

# **Time allocation, gender and norms: Evidence from post-genocide Rwanda**

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## **Abstract**

This paper investigates the determinants of household time allocation in the post-war setting of a developing country. A decade after the 1994 genocide, Rwanda still bears the demographic impact of the war, which left sex ratios to be severely unbalanced in the aftermath of the conflict. Moreover, many women had to take over roles and activities that were culturally assigned to men. The paper contributes to prior research by providing a careful and nuanced approach to norms on gender roles. Results indicate that, first, the division of tasks among household members is driven by very different factors in male and widow-headed households; second, women have more freedom to perform economic activities in villagization settlements; and third, there is discrimination against women in the labor market.

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

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## **I. Introduction**

Even though more than a decade has passed since the 1994 genocide, the Rwandan society still bears the demographic impact of the conflict. Not only had at least 800.000 people died during the genocide, but also the majority of the deaths were male, leaving many women widowed in the post-genocide period. Many widows became the major breadwinners of their household and took over economic activities that were traditionally assigned to men. This situation poses a sharp contrast to the image of idealized female behavior that restricted women's participation in society in many ways before the genocide and discriminated them in accessing education, skills, and resources. Given the high proportion of female-headed households in Rwanda today, their freedom to make use of economic opportunities also has important repercussions for making achievements in poverty reduction.

Yet, there is a shortage of research exploring if and in what way norms on gender roles may pose constraints on women in Rwanda in the aftermath of the genocide. This is surprising, given that pressures on gender roles were among the factors that contributed to social tensions before the genocide. It is well-documented how the gender crisis of young, unemployed, impoverished and frustrated Hutu men contributed to their willingness to engage in genocidal violence (for instance, Baines 2003; Jones 2002; Schäfer 2008; Taylor 1999). The economic decline, starting throughout the 1980s due to a plumbing of coffee prices, Rwanda's most important export product, a severe drought in the late 1980s, and an increasing pressure on land sharpened tensions along gender lines. Many young men found themselves unable to obtain land and income required for paying a bride price, marrying, and starting a family. To these men, killing their Tutsi counterparts provided an opportunity for upward mobility by appropriating the endowments of their victims (Jones 2002: 68). Also, sanctions were imposed on financially independent women who overstepped the boundaries of roles traditionally assigned to them and threatened the image of men as providers.

This paper analyzes how households allocate tasks among their members and in what way this is interrelated with norms on female gender roles in the post-war context of Rwanda, using household survey data. 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. Moreover, it allows to grasp inequalities among household members in their work burdens, but also the extent to which members of different gender and age are engaged in paid activities outside the household, which are likely to translate

into bargaining power in household decision-making processes (Harvey and Taylor 2000). Linking the analysis of economic behavior with norms at the micro-level is a relatively new field in the literature, and a standard conceptual and empirical strategy has not yet agreed upon in the literature (Blackden and Wodon 2006; Iyer 2000). Norms on gender roles are country-dependent in the way roles are culturally defined, the characteristics of the family economy, and economic sectors. Not the least, the way that household survey data provide proxies for gender roles vary across countries. Hence, the approach followed here is to provide a detailed account of the Rwandan context, relying on in-depth anthropological and sociological studies in order to allow for a precise interpretation of norms. The estimation procedure builds on the work Fafchamps and Quisumbing (2003) who proposed a parameterization of household composition that allows to compare households of different size and composition.

This paper contributes to the literature in two ways. First, norms on gender roles are differentiated into three spheres: Intra-household relations between household members, taboos and restrictions on women's activities that are enforced at the community level, and overall discrimination of women in the labor market. Second, the particular post-war context of Rwanda allows exploiting the fact that different women living in different household arrangements are affected by changing gender roles in different ways. Widow who are heading a household, making up about one quarter of households in rural Rwanda, are assumed to be exogenously driven into widowhood and household headship. Given that these households lack the labor of their husbands (and often other deceased members), the division of tasks is newly negotiated, while time allocation is likely to be determined by gender roles in households characterized by a conventional setup of husband, wife, and children. Moreover, the government resettled many rural households into villagization schemes, which allows to compare the impact of two types of settlements that differ in the strength of social cohesion and cultural institutions that are likely to have an impact on women's freedom to perform activities in public.

The paper proceeds as follows. Section II discusses the state of the art in time allocation research and gender. The following section provides an overview of the gendered mortality and the demographic consequences of the genocide. Section IV reviews culturally defined norms on gender roles in Rwanda and formulates hypotheses. The EICV2 household survey data used is then introduced. The estimation approach is detailed in section VI, followed by a discussion of empirical results in section VII. The last section summarizes the main findings.

## II. Review of previous work

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 use less of their time at consumption activities than do other members (Becker 1965: 512). Building on 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 "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, but not contrasting it to men's patterns of time allocation, as in Khandker's analysis. In general, studies using 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 attached to gender have been proposed to explain these differences.<sup>1</sup> Akerlof and Kranton (2000) propose a model of identity, in which individuals derive higher utility from adapting their behavior to 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). However, only few studies convincingly argue how they pinpoint norms and variables that capture the effects of norms (Ilahi 2001a: 3). One potential way out is to use panel data which allows for the control of unobserved differences in time allocation (Alenezi and 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 behavior per se.

Other studies break down the impact of norms on particular spheres that can be measured more easily with proxy variables. For example, Cunningham (2001) compares the time use of single mothers, wives, and husbands with regard to income-generating activities and domestic tasks in

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<sup>1</sup> See Ilahi (2000), Tiefenthaler (1997) and Ueda (2005) for a detailed review of time allocation studies that incorporate norms.

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 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. 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. Their approach to intra-household gender roles will be followed in this paper. Using data from rural India, Fafchamps and Quisumbing find daughters-in-law to bear the largest work burdens.

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 girls 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 2001c).

### **III. The demographic impact of the genocide**

Rwanda has a long history of violent conflict that dates back to the colonial period.<sup>2</sup> Ethnically motivated violence against the Tutsi minority resulted in waves of migration into neighboring countries after Rwanda’s independence in 1962. The violence peaked in the 1994 genocide, when between April and July extremist Hutu backed by the government organized massacres against the Tutsi minority and, to a lesser degree, moderate Hutu intellectuals who were opposed to the

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<sup>2</sup> For an analysis of the historical context leading to the genocide see Desforges (1999), Doom and Gorus (2000), Kimonyo (2000; 2001), Mamdani (2001), Newbury and Newbury (1999), Prunier (1999) and the special issue on Rwanda of *ISSUE* (1995).

regime under president Habyarimana. The human suffering caused by the genocide is inconceivable, with death toll estimates 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 and Stam undated), 800,000-850,000 deaths (Prunier 1999), 935,000 deaths (Ministry for Local Government 2002) and more than a million deaths (African Rights 1995b). Most of these individuals were killed in one-sided violence, while a small number of soldiers died in combat between the Rwandan Armed Forces (Forces Armées Rwandaises, FAR) and the rebel army, the Rwandan Patriotic Front (RPF), which eventually stopped the genocide and took over power.

While overall death tolls are a politically sensitive and debatable topic, this also applies to the estimates of deaths by sex. Few studies attempt to differentiate deaths by sex, not the least because reconciliation policies enacted after 1994 strictly forbid to collect information on ethnic identity and other characteristics that would allow reconstructing the demographic impact of the genocide in more detail. In a detailed study of the province of Gikongoro in southern Rwanda, Verpoorten (2005) estimates that Tutsi women had an eight percentage points better chance of surviving compared to Tutsi men. Based on information gathered from the victims' neighbors, survivors and other locals, the Rwandan Ministry for Local Government finds that "on the whole, the percentage of male victims (56.4 percent) is higher than the percentage of female victims (43.3 percent), except for the prefecture of Gisenyi" (2002: 22). Despite the scant statistical evidence, most researchers agree that men and boys made up the majority of casualties, both in one-sided violence against Tutsi and political opponents of the Habyarimana regime and in combat deaths between FAR and RPF.<sup>3</sup> Yet, the targeting of victims in one-sided violence appears to have changed in the course of the genocide. In-depth accounts of the massacres report that women and children were not systematically targeted in many communities at least until mid-May 1994 (Desforges 1999: 227), the most virulent phase of the genocide, although both men and women as well as the elderly and children died in large-scale massacres. Jones (2002) depicts the dynamics of violence as an evolution from a *gendercide*, originally targeting men, male youth and infant boys to a "chronologically progressive and culturally transgressive targeting of Tutsi women, elderly, and girl children" (Jones 2002: 65).

