Domestic Violence and Household Decision-making:
Evidence from East Africa*

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Abstract

Economists have largely ignored domestic violence as a topic of study. This paper examines the economic and social dynamics of violence using nationally representative surveys from Zambia and Rwanda, and original data collected by the author in Tanzania. In contrast to previous empirical work, this study is based on a representative sample that spans a broad geographic area. I do not find evidence to support the expected negative relationship between violence and income predicted by existing theories of domestic violence. I find that household wealth and female education and earnings are correlated with women's attitudes towards violence, yet poor predictors of actual prevalence. This paper also uses exogenous variation in the gender of household members—births, child deaths, and children within the household—to identify the effect of household composition on violence. Although gender mix of births is not related to violence, the probability of violence increases with the death of a son. Moreover, the presence of teenage boys, but not girls or younger children of either gender, reduces the probability of violence. In addition, these data show that social and demographic factors such as polygamy, marital duration, and urban residence are positively correlated with violence. Finally, I exploit a unique dataset from Tanzania which contains detailed information on social links to friends and family to empirically test theories of social isolation and vulnerability to violence. Using this data, I find that proximity to friends and family reduces the probability that women suffer from violence. The results suggest it may not be appropriate to assume economic opportunities will lead to decreases in domestic violence, and that programs aimed at improving women's well-being need to explicitly address this issue.

1   Introduction

Economists have studied the motivations of violence in many different contexts, yet violence within households has largely been ignored as a topic of study. There is a political economy literature on the relationship between aggregate income and political violence, as well as a literature on the economics of crime. In contrast, domestic violence—widely recognized by scholars and policymakers as a problem that crosses geographic and class boundaries—has received scant attention within the discipline.

This paper is an empirical study of the economic and social dynamics of domestic violence. It incorporates theoretical insights from economic, sociological and psychological theories of spousal abuse. In contrast to existing empirical work, the analysis is based on a representative sample of couples from a broad geographic area that spans three countries in East Africa: Rwanda, Tanzania and Zambia. Domestic violence can be defined broadly as physical, emotional, and/or sexual abuse of one family member against another. The focus in this paper is on physical violence of a husband toward his wife. It is the most common form of gender-based violence in the region of study. However, the issue is not limited to Sub-Saharan Africa. In the absence of armed conflict, it is perhaps the most common form of violence against women in rich and poor countries alike. Estimates of prevalence vary widely both within and across countries, but in general, greatly outnumber other types of violent crime against adult women[1].

Economists modeling the process of intra-household decision-making have highlighted the importance of taking into account the role of violence in bargaining[2]. However, only a few papers have incorporated violence in a formal model. The remainder of the bargaining literature has either used violence as an example of why it may not be appropriate to assume a cooperative bargaining

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[1] Estimates of prevalence in Latin American countries range from 10 to 50 percent see Castro (2004) pp. 66-67. For US estimates, see Pollak (2003).
[2] E.g., Lundberg and Pollak (1996).

process for all households, or imposed assumptions on bargaining outcomes that are not consistent with violence in equilibrium[3].

In a context of high prevalence, it is not appropriate to assume away violence. Prevalence of violence is high in my region of study: over a third of all women have been physically hurt by their husbands at some point in the past—either by their own account (Zambia and Tanzania), or that of their husband (Rwanda). In Zambia and Tanzania, where the data is available, half of all women who have been victims of violence in the past also report incidents of violence within the last year.

A subset of the economic literature on household decision-making has modeled domestic violence[4]. In a non-cooperative bargaining model by Tauchen, Witte and Long (1991), violence serves both an expressive and an instrumental purpose: it enters the husband's utility directly as well as indirectly through the wife's behavior. In this model, men "purchase" violence from women with income transfers, so that the level of resources controlled by each partner and whether the reservation utility constraint is binding determine the level of violence in equilibrium. Farmer and Thiefenthaler (1997) also model the determinants of violence in the context of a non-cooperative game. The comparative statics from the model predict that women's income and financial support outside the marriage change the woman's threat point and thus decrease the level of violence. Farmer and Thiefenthaler (1996) model a different aspect of violent relationships: women who return to an abusive relationship after seeking help. In their model, battered women use shelters and other support services to signal to the batterer their ability to leave, which changes their threat-point.

