Time allocation, gender and norms: evidence from post-genocide Rwanda

Draft Paper

Kati Schindler

DIW Berlin
email: kschindler@diw.de

29 September 2008

Abstract

The aim of this paper is to analyze time allocation and its interrelatedness with gender and norms in the context of post-genocide Rwanda. The paper differentiates between domestic tasks and three income-generating activities and investigates the determinants of time allocation to these sectors across types of households and individuals. Originally combining different data sources, hypotheses on the impact of norms and gender are derived from qualitative data and tested with household survey data. Results suggest that norms on the gendered division of labor contribute to the higher incidence of poverty among female-headed households.

Keywords: time allocation, gender, norms, post-conflict, Rwanda

Acknowledgements

I am thankful to Christine Binzel, Carlos Bozzoli, Tilman Brück, Christophe Muller, and Enrica Chiappero-Martinetti for very helpful comments and to CARE Rwanda and AVEGA and particularly Jeannette Nduwamariya, Odette Kayirere, and Vincent Mutumwa for their invaluable support in carrying out qualitative fieldwork. The National Institute of Statistics of Rwanda provided access to the EICV2 dataset. Qualitative fieldwork was generously sponsored by a DAAD scholarship for short-term doctoral field research, which was conducted under permission no. MINISTR/001/2007. Lastly, I am indebted to my interview partners in Rwanda for their patience and willingness to discuss sensitive topics. All errors are mine.

I. Introduction

The aim of this paper is to analyze time allocation and its interrelatedness with gender and norms in a post-war context of a developing country. Even though more than a decade has passed since the 1994 genocide, the Rwandan society still bears the demographic impact of the conflict, which killed many more men than women. In the aftermath of the genocide, the share of female-headed households increased sharply. Many women became the major income-earner of their household and took over economic activities that were traditionally assigned to men. In this context, norms on the ideal division of labor across gender changed rapidly. The paper investigates in what way men and women engage in income-earning and domestic activities and how these in turn, have an impact on household well-being. Since time-diary data and household survey data from developing countries that include a time use component have only been available recently, this is a rather young field of research (Blackden & Wodon, 2006; Iyer, 2000).

The paper differentiates between domestic tasks and three income-generating activities (own-farm agriculture, non-agricultural self-employment, and agricultural wage work). These sectors provide different returns and are associated with different attributes regarding social status, of which agricultural wage work is the least desirable.

Three research questions are addressed: First, how does time allocation on domestic tasks and income-generating activities differ across individuals and households? Second, what determines time allocation at the household-level, comparing widow-headed and male-headed households? And third, what determines time allocation of widows, wives, and husbands?

This paper contributes to the literature in two ways. First, it extends the framework of gender indicators and accounts for interrelations between different indicators. More specifically, the paper compares the impact of 1) gender of headship, 2) the regime of intra-household decision-making processes, 3) civil status. The unit of analysis is both the individual and the household, which provides a comprehensive analysis. Second, there is little evidence yet on the impact of gender and norms on time allocation in a post-conflict context. The paper originally combines different data sources: Qualitative data are used to construct hypotheses on the impact of norms on time allocation. These hypotheses are then tested using a nationally representative household survey from Rwanda.

The paper proceeds as follows. Section II discusses the demographic impact of the genocide. Section III outlines the research question and introduces qualitative and quantitative data. The

following section discusses the state of the art of the literature and discusses hypotheses. Section V explains the estimation approach. Empirical results are presented in section VI. The last section summarizes the main findings.

II. The demographic impact of the genocide

Rwanda has a long history of violent conflict that dates back to the colonial period.[1] Ethnically motivated violence against the Tutsi minority resulted in waves of migration into neighbouring countries after Rwanda's independence in 1962. The violence peaked in the 1994 genocide, when between April and July extremist political groups backed by the Hutu-government organized massacres against the Tutsi minority and, to a lesser degree, moderate Hutu intellectuals who were opposed to the regime under president Habyarimana. The human suffering caused by the genocide is inconceivable. This paper is concerned with the long term demographic impact of the genocide. The estimation of the death toll is a politically sensitive and debatable topic, ranging from more than 500,000 deaths (Desforges, 1999; Verwimp, 2004), 600,000-800,000 deaths (Verpoorten, 2005), 800,000 deaths (Ministry of Youth, Culture and Sport, 1996 cited in Davenport & Stam, undated), 800,000-850,000 deaths (Prunier, 1999), and 935,000 deaths (Republic of Rwanda, 2002). Most of these individuals were killed in one-sided violence, while a smaller number of individuals died in combat between the Rwandan Government Forces and the rebel army, which eventually stopped the genocidal regime.

The genocide had a different impact on men and women. Qualitative accounts of the massacres report that women and children were not targeted in many communities at least until mid-May 1994, as "in the past Rwandans had not usually killed women in conflicts" (Desforges, 1999: 227). Furthermore, Rwandan society is organized along the patriliny – ethnicity and family affiliation are passed on to children through the male line. Following this line of argument, Tutsi men were the primary targets of the perpetrators, at least during the early phase of the genocide. Only a few of the studies that estimate the death toll differentiate deaths by sex. A detailed study of the province of Gikongoro, Verpoorten (2005) estimates that Tutsi women had an eight percentage points better chance of surviving compared to Tutsi men. Based on information gathered by the victims' neighbors, survivors and other locals, the Ministry for Local Government finds that "on the whole, the percentage of male victims (56.4 percent) is higher than

[1] For an analysis of the historical context leading to the genocide see Desforges, 1999, Doom and Gorus, 2000, Kimonyo, 2001 and 2001, Mamdani, 2001, Newbury and Newbury, 1999, Prunier, 1999 and the special issue on Rwanda of ISSUE, 1995.

the percentage of female victims (43.3 percent), except for the prefecture of Gisenyi…" (2002: 22).

In the aftermath of the genocide, sex ratios – the number of males per females – were severely unbalanced, there was a severe shortage of men. Some studies from the immediate post-genocide period estimate that in some communities, the female population accounted for as much as 80 percent of the local population (El-Bushra & Mukarubuga, 1995). Figure 1 indicates sex ratios derived from the 2002 census, which is the first demographic data available at a national level after the genocide. Given that the number of births fluctuates in the short term, the figure presents sex ratios for five-year birth cohorts. The sharp drop in the ratio of males to females in cohorts born before 1983 is likely to capture the effect of mass deaths, while the decrease in the ratio of cohorts born before 1948 seems to indicate an age effect due to the lower overall life expectancy of men. The countrywide sex ratio over all birth cohorts was 92 in 2002, while this number was as low as 84.2 in rural Kigali Ngali province.[2] Again, differentiating the sex ratios by birth cohort and province reveals that sex ratios were below 70 in rural areas of the provinces of Ruhengeri and Gisenyi.[3] Still, sex ratios derived from census data overestimate the number of men on the marriage market, as a large number of mostly male genocide perpetrators are jailed. Also, the 2002 census captures other effects that are difficult to disentangle from the impact of the genocide, such as waves of massive internal and external migration after 1994.

An immediate implication that follows from the unbalanced sex ratios is the differing chances of women to marry or remarry after being divorced or widowed (figure 2a and 2b).[4] In the distribution of marital status by birth cohort, three issues are of particular interest.[5] First, widowhood is a widespread phenomenon among women; in half of all birth cohorts, widows make up more than 40 percent of all women. In contrast, the proportion of widowed men is relatively low, even in the oldest birth cohorts. Second, women become widowed at a younger age than men. For example, the proportion of widows exceeds 30 percent in the 1970-74 female birth cohort but is less than five percent for men of the same cohort. Third, widowhood seems to be a permanent status for women, as the proportion of widows rises steadily with older birth cohorts, while the proportion of male widowers remains at a relatively stable level. This seems to

[2] Census data is only available at the provincial level.
[3] Own calculation based on Rwanda National Census Service, 2002.
[4] See section 4 for a description of the EICV2, which is the data source used in figure 2a and 2b. Overall, the EICV2 indicates similar trends in sex ratios as the 2002 census.
[5] The mean age at first marriages before the genocide was about 22.9 years for women (DHS 1991). Therefore, women born before 1970 may be considered as *conflict widow cohort* in Anderson and Silver's (1985) terminology, as they reached marriageable age before the genocide and are likely to be affected by widowhood.

indicate that men either remarry, potentially women of younger birth cohorts, or die once they become widowers.