Several arguments can be outlined to explain the higher mortality rates of males in one-sided violence. First, Rwandan society is patrilineal; ethnic identity and family affiliation, but also inheritance of property are passed on to children through the male line. From this follows that the

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<sup>3</sup> See Jones (2002: 75-76) for a critical discussion of texts that assume women constitute the majority of deaths.

genocidal ideology referred against eradicating Tutsi males in the first place in order to exterminate Tutsi as a group. In contrast to earlier waves of ethnically motivated violence, even infant boys were killed in order to prevent them to become fighters for the Tutsi case in future (African Rights 1995a: 39). Second, similar to other genocides, accounts indicate that the organizers of the genocide more easily induced people to participate in the killings of men who were depicted as supporters of the RPF and hence a threat to their own security and to the stability of Rwanda (Desforges 1999: 13). In contrast, propaganda depicting children, the elderly, and women as potential threat was much less compelling and was seemingly more often rejected on moral grounds. Third, the ideologists behind the genocidal propaganda attracted young impoverished men without land and employment to participate in the killings by offering them the incentive to appropriate the land and property of their victims. This resulted in the targeting of relatively wealthy and well-educated men (African Rights 1995a: 597). Fourth, there are accounts (although very scant) that more men died in large-scale massacres where victims were chased to hilltops, churches, and public buildings. According to Jones, “gendered role expectations dictated the behavior of Tutsi” (Jones 2002: 71), leading some men to place themselves in the frontline in order to save their wives and children. Fifth, since the colonial period, Tutsi women were often depicted as the female elite, being alleged of particular physical beauty, yet “inaccessible to most Hutu men whom they allegedly looked down upon” (Nowrojee 1996: 11). In many cases, Tutsi women and adolescent girls were spared from immediate killings by their perpetrators for being raped and held in sexual slavery.

In the aftermath of the genocide, sex ratios (the number of males for every 100 females) were severely unbalanced. Primarily, this is due to higher mortality rates of men during the genocide, but also due to the escape of large numbers of mostly male genocide perpetrators to what is today the Democratic Republic of Congo and Tanzania immediately after the genocide in fear or revenge by the RPF and persecution for their crimes (Newbury, D. 2005). Some studies estimate that the female population accounted for as much as 80 percent (El-Bushra and Mukarubuga 1995) and 70 percent (Nowrojee 1996: 2) of the local population in 1995 and 1996, respectively. Other accounts indicate that in 1996 more than 400.000 widows had registered with the government to apply for assistance, although their ethnic identity was not revealed (OUA 2000: 148).

Figure 1 indicates sex ratios derived from the 2002 census, which is the first demographic data available at the 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 and prime age adult sex ratio was 91.5 and 88.2 in 2002, respectively, while sex ratios were below 60 for some birth cohorts in Gitarama and Kibuye Provinces. Still, sex ratios derived from census data overestimate the number of men potentially available on the marriage market, as tens of thousands of mostly male genocide perpetrators are jailed (Ministry of Finance and Economic Planning and National Census Commission 2003).

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 2; see section 5 for a description of the EICV2 household survey). The mean age at first marriage before the genocide was about 22.9 years for women (Office National de la Population (ONAPO) and Macro International 1994). Therefore, women born before 1970 may be considered as *conflict widow cohort* (Anderson and Silver 1985), as they reached marriageable age before the genocide and are likely to be affected by widowhood. In the distribution of marital status by birth cohort, three issues are of particular interest. 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 indicate that men either remarry, potentially women of younger birth cohorts, or die once they become widowers.

The unbalanced sex ratio is mirrored in a large proportion of female-headed households. In the EICV2 household survey, 28.2 percent of rural households are headed by women.<sup>4</sup> This paper compares the behavior of male-headed households with widow-headed households as a subgroup of female-headed households for several reasons.<sup>5</sup> On the one hand, this choice reflects the fact that widowhood is not a result of choice, but forced upon women through circumstances. This makes widow-headed households a much more homogenous group in terms of opportunities

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<sup>4</sup> The proportion of female-headed households in the 2002 census is even higher (35.8 percent in rural areas). Potential reasons for the undersampling of female-headed households in the EICV2 household survey are their remote location and a higher proportion of one-person households.

<sup>5</sup> Of female heads of households in rural Rwanda, 79 percent are widowed, 12 percent are divorced, 7 percent are single, and 2 percent are married (calculated from EICV2 data).

compared to non-widowed female heads of household. Particularly, single and married women heading a household (who are mostly the second wife in a polygamous marriage or whose husband is jailed) have better access to support networks, male labor and secure land tenure through their informal or formal male partners as compared to widow heads of household. On the other hand, given the unbalanced sex ratio 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 their 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, that is, a widow moves to her husband's brother's house and is cared for by him (Burnet and RISD 1999). As a result of the excess death and breakdown of social coherence, this system did not function any longer after the genocide.

#### **IV. Norms on gender roles in Rwanda: Review and hypotheses**

For a long time, women in Rwanda have been constrained from freely participating in the development process. There are different factors and institutions that influence and enforce this discrimination which are discussed in turn in the following: Intra-household gender relations; norms on the ideal behavior of women and taboos; and legal discrimination of women by the law. Given the lack of research that explores in what way norms on gender roles have changed as a result of and in the aftermath of the genocide, the following review relies both on sources that depict gender relations (long) before the genocide and on more recent studies. It has been argued in the literature that norms do not change rapidly, even after major events. Following this line of argument, I assume that norms on appropriate female behavior in Rwanda were to a large degree carried over into the post-genocide period.

Women's role inside the household is coined by the idealized image of the woman as child-bearer. "As of early age, Rwandan girls are prepared for their future roles in society, which are centred around her functions as wife and mother" (UNICEF 1997: 103). Rwandan women are valued for the number of children, particularly sons, they give birth to, which is mirrored in high fertility rates. Up until the early 1990s, fertility in Rwanda ranked among the highest in the world, with total fertility rates of 8.5 and 6.2 in 1983 and 1992, respectively (Jayaraman et al. 2008). The high esteem given to procreation also has implications on the activities women typically perform. Many women used to remain at home after reaching puberty and engaged in domestic tasks and cultivation of food crops that are associated and easily combined with their

role as mothers. At the same time, these activities receive less recognition and remuneration and often have heavier requirements on physical labor compared to activities typically assigned to men, such as cultivating cash crops, livestock grazing, and off-farm production. As regards employment outside the farm sector, the private commercial sector used to be a male domain before the genocide, with only 19 percent of the labor force in this sector provided by women (Nowrojee 1996: 13). Employment in the (predominantly urban) public sector was more balanced across gender, although women often held lower-ranking and lower-paid positions than men (ibid.).

In addition, women used to be systematically subordinated in household-level decision-making processes. Empirical research has shown that husbands decide on most issues concerning expenditures and household maintenance in more general terms, with the exception of decisions involving the care of (young) children that are usually taken by the mother (Csete 1993). Similarly, the husband decides over the labor allocation of other household members; their labor “is said to belong to him” (UNICEF 1997: 9). This leaves little room for wives to engage in income-generating activities independently from their husbands. This, in turn, constrains women from acquiring skills and gaining experience in interactions with political authorities, banks, and commercial activities (Newbury, C. and Baldwin 2000: 8). Moreover, women also lack the capacity to employ resources and surplus freely. As Jefremovas argues, “women in Rwanda have limited control over cash they produce, whether it is gained by selling the crops they produce or through wage labour. Women can and do earn cash, but can only control small amounts of the income they generate” (Jefremovas 1991: 382). Their subordinate position also makes it harder for women and girls to defend their rights, for example by insisting on receiving education. This is reinforced by patterns of patrilocal residence (a married couple living with or near the husband’s parents) which implies that investments into a girl’s education only pay off to her husband’s family once she married (Hamilton 2000).