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[3] Both Udry (1996) and Lundberg and Pollak (1996) argue that it is problematic to assume Pareto optimality for all households in the presence of domestic violence. Chiappori (1992, 2002) assumes bargaining outcomes are Pareto optimal, which requires perfect information and precludes violence if one assumes it enters the woman's utility negatively.

[4] Following seminal work by Becker (1981) on household decision-making and bargaining models first introduced by Manser and Brown (1979, 1980) and McElroy and Horney (1981).

More recently, Bloch and Rao (2002) model violence in a less developed country setting as a bargaining instrument used to extract larger dowry payments from the bride's family. In contrast to previous models, resources are reallocated between the families of the bride and groom, rather than within the couple itself. Finally, a paper by Robert Pollak (2003) addresses the prevalence of domestic violence –as opposed to its causes—by modeling the inter-generational transmission of domestic violence. The model incorporates the role of marital formation and dissolution in the prevalence of violence by assuming that individuals who grew up in violent homes are more likely to marry partners who grew up in violent homes. In this model, assortative mating increases the equilibrium level of violence.

There is a rich literature on the causes of domestic violence in other social sciences, particularly sociology and psychology. Sociological models link violence to gender inequality. The causes of violence lie in the way society is organized: for instance, unequal economic opportunities available to women and men, the protection—or lack thereof—offered to victims by the legal system and the (un) availability of other institutional resources for victims[5]. Psychological models incorporate individual characteristics as determinants of violence. In terms of the batterer, violence is linked to low self-esteem, pathological jealousy, and severe stress. The psychological literature on domestic violence places emphasis on the link between violence and the batterer's desire for control over the victim. Violence often goes hand in hand with a curtailment of the victim's economic and social independence[6].

Although the mechanisms differ, theories on the causes of domestic violence predict a relationship between violence and actual or potential female earnings as well as female economic opportunities outside of the marriage. In the existing economic models, changes in these economic variables affect the woman's "threat point" and thus can decrease the incidence of violence.

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[5] For a recent review of the sociological literature, see Castro (2004). Earlier work includes Counts et al (1992), Morrision et. al (1999), Pagelow (1981), and Strauss et al (1990).
[6] Walker (1984)

Though the sociological theoretical framework is quite different, the insight is similar: factors that increase female economic independence will lead to reductions in violence. Psychological models imply a negative relationship through a different channel: batterers use violence (or the threat of violence) to limit women's control over household resources, both by preventing them from having a separate source of income and by limiting access to and information on household finances[7].

The first set of empirical results in this paper presents suggestive evidence against this predicted relationship. In these three East African countries, women who work for wages are just as likely to be abused as those not currently working outside the home, or those working without compensation (for example, on the family farm), all else equal. Moreover, this result does not depend on inequality between the couple, as measured by female wages as a share of household expenditures[8]. Comparisons of my results with those of previous studies are difficult as results are based on small non-representative samples of women[9]. For instance, using a sample of 125 women referred from shelters and other advocates for battered women, Tauchen et al. (1991) find the expected negative correlation between violence and female income for a subset of low and middle income couples in their sample.

Perhaps more surprising is my finding that women who work outside of the home are more likely to agree with reasons a husband is justified in beating his wife, controlling for couples' education, household wealth and other demographic characteristics. Although working for wages reduces the probability of agreement, an attitudinal gap between women who work outside of the home and those who do not remains. The former are more likely to agree a husband is justified in

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[7] For example, work by Walker (1984) in the US includes accounts of women whose husbands not only managed all aspects of household finances, but also denied them access to bank accounts and credit cards.

[8] The analysis does not include male employment due to the absence of variation in this variable. That is, virtually all men surveyed reported they were currently working. The data does not include information on male earnings.

[9] E.g., Pagelow (1981). Also see the review in Castro (2004).

beating his wife, regardless of compensation. This attitudinal difference is consistent with sociological theories of how gender-based violence is perpetuated[10].