Again, the unbalanced sex ratio and the large number of widows is mirrored in a large proportion of female-headed households. In the EICV2 household survey (see the next section for a description of the dataset), 28.2 percent of rural households are headed by women.[6] This paper compares the behaviour of male-headed households with widow-headed households as a subgroup of female-headed households for several reasons. First, this choice reflects the fact that widow-headed households account for almost 80 percent of female-headed households in rural areas. Second, it seems that widow heads are a much more homogenous group in terms of behavioural choices and opportunities compared to non-widowed female heads of household. Particularly, unmarried and married women heads (who are mostly the second wife in a polygamous marriage) have better access to support networks and male labor through their informal or formal male partners as compared to widow heads of household. Third, given the unbalanced sex ratios and the rising proportion of widows over birth cohorts, I assume that the civil status of widows in the post-genocide context is exogenous at least in the medium-term. In other words, widow heads of household have few opportunities to incorporate new members into the household. The large number of widow-headed households in the aftermath of the genocide also indicates a breakdown of support networks. Traditionally, levirate was practiced in Rwanda, i.e. a widow moves to her husband's brother's house and is cared for by him (1999 Burnet and RISD). As a result of the excess death and breakdown of social coherence, this system did not function any longer after the genocide.

III. Research question and data

The paper discusses three research questions. First, how does time allocation differ across individuals and household types? This question will be answered by analyzing descriptive statistics on hours spent on domestic tasks and income-generating activities. As mentioned above, the household-level analysis differentiates between widow-headed and male-headed households.

It has been argued in the previous section that male-headed and widow-headed households differ in their ability to adapt household composition to opportunities in the short and medium-term.

[6] The proportion of female-headed households in the 2002 census if even higher (35.8 percent in rural areas). Reasons for the undersampling of female-headed households in the EICV2 household survey potentially include their remote location and a higher proportion of one-person households.

Similarly, I assume that they may have a different set of opportunities available to employ household labor. Hence, the second research question asks: What determines time allocation at the household level? Using regression analysis, the paper contrasts widow-headed and male-headed households and particularly focuses on the impact of gender and proxies for norms.

As a third step, the level of analysis moves down to the individual-level by addressing the question: What determines time allocation at the individual level? Here, the analysis differentiates between widows, wives, and husbands, and uses, again, regression techniques.

This paper builds on the qualitative data to construct hypotheses on the factors influencing time allocation, which are then tested with nationally representative quantitative household survey data.

Qualitative data

Qualitative fieldwork was conducted in Rwanda between February and May 2007. Following an approach proposed by Girtler (2001), about 50 narrative interviews with rural households were conducted. Four regions – Gikongoro, Butare, Byumba, Rwamagana – were chosen to capture different local conditions in terms of intensity of the genocide, geography and climate, and proximity to urban centers. Topics discussed with most interviewees included the person's life history, migration, marital history and children, access to land, agricultural production, other income-earning strategies, social networks, well-being and poverty, access to government and NGO services, and characteristics of the community (including security issues), *Gacaca* courts and mutual support. Furthermore, some group discussions were conducted with members of associations, in which more general issues regarding the opportunities and constraints in development were discussed. Additionally, formal interviews were conducted with 40 key experts, including staff of the Ministry of Agriculture, Ministry of Land, Ministry of Gender and the Promotion of Women, personnel of national and international aid agencies, research institutes, the National University of Rwanda, and community authorities. Given the limited duration of fieldwork the qualitative data is considered to be indicative of general trends.

Quantitative data

The paper uses the latest household survey from Rwanda, the *Enquête intégrale sur les conditions de vie de ménage* (EICV2), a national survey of 6,900 households based on a stratified two-stage sample design. Three strata were identified at the national level (city of Kigali, other

urban, rural), and the rural strata was sorted by the 10 bio-climatic zones present in Rwanda. The survey was designed to be representative at the provincial level (in the former administrative structure with 12 provinces) in the agricultural cycle of 2005-2006.[7] The EICV2 has sections on household demographics, education, health, consumption, agriculture production, migration, credit and savings, employment, and time use.

Data on time use was collected through a stylized version of diaries in which respondents were asked to recall the frequency and duration of time they have spent on selected pre-coded activities over a long and a short reference period (cf. Harvey & Taylor, 2000; United Nations, 2005). Collecting time use data as part of a multi-purpose household survey has the advantage that time allocation can be analyzed in conjunction with other socio-economic characteristics of individuals and households. Time use in the long reference period includes information on the number of months worked in an income-generating activity over the last 12 months, while time use in the short term covers the number of hours per day and number of days worked over the last seven days in domestic tasks and income-generating activities. Given that more detailed information is available on the latter, this paper only focuses on the short term.

The domestic work covered in the survey comprises gathering wood, fetching water, going to the market, cooking, and other household chores (including cleaning, laundry and childcare). The time spent on each of these activities includes the time of travel to and from the household. In the following, all of these domestic activities are aggregated and called domestic tasks. In terms of income-generating activities, the survey captures wage work, self-employment and unpaid work, each in the farm and non-farm sector. I aggregated these categories into (1) work on the household's own land, (2) agricultural wage work outside the household and (3) non-agricultural market activities, such as public sector employment or trading. Neither leisure, nor time spent on social activities, are included in the survey.

The distinction of income-generating (or market) work and domestic work is somewhat arbitrary, given that fetching water and gathering firewood may contribute essentially to household production such as subsistence farming. This is also mirrored in the ILO definition of economic activity status, which considers individuals to be active if they are engaged in the production of goods or services for the market, for barter, or for household consumption (ILO 1982). Still, the

[7] Households were interviewed at different stages in the agricultural cycle. The impact of the timing of household interviews on time allocation was tested and only turned out to be significant for on-farm self-employment in rural areas during the planting season (data not shown).

EICV2 derived economic activity status[8] only from filter questions on market activities and used different data collection procedures for domestic and market activities. While information on domestic tasks was collected for all individuals of age six and above, only economically active individuals were interviewed about their market activities. In order to avoid measurement errors, the definitions of domestic and market activities used in the EICV2 collection are followed in this paper.

A small number of individuals (less than one percent of the sample) have doubtfully high numbers of aggregated hours worked over the last seven days, which appears to be the result of interviewer error. I imposed a ceiling of 18 hours of work per day (c.f. Medeiros et al., 2007).

In the following, the analysis is restricted to rural areas, because both the opportunities to engage in a particular sector as well as the educational requirements for wage work are likely to be different in urban and rural areas. The sample is restricted to households that engage for at least one hour in domestic tasks and income-generating activities, respectively in order to avoid biases due to data collection problems. Furthermore, only individuals in the age span of 15-60 years are considered in order to exclude both child labor and economic activity in old age. Complete information on domestic tasks and market activities is available for 4,800 rural households (of which 1,015 are widow-headed) and 11,400 individuals.

IV. Review of previous work and hypotheses

In Becker's (1965) pioneering work on time allocation, household members specialize in the kind of activity – market work or house work – in which they have a comparative advantage, measured in terms of earnings per hours. "Members who are relatively more efficient at market activities would use less of their time at consumption activities than would other members" (Becker, 1965: 512). This approach and studies that applied and developed it further introduced household production as sector of work similar to market work in economics. Applying Becker's approach, Khandker (1988) analyzes the labor force participation and time allocated to home and market production of a sample of Bangladeshi women. Khandker finds that individual and household characteristics significantly influence women's time use patterns and concludes that

[8] In the EICV2 survey, economically active (in the short term) are those individuals who worked at least one hour over the last seven days or who were unemployed but wished to work and took measures to actively seek for work. Full-time students, individuals who described themselves as inactive, and children of age five and younger were considered inactive (Strode et al. 2007, p. 69f.).