While a woman’s role inside the household is also an outcome of personalized relationships and as a result entails a degree of flexibility, a number of culturally defined taboos imposed on women are enforced more strictly whenever women appear in public, that is, outside the household. There is a taboo for women in Rwanda to build or repair their houses and fences around the compound, to engage in activities related to cattle, such as milking cows and taking cattle to the well, to cut firewood, and to take decisions on farm management (Kimenyi 1992; Newbury, C. and Baldwin 2000). A number of additional activities are not forbidden for women per se, but they were rather uncommon for women before the genocide, such as working as day

laborers on construction sites (Newbury, C. and Baldwin 2000: 6). A case study on inter-gender differences in tree tenure conducted in southern Rwanda illustrates the persistence of taboos (den Biggelaar 1995). Married women are prohibited to plant and own trees for producing timber and firewood or that could be used for construction, possibly because issues of land and tenure security are a male domain. However, this taboo does not apply to female heads of household (widows, divorcees, or women with absent husbands) who are equated with men and acknowledged to take decisions in farming for their households. Yet, the study does not find significant differences in tree planting between female heads of household and wives. Instead, women heads “continue to respect traditional taboos” (den Biggelaar 1995: 14). According to Kimenyi (1992), the limitations for women to engage in certain activities are also reflected and perpetuated by language. Most importantly, women and girls are not allowed to be subjects of some categories of verbs, for instance those referring to courtship, thus denying females an active role therein.

Then again, there are strong notions on the ideal behavior of women inside and outside the household. Rwandan girls are brought up to be modest, reserved, silent, obedient, and of a submissive attitude (Hamilton 2000; Sharlach 1999; UNICEF 1997). Conforming themselves to this stereotypical female role model is also a coping strategy, as “most women try to enforce their claims [on labor, resources and surplus] by asserting that they have behaved in an appropriate manner, as upright wives, virginal daughters, good mothers, and virtuous widows” (Jefremovas 1991). In her study of the urban informal sector in Kigali, Burckhardt (1996) shows that women are disadvantaged by codes for female conduct imparted on them by their social upbringing. Women often lack communication and networking skills, self-confidence and persistence that are essential for establishing themselves successfully as informal sector entrepreneurs. Moreover, sanctions have been imposed on women who over-stepped the roles assigned to them since the pre-colonial era (Baines 2003: 482-483). A more recent example of sanctions enacted against independent women that had a far-reaching impact on gender relations occurred in 1983 (Taylor 1999: 161-163). In Kigali, hundreds of young urban women – many of them well-educated, employed in decent positions, financially independent, dressed stylishly, and single – were publicly harassed by soldiers and police forces and many of them were put in detention centers under charges of prostitution and vagabondage. This discouraged other women to pursue their economic independence from men.

Women were also discriminated against by the formal legislation, which in many ways consolidated women’s status as secondary citizens already assigned to them by custom. The

Family Code of 1992 designated the husband automatically as the head of household who was replaced by his eldest son upon his death (Nowrojee 1996: 41; Sharlach 1999: 391). Also, it gave the husband a bigger authority in parental decisions in case of disagreement (UNICEF 1997: 111). The Commercial Code, dating back from the colonial period, required the written consent of the husband whenever a wife aimed at engaging in commercial activities or employment outside the household (Nowrojee 1996: 13). Moreover, the husband's permission was needed whenever a wife wanted to obtain a credit, take legal action or appear as a witness in court (Jefremovas 1991: 382). Under pressure from aid donors, the revision of several laws and legal codes that do not comply with international standards on gender equality has been started recently. Most importantly, the Rwandan Ministry for Family Affairs introduced a new legislation on succession and marital property regimes in 1999 (Republic of Rwanda 1999) as a response to the sharp increase of female-headed households after the genocide. The law granted women the right to hold ownership of property, including land, and to inherit for the first time in Rwandan history, which reduced women's dependence on their relationships to men for accessing resources (Burnet and RISD 2001). However, its implementation faced several obstacles (African Rights 2007). Most importantly, the law only secured the property rights of women who had formally registered their marriage with civil authorities, a procedure that is costly in Rwanda and was not common in rural areas before the genocide. As a result, despite its progressive outlook, for the majority of widows the law did not reduce their vulnerability to losing access to land.

Improvements, although rather modest, on women's situation have also been achieved in other respects in the post-genocide period. Women participated more intensively in associations, farm cooperatives and credit groups, which were used by many to compensate for lost family ties and breakdown of mutual support networks (Colletta and Cullen 2000). Female parliamentarians in Rwanda now make up the highest proportion in the world (Burnet 2008; Devlin and Elgie 2008). Yet, the increased presence of women in the public and policy domain is restricted to Kigali and mostly benefits well-educated middle-class women, while few patterns have changed in rural areas. Similar to the urban-rural divide, certain policies had a larger impact on different types of households and women. Much aid and transfers, both from international donors and the government, were channeled to genocide victims in order to help them rebuild their war-damaged houses and assets, acquire skills to improve their livelihoods, and fund their children's education. This institutional support particularly helped widows to gain recognition as breadwinners by their community and overcome taboos constraining them in the income-

generating activities. However, widows appear to be a heterogeneous group. While some widows do relatively well economically and are capable of taking advantage of economic and educational opportunities, many others continue to be restricted by lack of support, discrimination, remoteness, and health problems that often relate to genocidal violence (Brück and Schindler 2009).

From this review, three hypotheses are derived on how norms on female gender roles have an impact on the gendered division of labor within households today. First, restrictive norms on female gender roles within the household are likely to be modified and mitigated due to war-induced changes in household composition. This is more likely to have taken place in widow-headed households than in other types of households. Given that the majority of widows are likely to be genocide widows, many of them not only lost their husband, but also other male household members. Hence, widow heads often became the breadwinner and the principal decision-maker of their household. On the contrary, households characterized by a traditional setup – a male head, his wife, children, etc. – are likely to stick to traditional gender roles. Married women may have an incentive to conform to the cultural ideal of female behavior given the surplus of women in the marriage market and increasing divorce rates in the aftermath of the genocide.<sup>6</sup>

Second, norms on the behavior and activities of women in the public sphere are likely to be persistent, particularly in rural areas. The enforcement of norms may be less strict in so-called imidugudu villagization schemes that were implemented after the genocide (Bigagaza et al. 2002; Hilhorst and van Leeuwen 1999). The government promoted imidugu settlements as a means of addressing the severe shortage of housing of vulnerable persons (with plans to eventually settle the whole rural population in imidugudu). Traditionally, families in rural Rwanda construct their houses close to their fields, leading to dispersed settlements of compounds that can be spread out over long distances. By concentrating settlements in imidugudu centers, one important goal of the villagization policy was to mitigate the pressing land scarcity and increase agricultural productivity (Kondylis 2005). Moreover, imidugudu were aimed at encouraging reconciliation and facilitating the integration of former refugees, in addition to improving the provision of public services and infrastructure. The selection of beneficiaries entitled to receive houses or plots for construction varied across imidugudu, although many Rwandans did not voluntarily move to imidugudu. Some settlements mainly served expatriates who were returning to Rwanda

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<sup>6</sup> Data from several waves of Demographic and Health Surveys indicate that the proportion of divorced women aged 15-49 increased from 6.1 percent in 1992 (ONAPO and Macro International 1994) to 9.5 percent in 2000 (ONAPO and ORC Macro 2001) and remained at 9.4 percent in 2005 (INSR and ORC Macro 2006), while less than 2 percent of men were divorced.

after spending many years in exile, while in other cases genocide survivors, orphans, and female-headed households were the principal beneficiaries (Hilhorst and van Leeuwen 1999: 28-29). It appears that in most imidugudu settlers did not know each other well beforehand, resulting in a low level of social cohesion and networks, at least initially. From this follows that cultural institutions are less visible, which in turn leaves women more freedom to perform income-generating activities traditionally assigned to men in public.

Third, regardless their marital status, women living in any household setting continue to be discriminated against in the labor market. Hence, even if their levels of education, skills, and experience are equal to that of men, it is hypothesized that women face higher entry barriers to employment outside their own farm. This is assumed to apply both to the public and the informal sector. The overall discrimination is likely to stem from a combination of legal discrimination and stereotypes regarding expected behavior of women in public by employers.

