureau of Economic Research (NBER) Working Paper 11230. Cambridge, MA: National Bureau of Economic Research.

Burchardt, Tania. 2008. Time and Income Poverty. CASE Report 57, Centre for Analysis of Social Exclusion, London School of Economics and Political Science, UK.

Charmes, Jacques. 2006. "A Review of Empirical Evidence on Time Use in Africa from UN-sponsored Surveys" in Mark Blackden and Quentin Wodon, eds. *Gender, Time Use, and Poverty in Sub-Saharan Africa*, pp. 39–72. World Bank Working Paper 73, World Bank, Washington, DC.

Cogan, John F. 1981. "Fixed Costs and Labor Supply." *Econometrica* 49(4): 945–63.

Colinas, Lourdes. 2008. Economía productiva y reproductiva en México: un llamado a la conciliación [The Productive and Reproductive Economy in Mexico: A Call for Reconciliation]. Serie Estudios y Perspectivas, 94. Mexico City: Comisión Económica para América Latina y El Caribe.

Comisión Económica para América Latina y el Caribe (CEPAL). 2007. El aporte de la mujer a la igualdad en America Latina [Women's Contribution to Equality in Latin America]. Working Paper, 10th Regional Conference on Women in Latin America and the Caribbean, Gender Unit. Santiago de Chile: Comisión Económica para América Latina y El Caribe.

———. 2009. *Panorama Social de America Latina, 2008* [Social Panorama for Latin America, 2008]. Santiago: Comisión Económica para América Latina y el Caribe.

Cörvers, Frank and Bart, Golsteyn. 2003. Changes in Women's Willingness to Work in a Tightening Labour Market: The Impact of Preferences, Wages and Individual Characteristics. Research Centre for Education and the Labour Market, Faculty of Economics and Business Administration, Maastricht University, Maastricht, The Netherlands.

Damián, Araceli. 2005. "La pobreza de tiempo en México: Conceptos, métodos y situación actual" [Time Poverty in Mexico: Concepts, Methods and Current Situation]. Unpublished manuscript, Centro de Estudios Demográficos y de Desarrollo Urbano, Colegio de México, Mexico City.

Del Boca, Daniela, Marilena Locatelli, and Silvia Pasqua. 2000. "Employment Decisions of Married Women: Evidence and Explanations." *Labour* 14(1): 35–52.

Encuesta Nacional sobre Condiciones de Vida (ENCOVI) [National Living Conditions Survey] 2000, 2006. National Institute for Statistics, Guatemala. http://www.ine.gob.gt/ (accessed June 2010).

Fiszbein, Ariel and Norbert Schady. 2009. *Conditional Cash Transfers: Reducing Present and Future Poverty*. Washington, DC: World Bank.

Floro, Maria and Marjorie Miles. 1998. Time Use and Overlapping Activities: An Econometric Analysis. Department of Economics, American University, Washington, DC.

Goldin, Claudia. 1990. *Understanding the Gender Gap: An Economic History of American Women*. New York: Oxford University Press.

Gómez Luna, Maria Eugenia. 2002. Macroeconomía y trabajo no remunerado [Macroeconomy and Unremunerated Work]. Instituto Nacional de Estadística, Geografía e Informática (INEGI), Aguas Calientes, Mexico.

González de la Rocha, Mercedes Eugenia. 2006. Procesos domésticos y vulnerabilidad: Perspectivas antropológicas de los hogares con Oportunidades [Domestic Processes and Vulnerability: An Anthropological Perspective on Households with Oportunidades]. Mexico City: Centro de Investigaciones y Estudios Superiores de Antropología Social (CIESAS).

Heckman, James. 1974. "Shadow Prices, Market Wages, and Labor Supply." *Econometrica* 42(4): 679–94.

———. 1976. "The Common Structure of Statistical Models of Truncation, Sample Selection, and Limited Dependent Variables and a Simple Estimator for Such Models." *Annals of Economic and Social Measurement* 5(4): 475–592.

Heckman, James and Xuesong Li. 2004. "Selection Bias, Comparative Advantage and Heterogeneous Returns to Education: Evidence from China in 2000." *Pacific Economic Review* 9(3): 155–71.

Heckman, James J. and Thomas E. Macurdy. 1980. "A Life-Cycle Model of Female Labour Supply." *Review of Economic Studies* 47(1): 47–74.

Heckman, James J. and Robert J. Willis. 1977. "A Beta-Logistic Model for the Analysis of Sequential Labor Force Participation by Married Women." *Journal of Political Economy* 85(1): 27–58.

Himmelweit, Susan. 2002. "Making Visible the Hidden Economy: the Case for Gender-Impact Analysis of Economic Policy." *Feminist Economics* 8(1): 49–70.

Jackson, Cecile. 1996. "Rescuing Gender from the Poverty Trap." *World Development* 24(3): 489–504.

Katz, Elizabeth G. 1995. "Gender and Trade Within the Household: Observations from Rural Guatemala." *World Development* 23(2): 327–42.

Killingsworth, Mark R. and James Heckman. 1986. "Female Labor Supply: A Survey," in Orly Ashenfelter and Richard Layard, eds. *Handbook of Labor Economics*, vol. 1, pp. 103–204. Amsterdam. North-Holland.