"the alternative hypothesis that women's time allocation in rural Bangladesh is inflexibly fixed by local custom can be rejected" (Khandker, 1988: 123). Some of the shortcomings of the early studies based on the unitary household model include the difficulty to apply it to the context of a developing country with market failures (Ilahi, 2000). Also, the focus is often on explaining the time allocation behavior of women alone, as in Khandker's analysis. More recent studies that used Becker's model on time allocation to compare husbands and wives did not succeed in explaining the differences in the determinants of time allocation of men and women.

More recently, norms and social roles attached to gender have been proposed to explain these differences.[9] Akerlof and Kranton (2000) propose a model of identity, in which individuals derive higher utility from adapting their behavior to the societal expectations attached to their gender role. The introduction of norms in time allocation analysis has resulted in a large number of studies that control for individual characteristics, household characteristics, and economic opportunities and assume that norms are the unobserved factor if economic incentives do not significantly explain differences in time allocation across gender (Eberharter, 2001; Medeiros et al., 2007). Ilahi (2001a: 3) cautions that it is a challenge to pinpoint variables that capture the effects of norms. One potential way out is to use panel data which allows for the control of unobserved differences in time allocation (Alenezi & Walden, 2004; Ilahi, 2001a). Still, while the use of panel data allows controlling for the impact of norms, it does not explain in what ways norms influence behaviour per se.

Other studies break down the impact of norms on particular spheres that can be measured more easily with proxy variables. For example, Fafchamps and Quisumbing (2003) focus on the impact of an individual's social status within the household hierarchy, proxied by an individual's relationship to the head of household. Using data from rural India, they find daughters-in-law to bear the largest work burdens. Cunningham (2001) compares time use of single mothers, wives, and husbands with regard to income-generating activities and domestic tasks in Mexico. She finds that "labor patterns are more similar for those with the same household roles than for those of the same sex, implying that it may be more appropriate to take into consideration household needs and resources than sex when considering labor supply of the head" (Cunningham, 2001: 29). Others have applied the framework of a bargaining model of family decision-making to investigate the impact of threat point variations and intra-household power relations on time allocation decisions of wives and husbands (Bayudan, 2006; Carlin, 1991). One of the few

[9] See Ilahi (2000) Tiefenthaler (1997), Ueda (2005) for a detailed review of time allocation studies and the incorporation of norms.

studies that is able to explicitly control for the impact of norms was conducted by Kevane and Wydick (2001). Assuming that social norms both regulate economic activities and influence threat points in intra-household bargaining, Kevane and Wydick compare the impact of social norms on women's labor allocation among two ethnic groups in Burkina Faso with differing culturally defined norms. They find that women who are subject to stricter norms (captured by an ethnicity dummy) do not respond significantly to changes in capital endowment, while there is no evidence for the impact of threat points.

Another group of studies focuses on the allocation of time to activities that are culturally assigned to women. Analyzing the division of childcare time among wives and husbands in Spain, Fernandez and Sevilla-Sanz (2006) find that changes in relative spouses' income do not have a significant effect on wives' relative share of childcare. Similarly, caring for the sick is a female domain in Peru, where girl bear a greater time burden in caring for sick household members than boys (Ilahi, 2001a). These results also hold for the impact of sickness on adult time: Rural women shift their time from income-generating activities towards domestic work if adult household members are sick, while there is no significant effect on men's allocation of time (Ilahi, 2001b).

In order to pinpoint the impact of norms on time allocation, this paper proposes to combine qualitative and quantitative data. The combination of methods is particularly tailored to the post-war context of Rwanda, in which norms have been altered severely within a short period of time while less anthropological and sociological studies are available on this topic. Rather than assuming norms to be at play, this section proceeds by outlining four hypotheses that capture the impact of norms and gender roles in a testable manner.

First, pre-genocide Rwanda was characterized by a strict gendered division of labor. There were strict rules on what activities were usually conducted by men and women and many cultural taboos restricted women from performing certain activities in public. For example, women were prohibited from engaging in construction work and working in public employment schemes. After the genocide, many women – widows in particular – became head and the principal income-earner of their household and had to take over income-generating activities that were culturally assigned to men. Interviewees reported that they originally lacked the skills and experience to perform these activities well, but also how unusual it appeared to them to engage in activities, such as overseeing wage laborers in the labor-intensive harvest season and rebuilding their war-damaged houses. The first hypothesis is that widow heads of household behave more similarly to wives than to male heads of household. If this hypothesis holds true, I expect that

widows' time allocation to income-generating activities responds less to changes in economic opportunities than husbands' time allocation.

It has been argued above that the demographic impact of the genocide lowered the chances of women born before the genocide to (re-)marry. This applies both to the chances of widows to remarry and to currently married wives in the case that their marital union breaks down. The second hypothesis is that the gendered division of labor among couples is particularly strict if wives have low fall-back options. In the empirical analysis fall-back options are proxied by sex ratios at the provincial level (indicating the probabilities of women to remarry) and a dummy variable if the wife's parents are still living (as a measure of livelihood security). If this hypothesis proves true, I suspect both proxies to have a negative significant impact on wives' time allocation to domestic work.

Third, the genocide not only killed an estimated 10 percent of the population, but also resulted in the breakdown of traditional support networks among relatives and neighbors. As a result, a large proportion of Rwandan households have an unusual composition of membership, such as one-person households, children-headed households, households of the elderly and households with large numbers of children (often adopted orphans). Many interviewees claimed that the demographic composition of households had the strongest impact on their choice of income-earning strategies. This third hypothesis is tested by focusing on variables indicating the presence of household members of different gender and age groups in the household-level analysis of time allocation.

Last, strong notions of social status are attached to different sectors of work, particularly to wage work. While non-agricultural wage work, such as civil servants, teachers, or NGO staff, are considered as highly prestigious and desirable, agricultural wage work (particularly in the family farm sector) is regarded as shameful. Interviewees argued that working on the neighbor's field discloses somebody's indigence to the community. The fourth hypothesis holds that agricultural wage work is applied as a coping strategy of last resort if the household lacks other means to generate an income. I expect a negative relationship of household wealth and education with the share of time spent in agricultural wage work both in the individual and in the household-level analysis.

One drawback of the EICV2 household survey is the weak quality of wage data, which is often paid in kind. Furthermore, income derived from joint activities of household members, such as agriculture on the family farm or a market enterprise, cannot be disaggregated into the hourly

earnings of each household member. As a consequence, Becker's specialization hypothesis cannot be tested with the EICV2 data.

V. Estimation approach

This paper assumes a utility maximization approach as proposed by Khandker (1988): The household derives utility from home-produced goods, market goods, and leisure of household members while there are time and budget constraints.

Ilahi (2001c) has argued that in developing countries, it is unlikely that all household members participate in market activities. Furthermore, a large proportion of individuals – especially children – support the income-generating activities of more senior household members without receiving any explicit remuneration. Under these circumstances, the separability assumption of the standard labor supply models (Becker, 1965; Gronau, 1977; also see Killingsworth and Heckman, 1986) does not hold. Following this line of argument, this paper applies a non-separable household model and assumes that household and individual characteristics – rather than wage rates and labor demand – are determinants of a household's (or an individual's) time allocation on different activities.

The first research question is answered with descriptive statistics. The dependent variables of interest to address the second research question – the determinants of time allocation at the household level – are expressed as the share of time a household allocates to a particular activity over total household time (the aggregated working hours of all individual members.) Likewise, the dependent variables in the individual-level regressions to answer the third research question are defined as the share of time an individual spends in an activity over the individual's total working time. The dependent variables may hence be interpreted as intensity of participation an activity. Using proportions of time rather than total hours reduces time measurement errors and potential biases if these errors are individual-specific and affect all reported hours of an individual in the same way (Juster & Stafford, 1991).

The share of time household h allocates to activity j (domestic work, own-farm agriculture, agricultural wage work, non-agricultural market work) is a function of five groups of factors:

$$T^{j}_{h} = f(X_k, Y_h, Z_h, C, P) \quad (1)$$

where ***X*** captures the characteristics of household head *k*, ***Y*** denotes household labor supply, intra-household decision-making regime and other characteristics, ***Z*** proxies household wealth, ***C*** captures location characteristics in the community that indicate economic opportunities, and ***P*** captures regional effects with dummies for each province (based on Rwanda's new administrative structure). As mentioned earlier, this equation is estimated for widow-headed versus male-headed households.