## **V. Data**

The paper uses the latest national household survey available from Rwanda, the *Enquête Intégrale sur les Conditions de Vie de Ménage* (EICV2). Using a similar format than the World Bank's LSMS, the EICV2 captures living conditions of 6,900 Rwandan households and collects information on household demographics, education, health, agriculture production, employment, income and expenditure, migration, credit and savings, and time use. The survey is based on a stratified two-stage sample design and provides representative data at the national and provincial level (in the former administrative structure with 12 provinces) in the agricultural cycle of 2005-2006. Three strata were identified at the national level (city of Kigali, other urban areas, rural areas) and the rural strata was further sorted by the 10 bio-climatic zones present in Rwanda.

Data on time use was collected through a stylized list of activities in different modules of the questionnaire. Respondents were asked to recall the frequency and duration of time they spent on selected pre-coded activities over a long and a short reference period (cf. Harvey and Taylor 2000; United Nations, 2005). Time use in the long reference period includes information on the number of months spent on 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 of work over the seven days prior to the interview in domestic tasks and income-generating activities. This paper only focuses on time use in the short term, given that more detailed information is available for the short reference period.

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). In the following, all of these domestic activities are summed up and referred to as domestic tasks. In terms of income-generating activities, the original survey captures wage work, self-employment and unpaid work, each in the farm and non-farm sector, hence representing six mutually exclusive categories. For the purpose of analysis, these income-generating activities were aggregated into (1) agricultural production 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. Each of these domestic and generating income activities includes the time of travel from the household and back. Time spent on social activities, caring for others, leisure, resting and sleeping is not recorded in the survey. Put differently, the hours spent on domestic tasks and income-generating activities included in the survey do not add up to 24 hours a day.

The distinction of domestic activities and income-generating activities is somewhat arbitrary, given that fetching water and gathering firewood may contribute essentially to household production, such as subsistence farming. Similarly, the standard ILO definition of economic activity status considers an individual to be economically active if she is engaged in the production of goods or services for the market, for barter, or for household consumption (ILO 1982). Yet, the EICV2 derives the economic activity status of individuals from filter questions on only income-generating activities<sup>7</sup> and applies different data collection procedures for domestic and market activities. While information on domestic tasks was collected for all individuals of age six and older, only economically active individuals were interviewed about their income-generating activities. In order to avoid coding errors, the distinction into domestic and income-generating tasks is adhered to.

The analysis of household time allocation 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. Also, community-level data that contain important information on infrastructure and access to markets were only captured in rural areas. Furthermore, the sample is restricted to households that engage for at least one hour in domestic tasks and income-generating activities, each, in order to avoid biases due to data collection problems. Complete information on time use is available for 4,695 rural households (of which

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<sup>7</sup> 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.).

1,105 are widow-headed) and 12,134 individuals. A small number of individuals (less than a half percent of the sample) have doubtfully high numbers of aggregated hours worked over the last seven days, which appears to be the result of interviewers' errors. A ceiling of 18 hours of work per day was imposed on those cases (c.f. Medeiros, Osorio and Costa 2007).

While the EICV2 data generally are of high quality, data on remuneration is rather weak. For the majority of surveyed wage laborers, information on earnings is missing, which is often paid in kind, especially in agricultural farm work. Also, income derived from joint activities of household members, such as working on the family farm or a family-run enterprise, cannot be disaggregated into the hourly earnings of each household member. As a consequence, Becker's (1965) specialization hypothesis cannot be tested with the data at hand.

## VI. Estimation approach

There are several challenges in estimating determinants of time allocation in this empirical setting. From the previous section follows that households are characterized by heterogeneous preferences and an unequal distribution of power, which may call for a collective household model. Yet, several assumptions required by a collective model are not given in the context of rural Rwanda. Also, sample households differ largely in size and composition, which leaves different scope for dividing tasks among members in different households. For instance, about 10 percent of the EICV2 sample households only encompass one or two members, while another 10 percent have more than nine members. To address these issues, a reduced form approach developed by Fafchamps and Quisumbing (2003) for analyzing time allocation in Pakistan – a context that has several similarities with rural Rwanda – will be followed.

Their procedure involves two steps. First, household-level regressions on total time spent in an activity, aggregated over all household members, will be estimated. Using a utility maximization framework, Fafchamps and Quisumbing derive a series of reduced form labor supply functions:

$$L_a^i = f_a(K_k, U, H_1, K, H_N, w_1, K, w_N) \quad (1)$$

where the labor supply of individual  $i$  on activity  $a$  depends on semi-fixed inputs  $K$ , unearned income  $U$ , human capital of other household members  $H$ , and welfare weights  $w$  in households with  $N$  members. In order to estimate this equation for households of different size, the labor supply functions are summed up over all members, replacing individual-specific variables with household summary statistics:

$$L_a = f_a(K_k, U, \overline{H}_g, \overline{w}) \quad (2)$$

where the averages of human capital variables  $H$  of members of position  $g$  relative of the head of household are included and household weights  $w$  are replaced with proxies for household composition. In addition, community characteristics are controlled for, given that patterns of income-generating activities may be driven by geographical factors. Summary statistics of variables used in the empirical analysis are provided in table 5.

Fafchamps and Quisumbing propose a parameterization for household composition:

$$N_1 + \sum_{j=2}^J (1 + \alpha_j) N_j \approx N e^{\frac{\sum_{j=2}^J \alpha_j N_j}{N}} \quad (3)$$

that takes into account total household size  $N$ , the number of different positions within the household hierarchy  $J$ , the number of household members in each position  $N_j$ , and a parameter  $\alpha$  measuring the difference of a position relative to the omitted position. In other words, the parameterization captures an individual's gender, marital status and age, which are likely to determine an individual's culturally defined gender role, but also her relative bargaining power within the household. The household position categories originally included in the EICV2 are displayed in table 2. Note that for the regression analysis household positions were aggregated in order to have a considerable number of observations in each household composition category; the household position categories used in the regression analysis include head, spouse, son, daughter, other female adults, other male adults, and children younger than six years.

The purpose of the household-level estimation is to test, first, whether household composition has an effect on total labor supply (that is, whether social roles pose a binding constraint on the household's allocation decision) and second, whether widow-headed households are different in terms of the drivers of total labor supply from male-headed households. In order to differentiate not only between these two household types, but also to take into account different initial levels of human capital and household composition in widow- and male-headed households, interaction terms are introduced in the estimation of equation 2.

In a second step, individual-level labor shares are estimated:

$$S_a^i = \frac{L_a^i}{L_a} \quad (4)$$

where the labor share  $S$  of individual  $i$  on activity  $a$  depends on the individual's labor supply and the total household labor supply allocated to an activity. Following the line of argument of Fafchamps and Quisumbing (2003), individual labor shares are determined by an individual's human capital endowment relative to the endowments of other household members and by an individual's position within the household hierarchy, but not by household asset endowments. Additionally, a dummy for imidugudu settlements is including in order to test the hypothesis that imidugudu settlements impose less restrictions on women's activities. The aim of the individual-level estimations is to test for the impact of social roles on time allocation across different household types. Again, interaction terms are used in order to compare widow-headed to male-headed households.

A difficult question is whether or not to control for household wealth, given that endogeneity is a potential problem. Different approaches have been suggested to cope with this issue in the literature on time allocation in developing countries. Some studies control for wealth irrespective its potential use in subsistence agriculture, such as land (Micevska and Rahut 2008) and agricultural assets (Ilahi 2001b), while other studies are more careful in avoiding potential loop-backs, for example by using relative changes in income (Cunningham 2001). In the case of Rwanda, transfers in land were not frequent at the time of the survey collection; therefore, I assume that land is unlikely to influence labor allocation on different activities in the short term. In addition, both livestock (transformed into tropical livestock units for comparability) and the current value of agricultural assets are controlled for, as both are important local indicators of household wealth, even though the latter are more likely to be endogenous to working in own-farm agriculture. A stepwise approach was used in estimating equation 2, adding one wealth indicator at a time to ensure that coefficients of other variables do not change as a consequence.

Equations 2 and 4 were estimated using Heckman's two-step approach in order to account for potential sample selection bias into being economically active (data not shown).<sup>8</sup> In none of the regressions Heckman's lambda turned out to be significant; hence, the null-hypothesis of the presence of a selection bias was rejected.