Milosavljevic, Vivian. 2007. *Estadísticas para la equidad de genero, magnitudes y tendencias en America Latina* [Statistics for gender equity, magnitudes and trends in Latin America]. Santiago: Comisión Económica para América Latina y el Caribe.

Murphy, Martin. 1980. "Comparative Estimates of the Value of Household Work in the United States for 1976." *Review of Income and Wealth* 28(1): 29–43.

Ordaz, Juan Luis. 2007. *México: Capital humano e ingresos. Retornos a la educación 1994–2005* [Mexico: Human Capital and Income. Returns to Education 1994–2005]. Serie Estudios y Perspectivas, No. 90. Mexico City: Comisión Económica para América Latina y el Caribe.

Parker, Susan and Emmanuel Skoufias. 2000. *The Impact of PROGRESA on Work, Leisure and Time Allocation*. Washington, DC: International Food Policy Research Institute.

Pedrero Nieto, Mercedes. 2005. *Trabajo domestico no remunerado en México: Una estimacion de su valor económico a través de la Encuesta Nacional sobre Uso del Tiempo 2002* [Unremunerated Domestic Work in Mexico. An Estimation of Economic Value using the National Time Use Survey 2002]. Mexico City: Instituto Nacional de las Mujeres.

Schultz, T. Paul. 2004. "School Subsidies for the Poor: Evaluating the Mexican Progresa Poverty Program." *Journal of Development Economics* 74(1): 199–250.

Sen, Amartya. 1999. *Development as Freedom*. New York: Anchor Books.

Siaens, Corinne, K. Subbarao and Quentin Wodon. 2006. "Assessing the Welfare of Orphans in Rwanda: Poverty, Work, Schooling, and Health," in C. Mark Blackden and Quentin Wodon, eds. *Gender, Time Use and Poverty in Sub-Saharan Africa*, pp. 135–52. World Bank Working Paper 73. Washington, DC: World Bank.

Skoufias, Emmanuel. 2001. "PROGRESA and Its Impacts on the Human Capital and Welfare of Children and Adults in Rural Mexico: A Synthesis of the Results of an Evaluation by IFPRI." Washington, DC: International Food Policy Research Institute.

Skoufias, Emmanuel and Susan W. Parker. 2001. "Conditional Cash Transfers and their Impact on Child Work and Schooling: Evidence from the PROGRESA Program in Mexico." *Economía* 2(1): 46–86.

Vickery, Clair. 1977. "The Time-Poor: A New Look at Poverty." *Journal of Human Resources* 12(1): 27–48.

Yaqub, Shahin. 2008. "Capabilities over the Lifecourse: At What Age Does Poverty Damage Most?" in Flavio Comim, Mozaffar Qizilbash and Sabina Alkire, eds. *The Capability Approach: Concepts, Measures and Applications*, pp. 437–57. Cambridge, UK: Cambridge University Press.

Zamudio, Andres. 1995. "Rendimientos a la educación superior en Mexico: Ajuste por sesgo utilizando máxima verosimilitud" [Returns to Higher Education in Mexico: Adjusting for Bias using Maximum Likelihood]. *Economía Mexicana* 4(1): 69–91.

APPENDIX

Time-use Model for Guatemala

Individual utility U is a function of leisure, L, consumption goods and services, C, and a vector of individual attributes, X.

$$U = f(C, L, X) \tag{1}$$

This function is maximized subject to:

$$C = A + wH \tag{2}$$

and

$$T = H + L + R \tag{3}$$

Where A represents income from other sources; w, current wages earned by the individual in the labor market; and H, hours worked in the labor

market. T is the total number of hours available; L, the time dedicated to leisure; and R, the time dedicated to unpaid work in the household and in the community. Solving for the first order condition, we derive the following function:

$$H = (w, A, X) \tag{4}$$

which can be estimated in a semi-logarithmic form

$$H = \pi + \alpha Lnw + \beta A + \gamma X + \varepsilon \tag{5}$$

and a wage determination function:

$$w = \delta + \varphi X + \upsilon \tag{6}$$

A problem occurs when we attempt to estimate these functions. The sample is truncated. We observe only those individuals who are currently working and receiving a wage. The number of hours worked and the wages are zero for those who are unemployed or outside the labor market. But their labor would command a return should they be in the labor market. A wage determination or labor supply function will suffer from selection bias if it is estimated by OLS. Applying the procedure developed by Heckman, we can correct the estimates using the inverse Mills ratio,[1] as a variable in the labor supply equation. The inverse Mills ratio is calculated as a function of the probability that an individual is in the labor market using the entire sample. The excluded variables in the labor supply equation serve as instruments in the full-sample estimates as part of a two-stage least-squares estimation procedure:

$$w = f(X, Inv) \tag{7}$$

where X represents personal characteristics such as age, education level, gender, etc., and Inv is the inverse Mills ratio. This allows us to estimate the opportunity cost of unpaid work in the household. We assume that in equilibrium, the marginal value of an hour of reproductive work is equivalent to the marginal value of paid work.

NOTE

[1] The inverse Mills ratio corrects the β coefficients for omitted variable bias (Heckman 1976).