To answer the third research question, the share of time allocated on the same four activities *j* is estimated for individual *i* as the following reduced-form equation:

$$T^{j}_{i} = f(W_i, Y_h, Z_h, F_i, C, P) \quad (2)$$

where individual characteristics ***W*** and fall-back options ***F*** of individual *i* are added to the same set of factors as in equation (1). Equation (2) is estimated separately for widows, wives, and husbands.

A difficult question is whether or not to control for household wealth and income, given that endogeneity is a potential problem. In the literature on time allocation in developing countries different approaches have been suggested to cope with this issue. Some studies control for wealth irrespective its potential use in subsistence agriculture, such as land assets (Fafchamps and Quisumbing, 2003; Micevska and Rahut, 2007), livestock and tools (Fafchamps and Quisumbing, 2003), and the value of agricultural assets (Ilahi, 2001). Other studies are more careful in avoiding potential loop-backs and use relative changes in income (Cunningham, 2001). The approach followed in this paper is to control for the stock of non-productive assets (the current value of furniture, electronic devices, and means of transport), the size of land the household received as inheritance or gift, and the current value of agricultural tools. I assume that assets and land are unlikely to influence – at least in the short term – labor allocation on different activities, while agricultural assets are more likely to be endogenous to working in own-farm agriculture. A stepwise approach was used in the estimating equation (1) and (2), adding one variable at a time to control that coefficients of other variables did not change as a consequence of including wealth indicators. As mentioned above, neither income nor wage data are used, given the limitations of the EICV2.[10]

[10] Not including pecuniary variables is not a major drawback in the analysis of time allocation, as Matshe and Young (2004), Miller and Mulvey (2000), and Jenkins and O'Leary (1997) argue.

Equation (2) was estimated using Heckman's two-step approach in order to account for potential sample selection bias of being economically active (data not shown).[11] In none of the regressions Heckman's lambda turned out to be significant; hence, the null-hypothesis of the presence of selection bias into being economically active was rejected.

In both the household and the individual-level data on time allocation, a number of observations have no observed labor time allocated to some of the four activities; this is particularly true for agricultural wage work. All zero observations in the dependent variable are interpreted as corner solutions or behavioral choices not to work in a particular activity. Equation (1) and (2) were estimated using the tobit technique. Otherwise, ignoring the zeros may yield biased estimations. The advantage of tobit estimations is that the same set of variables is used to estimate the probability to participate in an activity and the intensity of participation.[12] Such an approach avoids potential biases when a theory on the differential impact of factors on each decision is lacking. Overall, the Heckman two-step regressions produced very similar results in terms of levels of significance and magnitude of coefficients compared to the tobit estimations and may be regarded as a robustness check of the tobit results.

Tests on the tobit model specifications revealed that the normality assumptions of the underlying latent variable model were violated. I applied the procedure recommended by Wooldridge (2006: 603) to test the goodness of fit of the tobit estimation. The methods compares the magnitude and sign of coefficients derived from tobit estimations to probit estimations in order to test whether the same variables that predict the probability of participation also determine the level of outcome. The results indicate that the estimates are still valid (data not shown).

Some groups of variables were not jointly significant. For example, in the regressions on the determinants of individuals' time allocation to domestic tasks (table 5, regressions 1-3) the household wealth proxies are not jointly significant. I still reported all groups of variables for the sake of comparison of different activities.

[11] The variables included in the participation, but not in the intensity equation were dependency ratio (regression on domestic tasks), farm size (own-farm agriculture), education and community characteristics (non-agricultural market activities), and education (agricultural wage work).

[12] Others have argued that using the same set of variables for both decisions is the flipside of tobit estimations (Mathse and Young, 2004).

VI. Discussion of results

This section addresses each of the three research questions in turn.

Differences in time allocation across individuals and households

Figure 3 indicates that wealth and time allocation are interrelated. While mean hours spent in domestic work over the last week does not vary much across household consumption deciles, individuals of the richest consumption decile work more than twice as many hours in market activities compared to individuals of the poorest decile. This seems to suggest that members of wealthier households have more opportunities available to employ household labor productively. However, this unconditional analysis does not control for household size or human capital.

Also, there are severe differences in time use and household characteristics among widow-headed and male-headed households. Table 1 compares the mean values of key variables across these two household types and provides t-statistics on the significance of the differences in means. Three results are of particular interest. First, widows who are heads of household spent on average 15 hours per week more on domestic tasks, but significantly less time on income-generating activities than male heads of household. Also, widow heads are engaged in a significantly lower number of activities, both in the long and in the short term. This might explain the second result, which is that widow-headed households have a lower status of well-being. They have significantly fewer assets (except land endowment per capita) and higher incidences of poverty[13] and extreme poverty compared to male-headed households. Third, household composition in terms of absolute number of members, ratio of female to male members, and age of household head is significantly different across both types of household. Again, this is an unconditional analysis, as no other information is utilized to control for correlations.

Table 2 and table 3 differentiate weekly hours worked in different activities by an individual's relation to the head of household. There appear to be very clear patterns of household hierarchy and gender. Heads work significantly less than members, and there appears to be a clear division of labor among spouses. These results support the first hypothesis: Widow heads behave more like wives and less like "typical" male heads of household both in terms of absolute work burdens and the division of work in the domestic and market sector. Considering time spent on all activities, female members work on average 10 hours more per week than male members. This contrasts with evidence from developed countries, where the total time spent in all activities is

[13] Poverty lines were calculated using the cost of basic needs approach. The extreme poverty line is based on food needs only.

balanced across gender (Burda, et al., 2007). Still, the division of labor across household members of different sex is less pronounced in widow-headed households. This contradicts results from Mexico (Cunningham, 2001) where men in female-headed households work harder in order to compensate for the gender wage gap. This line of argument assumes that a female head earns less than a male head; as a consequence, a male member in a female headed household is required to help as secondary laborer.

As expected, household members without kinship ties to the head – mostly informal wage laborers – bear the highest work burden. Lastly, the total time spent on all activities is unexpectedly low: Economically active individuals in rural Rwanda spent about 44 hours per week in domestic tasks and market activities.[14] This low average may indicate underemployment.

Determinants of time allocation across households

Table 5 displays tobit estimations of model (1) for rural households. The coefficients present marginal effects conditional on working non-negative hours. While the income-effect of working in a particular activity cannot be calculated, it is assumed in the following that higher proportions of household time spent in income-generating activities correlate with higher household welfare. On the other hand, although all households do perform domestic tasks, these tasks are less important for income-generation.

An expected, but surprisingly strong result is that the composition of household membership (NCHILD, NFEMALE, NMALE, NADULT) has a stronger impact on the allocation of time shares on all four activities for widow-headed than for male-headed households. Taken together with the descriptive statistics shown in table 1, this finding supports the hypothesis that household composition is a key factor for the choice of household strategies. Interestingly, the presence of children increases household time shares allocated to domestic tasks. This is an unexpected finding, given the evidence from other developing countries where older children care for their younger siblings. For widow-headed households, the household member with the single largest impact on the allocation of household time in three of the four activities is adult men (NMALE1560), whose presence decreases time spent on domestic activities and increases time allocated to income-generating activities. This is a strong indication for a gendered division of labor across the market and the domestic sector. Interestingly, households in which the male head is married (CIVILHEADMAR) work significantly more on own-farm agriculture compared

[14] Ilahi (2001) finds similar values for Peru.

to divorced or single heads. This seems to indicate that work carried out by the main man and the main woman in the household in family-farm agriculture is complementary.