A number of individuals and households have no observed time allocated to some of the four activities; this is particularly true for agricultural wage work, which is not performed by about 75 percent of the sample households. All zero observations in the dependent variable are

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<sup>8</sup> 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).

interpreted as corner solutions or behavioral choices not to work in a particular activity, while the remaining observations with positive hours worked are continuously distributed. Equation 2 and 4 were estimated using tobit. 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. Such an approach avoids potential biases when a theory on the differential impact of factors on the decision to participate in an activity and the decision of intensity of participation is lacking. Overall, the Heckman two-step estimates 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. The procedure recommended by Wooldridge (2006: 603) was applied to test the goodness of fit of the tobit estimation. The method 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 household labor supply to domestic tasks (table 6, model 1) household wealth proxies are not jointly significant. All groups of variables are still reported in the results tables for the sake of comparison of different activities.

Households were interviewed at different stages in the agricultural cycle. Both farming activities on the household's own land and agricultural wage work are less intensive in July and August. The impact of the timing of household interviews on time allocation was tested and only turned out to be significant for subsistence farming in rural areas during the planting season (data not shown).

## **VII. Results and discussion**

This section begins with presenting descriptive evidence on patterns on time allocation that provides an unconditional perspective and does not control for individuals' human capital endowments, household composition or wealth, before discussing regressions results.

Descriptive statistics reveal that there are major differences in household characteristics among widow-headed and male-headed households. Table 1 compares the mean value of some key

variables across these two household types and provides t-statistics on the significance of the differences in means. Four results are of particular interest. First, widow heads are engaged in a significantly lower number of market activities than male heads, both in the long and in the short term. This may be due to lack of opportunities and may render widow-headed households more vulnerable to risks and income fluctuations. Second, widow-headed households have a lower status of well-being and a higher incidence of extreme poverty, defined in terms of food needs, compared to male-headed households. This may be a result of lower endowments of physical and human capital assets. Third, it appears that household composition in terms of the ratio of female to male members and total household size is significantly different across both types of household. This underlines the necessity to carefully incorporate household size and composition in the regression analysis. Last, while imidugudu settlements originally targeted vulnerable groups of individuals, including widows, genocide orphans and individuals living with HIV/AIDS, widow-headed households in the sample do not have a higher likelihood of living in an imidugudu than male-headed households (with 24 percent of either type of household living in an imidugudu).

Table 2 and table 3 depict individuals' total work burdens during the week prior to the interview in domestic tasks and income-generating activities, differentiated by an individual's relation to the head of household and household type. There appears to be a clear division of labor among spouses across sectors, in which wives engage predominantly in domestic tasks and husbands in income-generating activities. Moreover, wives work about 17 hours more per week than husbands. Household members without kinship ties to the head bear the highest work burden; they are most likely informal wage laborers who are incorporated into a household in exchange for housing and food. The total workload is unexpectedly low: Economically active individuals in rural Rwanda spent about 44.6 hours per week in domestic tasks and market activities combined.<sup>9</sup> This low average may indicate underemployment.

Table 3 indicates that clear patterns of gender roles are present. While heads of either gender work fewer hours in total than other members, widow heads and male heads allocate their time in a different manner. Male heads spent eight hours per week longer in income-generating activities than widow heads, while widow heads spent almost half of the surveyed time in reproductive tasks. Considering the aggregated time spent on all activities, female household members work on average 10 hours more per week than male members. This contrasts with evidence from

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<sup>9</sup> Note that only individuals with positive hours worked were considered in this calculation; the mean over all individuals is even lower. Ilahi (2001) finds similar values for Peru.

developed countries, where the total time spent in reproductive and productive activities is 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, contrasting with results from Mexico where men in female-headed households work harder in order to compensate for the gender wage gap (Cunningham 2001). 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.

Looking at the proportional time contributions of individuals to different activities (table 4), it appears that domestic tasks are a female domain. Differences in time contributions across gender are very large and even more so when household tasks are disaggregated further, for instance in cleaning or cooking (data not shown). Household hierarchy only matters if women as a group are analyzed more closely. For example, spouses contribute much more time to domestic tasks than other female household members. In contrast, heads irrespective of gender are the principal income earners, while children contribute the least. Gender matters more if income-generating activities are disaggregated into farm and non-farm work, as women engage more intensively in own-farm agriculture compared to men.

To conclude, these unconditional analyses suggest that a pronounced division of labor along gender lines is present in rural households, assigning females to reproductive and males to productive activities. Household hierarchy seems to matter particularly in income-generating activities. Moreover, descriptive evidence indicates that widow heads behave differently from a typical male head holding the economic responsibility of his household, but instead follow typical time patterns of wives, both in terms of absolute work burdens and the division of work in the domestic and market sector. Yet, the unconditional analysis does not reveal whether these patterns are driven by gender roles or simply by different endowments of productive assets and human capital.

In the following, regression results will be discussed for each of the three hypotheses in turn as outlined in section 4, beginning with the impact of gender roles at the household level, then moving to the community level, and concluding with the overall discrimination of women in the labor market.

#### *Intra-household gender roles*

Table 6 displays tobit estimations of total household labor supply on domestic work, agriculture on the household's land, non-farm market work, and agricultural wage work (equation 2). The

displayed coefficients represent marginal effects conditional that the household worked positive hours in an activity. The same four activities are considered in the individual-level regressions in table 7 (estimation of equation 4), where the dependent variables are now defined as proportions of individuals' time out of total household time spent on an activity. Again, regressions were estimated with tobit and coefficients indicate marginal effects if individuals did engage in an activity.

In the household-level estimates (table 6), the dummy for widow-headed households is individually significant in all activities except farm wage work, reducing household time spent in these activities compared to male-headed households. Also, the hypothesis that widow-headed and male-headed households are the same is strongly rejected for all activities (see F-tests at the bottom of table 6). Again, the F-test whether individuals living in widow-headed and male-headed households are equal also strongly rejects this hypothesis in the individual-level regressions (at the bottom of table 7). The dummy for individuals living in a household led by a widow is only large and statistically significant from zero at the five percent level in subsistence farming. Overall, it seems that distinguishing between these household types is statistically valid.

One key result regarding the drivers of household time allocation (table 6) is that in male-headed households, a large number of household composition variables are individually and jointly significant after controlling for human capital endowments (jointly significant in all activities and individually significant in many cases). Moreover, the hypothesis that all members are the same is strongly rejected for all activities (see F-tests at bottom of table 6). In male-headed households, females irrespective of their position within the household hierarchy contribute significantly more time to domestic work and significantly less time to agricultural wage work than other male adults, the reference category after controlling for human capital endowments. The latter are proxied by age, level of schooling completed, and health status during the two weeks prior to the interview. As expected, children work less in income-generating activities outside the family farm than other males. The household-level results suggest that household composition is a binding constraint and may be investigated in more detail at the individual-level. Investigating the determinants of individual labor shares in more detail (table 7) confirms these findings. Again, F-tests indicate that it is relevant to account for gender roles after controlling for human capital differences, while also many of the household composition variables are individually significant. There appears to be a strict division of labor along gender lines: Females engage much more intensively in domestic work and subsistence farming relative to other males, while this is the opposite for market-based activities and farm wage work. To conclude, in line with descriptive

evidence discussed above, these results suggest that gender roles (in addition to human capital endowments) are an important driver of the intra-household division of labor in male-headed households.

In contrast, household composition contributes less to explaining household labor supply in widow-headed household, both individually and jointly. Testing whether all adults are the same in widow-headed households reveals that this is cannot be rejected for domestic work and farm wage work (see F-tests at the bottom of table 6). Women seem to play a particular economic role in widow-headed households: Both daughters and other adult women contribute significantly more time to subsistence farming than other adult males. Yet, adult daughters (and other children) work less in farm wage work and, surprisingly, in domestic tasks. One possible explanation is that age rather than gender roles determine the division of tasks after controlling for education. Moving on to the individual-level analysis, gender roles are binding in own-farm agriculture, market activities, and farm wage work, but not in domestic tasks. This supports the hypotheses that gender roles are negotiated more easily in domains that are less visible to neighbors and the community as such. Yet, in activities in which gender roles do pose a constraint for widow-headed households, no clear pattern emerges of a gendered division of labor emerges. Considering F-tests on pairwise comparisons of widow heads to other categories suggest that in market activities, a widow heading a household behaves similarly to wives and works less intensively in non-farm income-generating activities than other adult males, the reference category. However, the situation is the opposite in farm wage work, where the hypothesis that a widow head has equal labor shares than a spouse is strongly rejected, while this cannot be rejected in a comparison with a male head. In rural Rwanda, agricultural wage work is a sector of last resort for vulnerable households which either lack land endowments to sustain themselves from agriculture or skills and education to enter better-paid jobs, while there are also notions of shame attached to working on somebody else's field. Hence, one possible explanation is that economic stress drives widow-headed households not only to engage in farm wage work, but also to ignore culturally defined gender roles in this activity. To conclude, regression results indicate that gender roles as proxied by household composition variables explain much less of household time allocation in widow-headed households.