The proxies for the intra-household decision-making regime reveal unexpected results. DECISION1 – a dummy indicating that all land cultivated by the household is the property of the head – significantly decreases the intensity of time spent by male-headed households in non-farm income-earning activities. This seems plausible: Heads who own all of the household's land are likely to be specialized in family-farm agriculture, especially if they access the land through inheritance. In widow-headed households, DECISION1 may represent a higher decision-making authority of the widow head. In turn, these widow heads may behave more like male heads of household and engage less intensively in domestic tasks, which may explain the lower share of time allocated to domestic tasks in widow-headed households. In contrast, the significantly positive impact of DECISION1 on widow-headed households is unexpected and ambiguous.

DECISION2 indicates whether or not the agricultural laborers in a household are also the ones who make decisions on agricultural strategies. A household in which the male head is the decision-maker on agricultural strategies, but not the primary farmer allocates significantly less time to own-farm agriculture and more time to non-agricultural work. A plausible explanation might be that the head of such a household specializes in non-farm work while at the same time he coordinates the subsistence farming of other household members, most likely women. As a consequence, the wife or another member become the primary farmer which reduces the proportion of individuals (and hence the proportion of household time) classified as own-farm agriculture. DECISION2 may proxy well-organized and diversified income-generating activities.

Lastly, the EICV2 data supports the fourth hypothesis on the little value attached to farm wage work. As expected, higher household wealth (captured by the log value of household durables) and higher average educational attainment of household members significantly lower the intensity of household time allocated to agricultural wage work. This result holds for both types of households and seems robust. In contrast, higher levels of education increases a household's time share in non-agricultural market work – which has higher returns to education – in male-headed households.

Determinants of time allocation across individuals

The third research question – determinants of time allocation at the individual level – is addressed in table 5, which presents the tobit estimation of equation (2). The dependent variables in this

model are the share of time allocated to the same four activities of an individual's total time; separate estimations were conducted for widows, wives, and husbands.

Proxies for household wealth have the expected signs and magnitudes. The results are particularly strong in terms of levels of significance and magnitude of the coefficients for farm wage work: Individuals of wealthier households (DURABVALUEL) allocate significantly less time to this activity. An additional year of education lowers the time shares of wives and husbands to farm wage work. For widows, a higher dependency ratio (NCHILD04, NADULT61) increases the intensity of time allocated to farm wage work. These findings again support the hypothesis that agricultural wage work is used as a strategy of last resort if individuals either lack the opportunities to engage in more profitable activities or face a pressure to care for a large number of non-working dependent members.

The two variables that were intended to capture threat points do not reveal straightforward results. If a wife's parents are still living, she spends 8 percentage points more time in farm wage work (conditional on the fact that she engages in the farm wages sector). If one assumes that wage work provides an opportunity to women to earn an income that is outside the immediate control of other household members, this is an improvement of a wife's livelihood. This interpretation of results supports the hypothesis on the impact of threat points on the time allocation of wives. However, it is feasible that PARENTLIV also capture other effects. For instance, a wife may bear the responsibility to support her elderly parents (the transfers flow in the opposite direction as assumed above) and engages in agricultural wage work out of need. In any case, the interpretation of PARENTLIV does not match with evidence on the low prestige attached to farm wage work. The sign of the SEXRATIO coefficients are contradicting the threat point hypothesis (although the magnitude of the coefficients is small): An increase in sex ratios – an improvement of women's chances to marry – significantly increase a wife's time spent in domestic tasks and decrease her intensity of time engaged in wage work.

VII. Conclusion

The analysis of time allocation revealed three issues. First, household hierarchy and gender are interrelated. While heads irrespective of gender are the principal income-earners, widow heads do engage more intensively in domestic tasks. Widow heads behave similarly to wives than to male heads in terms of total work burden, sectors of work, and the number of income-generating

activities they are engaged in. Given that domestic tasks contribute less to the household income this may explain the lower status of well-being of widow-headed households compared to male-headed households.

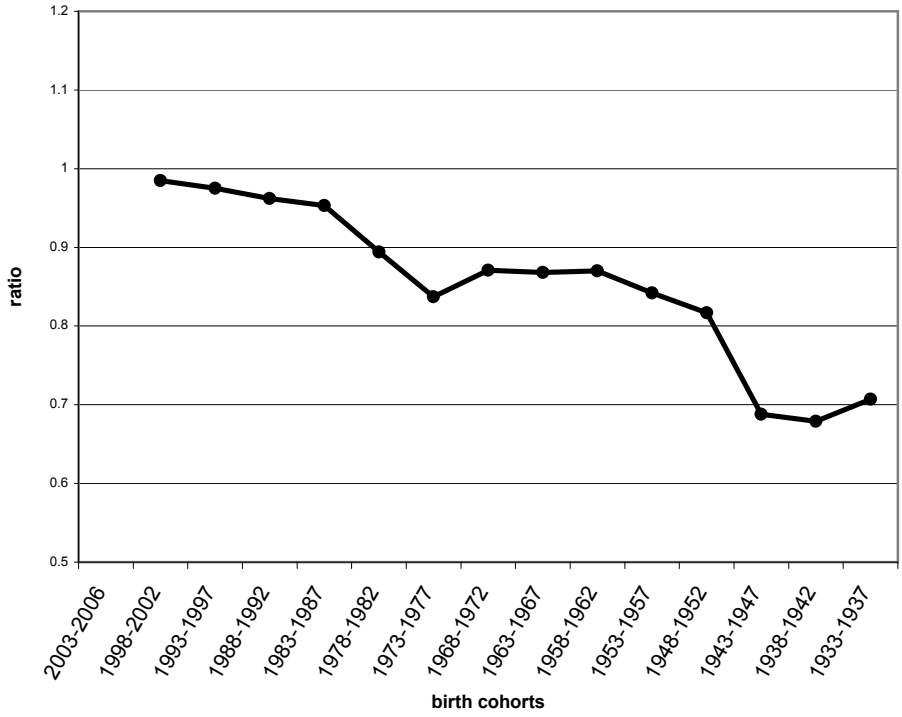
Second, household composition – the age and gender characteristics of household members – has the most important effect on male-headed and widow-headed households allocate their time. Unexpectedly, these results do not only hold for domestic tasks, but for income-generating activities as well. The presence of adult males is the single most influential determinant on household time allocated on domestic work and income-generating activities outside the family farm of widow-headed households. The importance of household composition and the presence of adult men points to a division of labor along gender lines. In Rwanda, where for many female-headedness is not a choice, but a long-term demographic outcome of the genocide, gender-related constraints in the access to income-generating activities render widow-headed households vulnerable to poverty.

Third, both the household-level and the individual-level analysis revealed that the rural agricultural wage sector is a coping strategy of last resort. Agricultural wage work is correlated with low levels of wealth, low education, and a high burden to care for dependent household member, such as small children and the elderly. This result contrasts with the optimistic view on the growth potential of the rural wage sector.

The findings of this paper make an argument for the provision of basic infrastructure in rural areas. Improved access to water and the provision alternative fuels to replace firewood as cooking fuel reduces the time individuals – particularly women – spent in arduous domestic tasks.

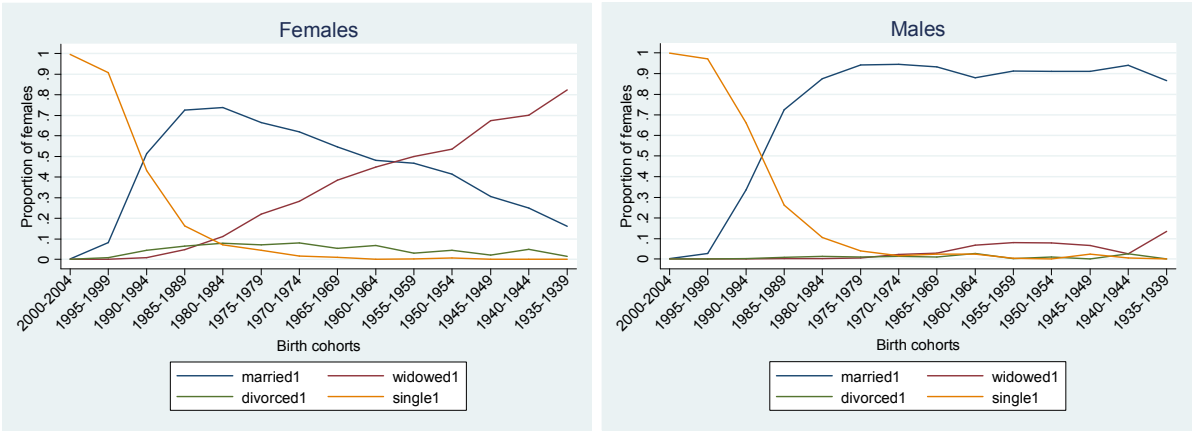
Appendix

Figure 1: Sex ratios (males per females) in Rwanda in 2002, by birth cohort



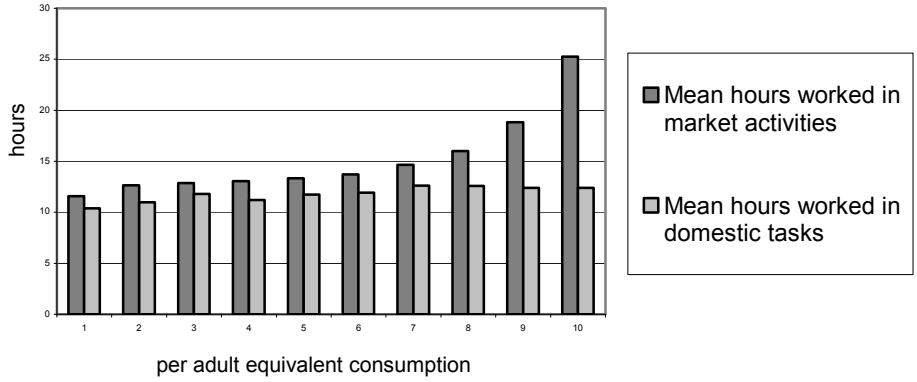
Source: Census 2002; whole country.

Figure 2: Distribution of marital status among women and men, by birth cohort



Sample: EICV2, all individuals; population weights used.

Figure 3: Mean number of hours worked in domestic tasks and market activities per individual by household consumption quintile, last 7 days[15]



Sample: EICV2, 5.073 households with complete information on economic activities; population weights used.

Table 1: Characteristics of household subgroups (mean values and t-statistics on differences in means)

	Mean		t-statistic on diff. in means
	Widow-headed households (N=1,162)	Male-headed households (N=3,795)	
Head's hours worked in domestic tasks	20.79	4.35	31.34***
Head's hours worked in market activities	23.72	29.98	-13.42***
Number of jobs per head, long term	1.51	1.70	-7.58***
Number of jobs per head, short term	1.27	1.34	-3.25**
Household size	4.22	5.33	-17.18***
Age of head of hh	54.32	42.19	26.18***
Dependency ratio	1.22	1.26	-1.07
Highest class attained per hh	5.23	5.97	-5.10***
Decision making proxy	0.07	0.05	1.59
Ratio of female to male members	1.91	1.23	18.29***
Land per capita in ha	0.19	0.18	1.06
Number of tools per hh	3.91	4.87	-10.41***
Value of durables	10428	26170	-4.83***
Poverty	0.61	0.58	1.79
Extreme poverty	0.41	0.36	3.28***

Sample: EICV2, rural households; population weights used.

[15] Mean over all household members, both economically active and inactive.

Table 2: Number of hours worked per individual in all domestic tasks and economic activities by household position, last seven days

	Mean hours worked in domestic tasks	Mean hours worked in economic activities	Mean hours worked in all activities	N
Head of household	9.14	28.35	37.74	4,262
Spouse[16]	30.31	22.70	53.09	3,225
Son/daughter of head	13.62	24.68	39.93	3,113
Child in custody	12.41	22.57	39.00	29
Father/mother of the head	11.64	37.04	55.69	3
Brother/sister of the head	14.00	28.15	43.79	183
Grandchild of head	14.96	24.60	42.29	185
Other relationship to the head	14.37	29.59	47.67	122
No relationship to the head	18.31	44.48	63.94	278
average	16.38	26.07	43.56	11,400

Sample: EICV2, economically active individuals in rural areas; population weights used.

Table 3: Number of hours worked in domestic tasks and economic activities per individual by household position and household type, last seven days

	Means	
	Mean hours worked in domestic tasks	**Mean hours worked in market activities**
head of household	9.10	24.69
other household member	19.88	28.37
male head	4.35	29.98
widow head	23.72	20.79
female member in male-headed household	26.91	22.81
female member in widow-headed household	20.18	23.81
male member in male-headed household	6.08	30.03
male member in widow-headed household	7.07	28.54

Sample: EICV2, economically active individuals of prime age in rural areas; population weights used.

[16] Spouses are always female in the sample.

Table 4: Summary statistics of variables used in regressions

Variable	Definition	Mean	Min	Max
Dependent variables				
SHAREDOM	share of hours worked in domestic tasks of total hours worked over last 7 days, per individual	0.39	0	1
SHAREDOMHH	share of hours worked in domestic tasks of total hours worked over last 7 days, per household (sum over all hh members)	0.49	0	1
SHARESUB	share of hours worked on own farm (independent farmer or unpaid) of total hours worked over last 7 days, per individual	0.41	0	1
SHARESUBHH	share of hours worked on own farm (independent farmer or unpaid) of total hours worked over last 7 days, per household (sum over all hh members)	0.33	0	1
SHAREMARKETNF	share of hours worked in non-agricultural market activities (wage work, self-employment, unpaid work) of total hours worked over last 7 days, per individual	0.12	0	1
SHAREMARKETNFHH	share of hours worked in non-agricultural market activities (wage work, self-employment, unpaid work) of total hours worked over last 7 days, per household (sum over all hh members)	0.10	0	1
SHAREWAGEF	share of hours worked in agricultural wage work of total hours worked over last 7 days, per individual	0.07	0	1
SHAREWAGEFHH	share of hours worked in agricultural wage work of total hours worked over last 7 days, per household (sum over all hh members)	0.06	0	1
Independent variables				
AGE	individual's age (centered in regression)	30.02	15	60
AGE2	individual's age squared	1064	225	3600
AGEHEAD	head's age	44.55	15	60
AGEHEAD2	head's age squared	2222	225	3600
CIVILHEADMAR	= 1 if head is married			
CLAS	highest class attained by individual (centered in reg.)	4.02		
NCHILD04	number of children hh members 0-4 years	0.87	0	4.00
NFEMALE514	number of female hh members 5-14 years	0.76	0	5.00
NFEMALE1560	number of female hh members 15-60 years	1.70	0	7.00
NMALE514	number of male hh members 5-14 years	0.73	0	6.00
NMALE1560	number of male hh members 15-60 years	1.48	0	8.00
NADULT61	number of adult hh members above 60 years	0.13	0	3.00
GNORM3	= 1 if all land is property of head	0.65	0	1
GNORM2	= 1 if the primary farmer is not the decision maker on what crops to grow			
SEXRATIO	sex ratio at the provincial level	89.75	87.1	93.3
PARENTLIV	= 1 if at least one parent is still living	.17	0	1
HEALTHHH2	number of individuals with long-term health problems	0.35	0	6.00
COOKFUEL	= 1 if primary cooking fuel is wood	0.95	0	1
CLUSTERMIG	= 1 if more individuals departed than arrived in cluster over last 5 years	0.39	0	1
MARKET	= 1 if community has a daily or weekly market	0.15	0	1
ROAD	= 1 if community has a road that is passable the whole year	0.66	0	1
IMIDU	= 1 if household lives in imidugudu or old resettlement	0.23	0	1
P1	= 1 if City of Kigali	0.01	0	1
P2	= 1 if Southern province	0.26	0	1
P3	= 1 if Western province	0.26	0	1
P4	= 1 if Northern province	0.19	0	1
P5	= 1 if Eastern province	0.25	0	1

Sample: households and economically active individuals of prime age (15-60 years) in rural areas; population weights used.