#### *Norms regarding women's activities in public*

Exploring the impact of the settlement type on household time allocation (table 6) reveals straightforward results. Living in an imidugudu increases household labor supply to non-agricultural market activities for any type of household after controlling for community

infrastructure (such as whether a market and a road are present) and households' endowments with land. It seems that the more concentrated settlements per se provide more opportunities; perhaps because imidugudu settlements have better access to government services and donor-programs. Moreover, interacting the imidugudu dummy with widow-headed households indicates that widow-headed households in particular benefit from living in such a settlement, as their total time devoted to market activities increases sharply. This result is confirmed with evidence from the individual-level analysis, where labor shares of females of any household type increase in imidugudu settlements. In line with the second hypothesis, this may point to the fact that women and those living in widow-headed households in particular more easily overcome restrictive norms on how to behave in public in newly-constructed settings, possibly because cultural institutions and local authorities are being newly formed and have less impact. Moreover, imidugudu settlements generally discourage agricultural wage work, perhaps because the wealth distribution across households is more equal, with fewer households present that can afford to employ agricultural laborers on their fields. Only the labor shares spent in farm wage work of women and girls living in widow-headed households slightly increase in imidugudu settlements. One could possibly point to the argument of economic stress as outlined above to interpret this finding.

#### *Discrimination of women in the labor market*

As expected, in male-headed households human capital proxies are jointly significant in all household and individual regressions, while again human capital contribute much less to explaining time allocation in widow-headed households. The household-level regressions reveal that in terms of human capital endowments, male-headed households with better educated men and women spend significantly more time in non-agricultural income-earning activities and less time in own-farm agriculture. Also, there seems to be a generational effect present, given that older individuals more likely engage in agriculture, either on the household's land or in farm wage work. In other words, formal education offers different opportunities than experience acquired over time.

Interestingly, the situation is different for widow-headed households: More education does not reduce household time spent in the agricultural wage sector (table 6). A possible explanation is that widow-headed households are less able to respond to opportunities in the labor market. The single most important human capital variable in widow-headed households is health problems, which significantly and largely reduces household time spent in non-agricultural market activities. This is very likely one of the long-term consequences of the genocide, where widows

and there household members often were victims of violence. At the individual-level (table 7), the dummy for individuals living in a household led by a widow is large and statistically significant from zero at the five percent level. In those households, individuals engage on average much more in own-farm agriculture than individuals living in other household settings. Own-farm agriculture may have less entry barriers to widows in terms of skills, experience, and capital endowment compared to other non-agricultural income-generating activities.

## **VIII. Conclusion**

The paper provided a careful analysis of the drivers of intra-household time allocation in the post-war context of Rwanda, where women-headed households in particular are confronted with restrictive norms on female gender roles. The analysis particularly accounted for the unusual war-related distribution of household size and composition that leaves different scope for dividing tasks among household members.

The analysis revealed three issues. First, the allocation of labor among household members is driven by very different factors among different household types. In male-headed households, tasks are allocated based on both social roles and on comparative advantage as a result of human capital differences of members, measured by formal education, age, and health status. In contrast, in widow-headed households, the division of tasks along gender lines is less pronounced. Overall, the few proxies for gender roles in widow-headed households that are significant in the empirical analysis have the expected signs, indicating that gender roles continue to structure the division of tasks. Yet, there are also examples that contradict the division of tasks into a female and reproductive domain and a male and productive domain. For instance, males living in widow-headed households appear to contribute more to domestic task than other adult women, hence behaving differently from their counterparts in women-headed households. The findings support the hypothesis that exogenously-driven changes household composition (in the case of Rwanda high male mortality rates due to violent conflict) have an impact on the way gender roles are negotiated within the household.

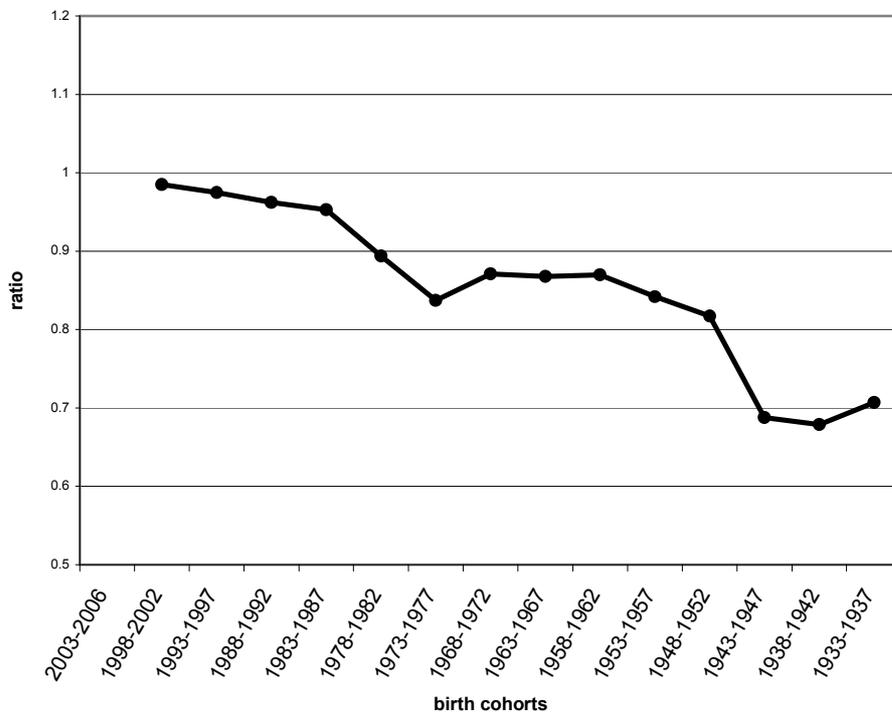
Second, it seems that the type of settlement has an impact on whether norms on female behavior in public do restrain women in engaging in income-generating activities. Women living in either kind of household are found to engage more intensively in non-farm income-earning activities if their household is settled in an imidugudu settlement, a villagization scheme that has been introduced to address the pressing shortage of housing and land after the genocide. Widow-headed households in particular seem to benefit from living in these settlements.

Third, women in general are found to be discrimination against in the labor market, even if they have similar levels of formal education and experience than men. This particularly affects households headed by widows, who have a larger ratio of female to male members. Rather, health status matters in these households. This seems to point to widows' immediate experiences of the genocide, in which many were victims of violence. Widow-headed households engage more intensively in agricultural income-earning strategies, which are generally less productive than non-farm work. In Rwanda, where for many households 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.

Several policy implications can be derived from the results. Women, particularly those in male-headed households, are likely to benefit from lowering the entry barriers to non-agricultural income-generating activities, such as petty trading and artisanry. Providing training, not necessarily formal, to acquire new skills and access to microfinance may be fields of intervention. Lastly, the paper makes an argument for the provision of basic infrastructure in rural areas. Improved access to water and the provision of alternative energy sources to replace firewood as cooking fuel reduces the time individuals – particularly women – spent in arduous domestic tasks.