Table 5: Determinants of household time allocation in rural Rwanda (equation 1, tobit estimation)

	Domestic work		Own-farm agriculture		Non-agric market work		Agric wage work	
	widow-headed household (1)	male-headed household (2)	widow-headed household (3)	male-headed household (4)	widow-headed household (5)	male-headed household (6)	widow-headed household (7)	male-headed household (8)
Head characteristics								
AGEHEAD	0.001	0.002	0.005	-0.001	-0.004	-0.001	-0.003	0.001
AGEHEAD2	0.000	-0.000	-0.000	0.000	0.000	-0.000	0.000	-0.000
CIVILHEADMAR		-0.001		0.043**		-0.003		-0.015
Household characteristics								
CLASA	0.005	-0.003	-0.004	-0.003	0.002	0.004***	-0.007***	-0.003**
NCHILD04	0.018	0.014***	-0.019	-0.008*	-0.010	-0.002	0.011	-0.001
NFEMALE514	0.022**	0.018***	-0.006	-0.016***	-0.007	0.006*	-0.004	-0.004
NFEMALE1560	-0.050***	-0.019***	0.026***	0.007	0.011**	0.003	0.016***	0.009***
NMALE514	0.030***	0.015***	-0.016*	-0.015***	-0.002	0.005	-0.006	-0.003
NMALE1560	-0.066***	-0.037***	0.009	0.004	0.021***	0.014***	0.027***	0.016***
NADULT61	-0.062*	-0.032**	0.048*	0.007	0.004	0.017*	-0.003	0.005
HEALTHHH2	0.026**	0.022***	-0.014	-0.013**	-0.004	-0.005	-0.004	0.003
COOKFUEL	0.021	0.005	-0.011	0.048**	-0.009	-0.025	-0.001	-0.020
GNORM3A	-0.042**	0.012	0.013	0.007	0.000	-0.014**	0.020*	-0.003
GNORM2A	-0.046	0.015	-0.019	-0.060***	0.023	0.031**	0.041	0.002
Household wealth								
DURABVALUELOG	-0.001	0.000	-0.000	-0.010***	0.014***	0.023***	-0.014***	-0.018***
LANDINHERIT	0.010	0.004	-0.009	-0.001	-0.001	-0.004	0.001	0.001
AGASSETLOG	-0.001	-0.009*	0.012	0.029***	0.003	-0.009**	-0.009	-0.005
Community characteristics								
CLUSTERMIG	-0.012	0.025***	-0.016	-0.025***	0.005	0.004	0.009	-0.004
MARKET	-0.038*	-0.013	0.019	-0.016	0.016	0.023***	0.008	-0.004
ROAD	-0.014	-0.011	-0.010	-0.009	0.012	0.002	0.006	0.009*
IMIDUGU	0.007	0.009	-0.044**	-0.008	0.032**	0.011	0.003	-0.013*
constant	0.662***	0.576***	-0.004	0.059	-0.468	-0.441***	0.698*	0.544***
sigma	0.183***	0.176***	0.198***	0.207***	0.375***	0.356***	0.345***	0.348***
Number of cases	895	3216	895	3216	895	3216	895	3216
of which, censored at 0	0	0	44	199	669	1971	641	2432
Log Likelihood Value	245.70	1013.21	112.53	224.02	-354.93	-1545.23	-364.43	-1228.14
McKelvey & Zavoina's R2	0.21	0.10	0.09	0.08	0.21	0.17	0.17	0.16
Aldrich & Nelsons's R2	0.19	0.10	0.08	0.07	0.13	0.12	0.10	0.09

Marginal effects conditional on non-negative hours displayed with * p<0.05, ** p<0.01, *** p<0.001 based on robust standard errors (not shown)
dependent variables: household time spent in an activity as proportion of total household time of all household members
regional dummies not shown; sample: rural households with complete information on economically active members age 15-60

Table 6: Determinants of individual time allocation in rural Rwanda (equation 2, tobit estimation)

	Domestic tasks			Own-farm agriculture			Non-agric market work			Agric wage work		
	widows (1)	wives (2)	husbands (3)	widows (4)	wives (5)	husbands (6)	widows (7)	wives (8)	husbands (9)	widows (10)	wives (11)	husbands (12)
Individual characteristics												
CAGE	-0.005	-0.004	0.007**	-0.005	-0.005	-0.013**	0.008	0.003	0.003	0.007	0.012***	0.010*
AGE2	0.000	0.000	-0.000**	0.000	0.000*	0.000**	-0.000	-0.000	-0.000	-0.000	-0.000***	-0.000**
CCLAS	-0.001	-0.000	-0.001	-0.009**	-0.006***	-0.006**	0.005**	0.005***	0.007***	-0.001	-0.002*	-0.008***
Household characteristics												
NCHILD04	0.003	0.018***	0.004	-0.022	-0.011*	0.001	-0.005	0.002	-0.005	0.024**	-0.007*	-0.002
NFEMALE514	-0.011	-0.013*	-0.013***	0.011	0.008	0.000	-0.010	0.004	0.017*	0.004	-0.001	-0.010
NFEMALE1560	-0.070***	-0.053***	-0.012*	0.044***	0.028***	-0.004	-0.000	0.002	-0.005	0.005	0.004	0.005
NMALE514	0.010	-0.006	-0.013***	-0.003	0.005	-0.004	0.002	0.005	0.015*	-0.005	-0.003	-0.008
NMALE1560	-0.008	-0.011	-0.014***	0.004	0.003	0.003	0.002	0.005	-0.003	-0.003	-0.005	0.002
NADULT61 (d)	-0.023	-0.014	-0.015	-0.046	-0.008	-0.008	-0.000	-0.000	0.008	0.048*	0.002	-0.013
HEALTHHH2	0.042***	0.028***	0.016***	-0.022	-0.022***	-0.009	-0.002	-0.001	-0.006	-0.008	0.003	-0.004
COOKFUEL (d)	-0.026	-0.007	0.009	0.044	0.034	0.062*	-0.008	-0.034*	-0.029	-0.023	0.006	-0.041
GNORM3A (d)	-0.065***	0.010	0.019***	0.031	-0.009	0.061***	-0.005	0.004	-0.073***	0.018	-0.004	0.021*
Threat Points												
PARENTLIV (d)		0.009			-0.039			-0.024			0.079**	
SEXRATIO		0.001*			-0.001			0.000			-0.001**	
Household Wealth												
DURABVALUEL	0.004	0.008**	-0.003	0.006	-0.004	-0.018***	0.010*	0.016***	0.048***	-0.024***	-0.020***	-0.038***
LANDTOBT6	0.003	0.002	0.004	0.013	0.004	-0.005	-0.008	-0.005	-0.001	-0.018	-0.007	-0.009
AGASSETVALUEL	-0.006	-0.019**	0.002	0.008	0.024***	0.056***	0.009	-0.007	-0.025***	-0.009	-0.005	-0.017*
Community Characteristics												
CLUSTERMIG (d)	0.002	0.042***	0.012	-0.013	-0.033***	-0.025	-0.008	-0.003	0.009	0.010	-0.008	-0.013
MARKET (d)	-0.030	-0.018	-0.016*	0.025	-0.009	-0.020	0.033*	0.029***	0.042**	-0.020	0.001	-0.011
ROAD (d)	0.002	-0.015	-0.007	-0.015	-0.003	0.003	0.015	0.016*	-0.014	-0.003	0.007	0.013
IMIDU (d)	0.001	0.025*	-0.012	-0.035	-0.016	-0.020	0.018	-0.001	0.028	0.021	-0.008	-0.008
constant	0.790	0.633	0.224	-0.059	0.092	-0.281	-1.227	-1.445	-0.648	0.900	1.562	1.735
sigma	0.247***	0.224***	0.312***	0.277***	0.255***	0.467***	0.569***	0.614***	0.802***	0.514***	0.488***	0.889***
number of cases	766	3088	2727	766	3088	2727	766	3088	2727	780	3139	2878
of which, censored at 0	28	40	999	93	430	655	682	2765	1817	643	2818	2413
Log Likelihood Value	-51.82	163.99	-1171.06	-201.24	-644.68	-2029.92	-216.32	-901.27	-1991.34	-294.51	-782.18	-1286.66
McKelvey & Zavoina's R2	0.133	0.135	0.104	0.136	0.106	0.073	0.231	0.139	0.180	0.253	0.260	0.233
Aldrich & Nelsons's R2	0.124	0.126	0.085	0.125	0.099	0.067	0.099	0.060	0.126	0.110	0.088	0.100

Marginal effects conditional on working non-negative hours displayed with * p<0.05, ** p<0.01, *** p<0.001 based on robust standard errors (not shown)
dependent variables: individual time spent in an activity as proportion of total time
regional dummies not shown; sample: economically active individuals age 15-60 in rural areas
(d) for discrete change of dummy variable from 0 to 1

Bibliography

Akerlof, G.A. and Kranton, R.E. (2000), 'Economics And Identity', *The Quarterly Journal of Economics.*, 115, 3, 715-753.

Alenezi, M. and Walden, M.L. (2004), 'A New Look at Husbands' and Wives' Time Allocation', *Journal of Consumer Affairs*, 38, 1, 81-106.

Anderson, B.A. and Silver, B.D. (1985), 'Demographic Consequences of World War II on the Non-Russian Nationalities of the USSR', *in* Linz, S.J. (ed.), *The Impact of World War II on the Soviet Union*, Totowa., Rowman & Allanheld.

Bayudan, C.G. (2006), 'Wives' Time Allocation and Intrahousehold Power: Evidence from the Philippines', *Applied Economics*, 38, 7, 789-804.

Becker, G. (1965), 'A theory of the allocation of time', *Economic Journal*, 75, 493-517.

Blackden, M.C. and Wodon, Q. (2006), 'Gender, time use, and poverty in Sub-Saharan Africa', *World Bank Working Paper*, 73.

Burnet, J.E. and Rwanda Initiative for Sustainable Development (RISD) (1999), *Women's Land Rights in Rwanda*.

Carlin, P.S. (1991), 'Intra-family Bargaining and Time Allocation', *in* Schultz, T.P. (ed.), *Research in population economics. Volume 7*, Greenwich, Conn. and London, JAI Press.

Cunningham, W. (2001), 'Breadwinner or Caregiver? How Household Role Affects Labor Choices in Mexico', *World Bank Policy Research Working Paper*, 2743.

Davenport, C. and Stam, A. (undated), 'Rashomon Goes to Rwanda: Alternative Accounts of Political Violence and Their Implications for Analysis and Policy (draft paper)'.

Desforges, A. (1999), *Leave None to Tell the Story: Genocide in Rwanda*, New York, Washington, London, Brussels, Paris, Human Right Watch.

Doom, R. and Gorus, J.F.J. (2000), *Politics of identity and economics of conflict in the Great Lakes region*, Brussels, VUB University Press.

Eberharter, V.V. (2001), 'Gender roles, labour market participation and household income position', *Structural Change and Economic Dynamics*, 12, 3, 235-246.

El-Bushra, J. and Mukarubuga, C. (1995), *Women, war and transition*.

Fafchamps, M. and Quisumbing, A.R. (2003), 'Social roles, human capital, and the intrahousehold division of labor: evidence from Pakistan', *Oxford Economic Papers*, 55, 1, 36-80.

Fernandez, C. and Sevilla-Sanz, A. (2006), 'Social Normas and Household Time Allocation', *University of Oxford, Department of Economics, Economics Series Working Papers*, 291.

Girtler, R. (2001), *Methoden der Feldforschung*, Köln, Weimar, Wien, Böhlau.

Harvey, A.S. and Taylor, M.E. (2000), 'Time Use', *in* Glewwe, P. (ed.), *Designing Household Survey Questionnaires for Developing Countries: Lessons from 15 Years of the Living Standards Measurement Study*, Washington, DC, The World Bank.

Ilahi, N. (2000), 'The Intra-household Allocation of Time and Tasks: What Have We Learnt from the Empirical Literature?' *Policy research report on gender and development working paper series*, 13.

Ilahi, N. (2001a), 'Children's work and schooling: Does gender matter? Evidence from the Peru LSMS panel data', *World Bank Policy Research Working Paper*, 2745.

Ilahi, N. (2001b), 'Gender and the Allocation of Adult Time: Evidence from the Peru LSMS Panel Data', The World Bank, Policy Research Working Paper Series: 2744.

Ilahi, N. (2001c), 'Gender and the Allocation of Adult Time: Evidence from the Peru LSMS Panel Data', *The World Bank, Policy Research Working Paper Series*, 2744.

ILO (1982), *Resolution concerning statistics of the economically active population, employment, unemployment and underemployment adopted by the Thirteenth International Conference of Labour Statisticians Thirteenth International Conference of Labour Statisticians*, Geneva.

Iyer, L. (2000), 'The Intra-household Allocation of Time and Tasks: What Have We Learnt from the
Empirical Literature? Policy Research Report on Gender and Development', *World Bank Policy Research Working Paper*, 13.
Jenkins, S.P. and O'Leary, N.C. (1997), 'Gender Differentials in Domestic Work, Market Work, and Total Work Time: UK Time Budget Survey Evidence for 1974/5 and 1987', *Scottish Journal of Political Economy*, 44, 2, 153-164.
Juster, F.T. and Stafford, F.P. (1991), 'The Allocation of Time: Empirical Findings, Behavioral Models, and Problems of Measurement', *Journal of Economic Literature*, 29, 2, 471-522.
Kevane, M. and Wydick, B. (2001), 'Social Norms and the Time Allocation of Women's Labor in Burkina Faso', *Review of Development Economics*, 5, 1, 119-129.
Khandker, S.R. (1988), 'Determinants of Women's Time Allocation in Rural Bangladesh', *Economic Development and Cultural Change*, 37, 1, 111-126.
Kimonyo, J.P. (2000), *Revue crititque des interprétations du conflit rwandais*, Butare, Universié Nationale du Rwanda.
Kimonyo, J.P. (ed.) (2001), *Ruptures socioculturelles et conflict au Rwanda*, Université Nationale du Rwanda, Butare.
Mamdani, M. (2001), *When Victims Become Killers: Colonialism, Nativism, and the Genocide in Rwanda*, Princeton, Princeton University Press.
Matshe, I. and Young, T. (2004), 'Off-farm labour allocation decisions in small-scale rural households in Zimbabwe', *Agricultural Economics*, 30, 3, 175-186.
Medeiros, M., Osorio, R.G. and Costa, J. (2007), 'Gender Inequalities in Allocating Time to Paid and Unpaid Work: Evidence from Bolivia', *International Poverty Centre Working Paper*, 34.
Miller, P. and Mulvey, C. (2000), 'Women's Time Allocation to Child Care: Determinants and Consequences', *Australian Economic Papers*, 39, 1, 1-24.
Ministry for Local Government (2002), *The counting of the Genocide victims: final report*, Kigali, Republic of Rwanda.
Newbury, C. and Newbury, D. (1999), 'A Catholic Mass in Kigali: Contested Views of the Genocide and Ethnicity in Rwanda', *Canadian Journal of African Studies / Revue Canadienne des Etudes Africaines*, 33, 2/3, 292-328.
Opinion, I.-A.J.o. (1995), 'Special Issue on Rwanda', 13, 2.
Prunier, G. (1999), *Rwanda: le génocide*, Éditions Dagorno.
Republic of Rwanda, M.f.L.G. (2002), *The counting of the Genocide victims: final report*, Kigali, Republic of Rwanda.
Rwanda National Census Service (2002), *Rwanda 2002 Census of Population and Housing*, Kigali, SNR.
United Nations Department for Economic and Social Affairs (2005), *Guide to Producing Statistics on Time Use: Measuring Paid and Unpaid Work*, New York, United Nations.
Verpoorten, M. (2005), 'The death toll of the Rwandan genocide: a detailed analysis for Gikongoro Province', *Population and Development Review*, 60, 4, 331-368.
Verwimp, P. (2004), 'Death and survival during the 1994 genocide in Rwanda', *Population Studies*, 58, 2, 233–245.
Wooldridge, J. (2006), *Introductory Econometrics: A Modern Approach*, Mason, Thomson.