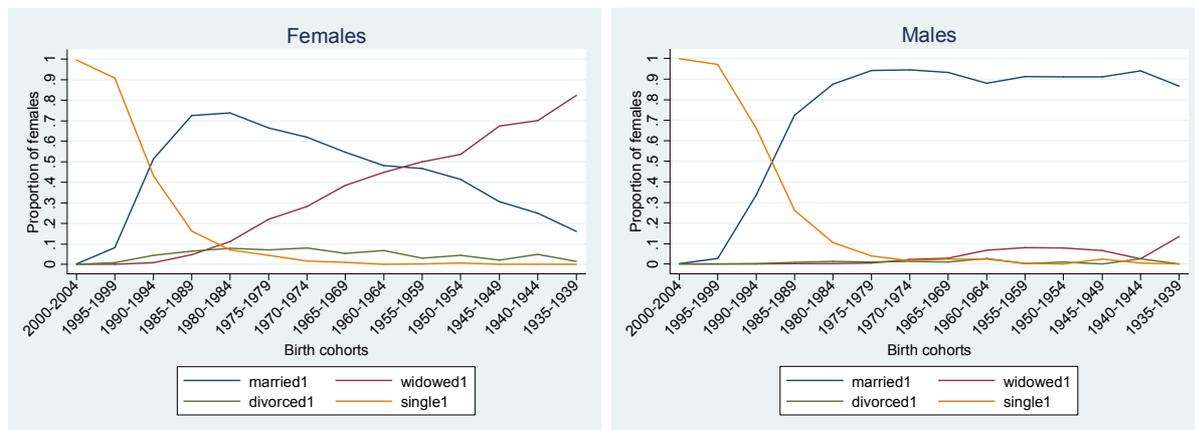
## Appendix

**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**



Source: EICV2; all sample individuals, 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)	
Age of head of household	54.32	42.19	26.21***
Number of classes attained by head	1.62	3.56	-19.97***
Proportion of heads having health problems in last 2 weeks	35 %	22 %	8.53***
Household size	4.22	5.33	-17.24***
Dependency ratio	1.22	1.26	-1.12
Ratio of female to male members	1.91	1.23	16.07***
Land owned, in hectare	0.72	0.86	-3.52***
Number of tools per household	3.91	4.87	-10.40***
Value of durables, in Rwandan Franc	10428	26170	-4.82***
Proportion of households living in imidugudu settlement	24.7 %	24.9 %	-0.42
Proportion of households under poverty line	61 %	58 %	1.76*
Proportion of households under extreme poverty line	41 %	36 %	3.24**
Number of econ. activities per head, short term	1.24	1.32	-5.52***
Number of econ. activities per head, long term	1.41	1.65	-12.33***

Sample: EICV2, rural households; weights used.

**Table 2: Number of hours worked in domestic tasks and income-generating activities per individual by household position, last seven days**

	Mean hours worked in			N
	domestic tasks	income-generating activities	all activities	
Head of household	13.42	30.06	38.34	4,771
Spouse	31.05	25.63	53.77	3,351
Son/daughter of head	18.58	29.29	42.49	3,121
Child in custody	16.51	27.32	37.42	35
Father/mother of the head	9.95	26.85	35.39	14
Brother/sister of the head	18.07	31.56	44.04	191
Grandchild of head	19.60	27.82	42.07	207
Other relationship to the head	21.32	32.52	48.75	131
No relationship to the head	22.82	48.05	66.07	313
<b>average</b>	20.95	29.15	44.64	12,134

Sample: EICV2, economically active individuals 6 years and older with positive hours worked in an activity and older in rural areas. Spouses are recoded to be always female in the sample.

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

	Mean hours worked in			N
	domestic tasks	income-generating activities	all activities	
<b>Head of household</b>	12.35	30.36	37.67	4,695
<b>Other household member</b>	25.01	28.52	48.97	7,369
<b>Male head</b>	8.19	32.21	36.20	3,590
<b>Widow head</b>	21.07	24.20	42.30	1,105
<b>Female member in male-headed household</b>	29.58	26.09	52.50	4,700
<b>Female member in widow-headed household</b>	21.90	25.24	43.98	751
<b>Male member in male-headed household</b>	9.37	33.22	37.74	1,233
<b>Male member in widow-headed household</b>	10.18	33.99	39.07	685

Sample: EICV2, economically active individuals 6 years and older with positive hours worked in an activity in rural areas.

**Table 4: Time contribution of individuals to domestic and income-generating activities out of total household time by household position, last seven days**

		Domestic tasks	Own-farm agriculture	Non-agric market work	Agric wage work	Sum of all income-generating activities
<b>Males</b>	<b>Male head</b>	11%	39%	66%	55%	50%
	<b>Son</b>	12%	22%	36%	31%	29%
	<b>Other males</b>	20%	18%	28%	65%	40%
<b>Females</b>	<b>Widow head</b>	42%	64%	28%	44%	57%
	<b>Spouse</b>	56%	52%	17%	26%	39%
	<b>Daughter</b>	35%	29%	23%	27%	28%
	<b>Other females</b>	37%	29%	26%	21%	29%
<b>Total hours spent on this activity per hh</b>		58.67	58.67	44.17	31.12	63.93
<b>Number of hh reporting this activity</b>		5,079	5,079	1,726	1,326	5,079

Sample: EICV2, economically active individuals 6 years and older with positive hours worked in an activity in rural areas. Proportions do not add up to 100 percent because not all types of individuals are present in a given household.

**Table 5: Summary statistics of variables used in regressions**

Variable	Definition	Mean	SD	Min	Max
<b>Dependent variables (household-level regression)</b>					
DOMHOURHH	natural log of total hours spent per household in domestic activities over last 7 days	65.00	39.21	0	561
SUBHOURHH	natural log of total hours spent per household in agricultural activities on the household's own land over last 7 days	44.59	34.95	0	320
MARKETNFHOURHH	natural log of total hours spent per household in non-agricultural market activities over last 7 days	17.72	30.77	0	313
WAGEFHOURHH	natural log of total hours spent per household in agricultural wage work over last 7 days	8.45	19.11	0	330
<b>Dependent variables (individual-level regression)</b>					
DOMHOURI	individuals' hours spent in domestic activities as proportion of total household time in domestic activities over last 7 days	0.24	0.27	0	1
SUBHOURI	individuals' hours spent in agricultural activities on the households' own land as proportion of total household time in this activity over last 7 days	0.37	0.32	0	1
MARKETNFHOURI	individuals' hours spent in non-agricultural market activities as proportion of total household time in non-agric. market activities over last 7 days	0.13	0.32	0	1
WAGEFHOURI	individuals' hours spent in agricultural wage work as proportion of total household time in agric. wage work over last 7 days	0.10	0.28	0	1
<b>Individual characteristics</b>					
AGEDIFF	individual's difference in age from household mean age	0.01	18.12	-21.40	77.60
EDUDIFF	individual's difference in number of classes attained from household mean education	-0.61	3.47	-3.01	19.99
HEALTHDIFF	individual's difference in health status from household mean health status	0.004	0.23	-0.19	0.81
HEAD	individual is head of household (d)	0.20	0.40	0	1
SPOUSE	individual is spouse of head (d)	0.13	0.34	0	1
OTHERFEM	individual is other female member (d)	0.02	0.16	0	1
OTHERMAL	individual is other male member (d)	0.02	0.16	0	1
<b>Household composition</b>					
HHSIZEL	log of household size	1.72	0.50	0	2.77
SHAREH	share of head of household size	0.19	0.17	0.06	1
SHARESP	share of spouse(s) of household size	0.13	0.12	0	0.50
SHAREOM	share of other males of household size	0.02	0.08	0	0.75
SHAREOF	share of other females of household size	0.02	0.08	0	0.75
SHARECH	share of children of household size	0.20	0.18	0	0.67
<b>Human capital</b>					
AGEM	mean age of male household members	21.88	12.74	0	97
AGEM2	mean age squared of male household members	602.1	942.8	0	9409
CLASAM	mean of number of classes attained by male household members	3.25	3.02	0	23
HEALTHAM	share of sick male household members of household size	0.18	0.31	0	1
AGEF	mean age of female household members	23.19	13.84	6.50	95
AGEF2	mean age squared of female household members	668.7	1059	42.25	9025
CLASAF	mean of number of classes attained by female household members	2.81	2.54	0	18
HEALTHAF	share of sick female household members of household size	0.20	0.33	0	1
<b>Household characteristics</b>					
LANDL	natural log of land owned by household in hectare	-0.73	1.22	-6.50	3.90
AGASSETVALUEL	natural log of current value of agricultural assets	7.85	0.88	3.00	14.02
TLUL	natural log of tropical livestock units <sup>10</sup> owned by household	1.28	0.93	0	5.89
UNEARNEDY	unearned income (transformed into terciles in regression)	21833	56292	0	1.5 mio
IMIDU	household lives in imidugudu (d)	0.25	0.42	0	1
DECISION					

<sup>10</sup> One tropical livestock unit represents 1 cow, 0.25 pigs, 0.17 sheep, and 0.17 goats.

<b>Community characteristics<sup>11</sup></b>					
MARKET	cellule has a daily or weekly market (d)	0.14	0.36	0	1
ROAD	cellule has a road that is passable the whole year (d)	0.66	0.48	0	1
CLUSTERMIG	more individuals arrived than departed from cellule over last 5 years (d)	0.39	0.48	0	1
<b>Provincial characteristics</b>					
P1	City of Kigali (d)	0.01	0.12	0	1
P2	Southern province (d)	0.26	0.44	0	1
P3	Western province (d)	0.26	0.45	0	1
P4	Northern province (d)	0.19	0.38	0	1
P5	Eastern province (d)	0.25	0.44	0	1

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

<sup>11</sup> The community questionnaire was conducted at the cellule level, the smallest administrative unit in Rwanda that encompass on average 300 households. Yet, the majority of cellules do not comprise a small center.

**Table 6: Determinants of household time allocation in rural Rwanda (tobit estimation)**

		Total hours per hh worked in				
		domestic work	own-farm agriculture	non-farm market	agricultural wage work	
		(1)	(2)	(3)	(4)	
household composition	male-headed	household size (log)	0.60***	0.22	0.86***	0.90***
		share head	0.22	0.59	0.23	0.97
		share son	0.19	0.43	-0.96**	-2.04***
		share spouse	0.61**	0.59	-0.11	-2.58***
		share daughter	0.42**	0.72*	-1.31***	-2.24***
		share other female adults	0.59**	-0.23	-0.61	-2.29***
		share children	-0.01	0.42	-1.28***	-1.82***
	widow-headed	widow-headed household (d)	0.14	-0.14	0.05	-0.07
		household size (log) <sup>†</sup>	-0.29	0.81	0.83	-0.95
		share head <sup>†</sup>	-0.70	2.12	3.00	-4.43
		share son <sup>†</sup>	-0.35	0.89	0.63	1.11
		share daughter <sup>†</sup>	-0.66*	1.30*	-0.02	1.65*
		share other female adults <sup>†</sup>	-0.88*	3.48***	-0.23	1.49
		share children <sup>†</sup>	-0.44	1.30	0.92	1.78*
human capital	male-headed	males average age	0.00	0.02*	0.01	0.03***
		males average age squared	-0.00	-0.00**	-0.00	-0.00***
		males average education	-0.00	-0.03**	0.06***	-0.05***
		males average health problems	0.11***	-0.14*	-0.08	0.06
		females average age	-0.00	0.02**	-0.01	0.04***
		females average age squared	0.00	-0.00*	0.00	-0.00***
		females average education	-0.00	-0.03***	0.04***	-0.04***
	females average health problems	0.07*	-0.23***	-0.02	0.14*	
	widow-headed	males average age <sup>†</sup>	-0.02	0.07**	0.14***	0.05
		males average age squared <sup>†</sup>	0.00	-0.00	-0.00**	-0.00
		males average education <sup>†</sup>	0.01	-0.02	-0.09***	-0.03
		males average health problems <sup>†</sup>	-0.09	0.09	0.02	-0.15
		females average age <sup>†</sup>	-0.00	0.02	0.01	-0.03
		females average age squared <sup>†</sup>	-0.00	-0.00	-0.00	0.00*
females average education <sup>†</sup>		0.01	-0.03	0.03	0.02	
females average health problems <sup>†</sup>	0.06	-0.10	-0.63***	-0.27		
household characteristics	land size (log)	0.01	0.13***	-0.00	-0.05*	
	agric assets (log)	0.01	0.13***	0.09***	-0.10***	
	tropical livestock units (log)	0.05**	0.23***	0.05	-0.24***	
	unearned income medium (d)	-0.05*	-0.16**	-0.03	0.26***	
	unearned income high (d)	0.02	-0.18***	0.08	0.12*	
	decision-making (d) * male headed household	-0.06	-0.40***	0.42***	-0.08	
	household lives in imidugudu (d)	0.01	0.08	0.13*	-0.15**	
	widow-headed hh lives in imidugudu (d) <sup>†</sup>	0.03	-0.08	0.34*	0.11	
location	market (d)	-0.02	-0.10*	0.22***	-0.05	
	road (d)	-0.05**	-0.11**	-0.01	0.06	
	community has in-migration (d)	-0.01	0.08*	-0.00	0.00	
summary statistics	constant	2.72***	1.18	-6.96**	-3.08	
	sigma	0.52***	1.26***	3.80***	4.20***	
	N	4443	4443	4443	4443	
	N left-censored	2	359	2898	3336	
	log-likelihood value	-3408.17	-7279.17	-5794.81	-4563.06	
	chi2	941.56	588.78	508.30	321.19	
<b>F-tests</b>						
<b>male-headed households</b>						
all adults are the same	3.03**	3.45**	4.45***	9.42***		
human capital variables are jointly significant	4.05***	7.81***	13.75***	10.01***		
<b>widow-headed households</b>						
widow-headed = male-headed household	1.86*	2.77***	3.96***	2.21**		
all adults are the same	1.69	3.21*	1.01	3.07*		
human capital variables are jointly significant	1.16	2.23*	6.32***	2.36*		

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: total household time spent in an activity; four regional dummies not shown; other male adults are the left-out category in household composition; (d) for discrete change of dummy variable from 0 to 1; † interacted with widow-headed household dummy; sample: rural households.

**Table 7: Determinants of individual time allocation in rural Rwanda (tobit estimation)**

		Individual time shares spent in				
		domestic work	own-farm agriculture	non-farm market work	agricultural wage work	
		(1)	(2)	(3)	(4)	
male-headed hhs	human cap	difference in age	-0.01***	-0.00***	-0.00***	-0.00***
		difference in education	-0.00***	-0.00***	0.01***	-0.02***
		difference in health	-0.00***	-0.01***	-0.00**	-0.00
	composition	head	0.02	0.29***	0.02	-0.05*
		son	-0.06***	0.13***	-0.09***	-0.10***
		spouse	0.39***	0.41***	-0.15***	-0.12***
daughter		0.11***	0.21***	-0.15***	-0.12***	
	other female	0.16***	0.19***	-0.05*	-0.16***	
widow-headed hhs	human cap	widow-headed hh	0.02	0.11**	-0.01	-0.02
		difference in age	0.00***	0.00	0.00	-0.00**
		difference in education	0.00*	0.00	0.00	0.00
		difference in health	-0.00	0.00	-0.00	-0.00
	composition	head	0.25***	0.05	-0.15***	0.05
		son	0.04	-0.05	0.06	0.01
		daughter	0.07*	-0.04	0.02	0.03
		other female	0.02	-0.02	-0.09	0.12
		imidugudu * females	0.01	-0.00	0.04**	-0.04**
		imidugudu * females in widow-headed hh	-0.01	-0.02	0.03	0.05*
constant	0.04**	-0.15***	-0.62***	-0.79***		
sigma	0.26***	0.37***	1.10***	1.18***		
N	12033	12033	12033	12033		
N left-censored	2231	3039	9824	10336		
log likelihood value	-2697.47	-6718.98	-6556.94	-5638.44		
chi2	6832.81	1816.02	1049.11	465.53		
<b>F-tests</b>						
<b>male-headed households</b>						
all adults are the same		1242.16***	215.77***	95.58***	26.54***	
human capital variables are jointly significant		360.05***	57.26***	87.57***	55.19***	
<b>widow-headed households</b>						
widow-headed = male-headed household		142.53***	14.58***	14.12***	3.45***	
all adults are the same		35.70	6.96***	13.82***	1.16	
human capital variables are jointly significant		38.37***	0.47	0.83	3.76*	
<b>pairwise comparisons</b>						
widow head = daughter in widow-headed households		89.94***	22.26***	39.28***	0.48	
widow head = other women in widow-headed households		44.40***	3.77*	1.39	0.90	
widow head = spouse		13.75***	43.88***	0.05	11.50***	
widow head = male head		31.65***	23.34***	12.08***	3.43	

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 household time in an activity; other males are the left-out category in household composition; (d) for discrete change of dummy variable from 0 to 1; † interacted with widow-headed household dummy; sample: economically active individuals 6 years and older in rural areas.

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