Although more educated women and those in wealthier households find violence less acceptable, they are not less likely to be victims of spousal abuse. I find a negative relationship between female education and violence, but the magnitude of the coefficient is quite small and only marginally significant in most specifications. Women in households at the top end (highest quintile) of the wealth distribution—as measured by household asset ownership--are far less likely to agree that a husband is justified in beating his wife. However, I find no difference in prevalence of violence at different levels of household wealth, controlling for couples' education, ages, and other household characteristics. If the analysis is limited to couples with a history of domestic violence, I find fewer recent incidents of violence—within the last year—for women in wealthier households. This is consistent with results of studies based on samples of battered women.

The second set of empirical results exploits exogenous variation in gender composition of births, child deaths, and household members to identify the effect of household composition on domestic violence. In a setting where wives are viewed as being responsible for providing children, and where men express a preference for sons, husbands of women who bear more sons may be more satisfied with their relationship and less likely to "punish" them with violence. Earlier work by Rao (1998) in India finds an association between gender composition of children and violence. However, this relationship is not well identified in a setting where male-female cohort ratios reveal thousands of "missing" girls. In contrast, although in Sub-Saharan Africa men and women say they prefer sons, demographers have not found evidence of differences in behavior. Male-to-female cohort sizes are roughly equal, showing no evidence of female infanticide, selective abortion, or differential stopping behavior. The coefficient on gender composition of births will therefore be well identified.

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[10] Castro (2004).

Despite this expected relationship between the number of sons and domestic violence, I find no association between gender composition of births and abuse. The result does not change if gender mix is defined as the number of sons (controlling for the total number of children), or the proportion of sons to total births. I do, however, find a relationship between the gender composition of child deaths and violence. All else equal, the probability of violence ever occurring increases with the deaths of sons, but not daughters. Although boys are more likely to die than girls as infants, the explanatory variable includes deaths of children at any age. Moreover, sex differences in the probability of mortality are quite small and thus cannot account for the results.

There is another channel by which the gender composition of the household affects women's vulnerability to violence. The presence of teenage boys—but not teenage girls or younger children of either gender—decreases the probability of violence in the recent past (within the last year), but is unrelated to the probability of violence having occurred. Teenagers may be more likely to defy adult restrictions as a way of asserting themselves, and older boys may have the willingness and ability to intervene on behalf of their mother.

The third set of results in this paper explores the association of social and demographic factors to domestic violence. Because of the non-experimental nature of this data, some of these results are more speculative in nature. Nevertheless, they provide important insights about the role of non-economic variables in women's vulnerability to violence. Tauchen et al. (1991) find that violence is positively related to the age difference within a couple, and negatively related to male age. Similarly, I find that controlling for female age, male age is negatively correlated with violence. Moreover, it is marital duration, not female age or the difference in couples' ages, which increases the probability that a woman will be a victim of violence at some point[11]. Polygamy and urban residence are also both positively correlated with violence. Women who are first wives in

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[11] In this sense, marital duration can be thought of as "exposure." The coefficient on marital duration reflects the fact that women have had more years hat is, more years of marriage

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polygynous[12] marriages are both more likely to have a history of violence, and be victims of violence within the past year, controlling for marital duration. I also find a link between violence and men's alcohol consumption.

Scholars of violence maintain that social isolation often accompanies violence, though the direction of causality is not clear. However, measures of social connectedness are largely absent from empirical work. A unique dataset collected by the author in Tanzania that includes information on women's links to family and friends allows me to address this question.

The results suggest women's relationships to family and friends play an important role in reducing violence. In Tanzania, the presence and frequency of interaction with friends and relatives, particularly with women, are negatively correlated with violence. In informal interviews with women, family support emerged as the single most important factor that enabled them to leave an abusive husband. The result is also consistent with Levinson's (1989) finding of lower incidence of wife beating in societies characterized by female work groups, based on an anthropological analysis of ninety groups. The widespread practice of patrilocal residence throughout the area of study, where married women move away from their family to reside with their husbands, may contribute to the social isolation of women and increase their vulnerability.

The remainder of this paper is organized as follows. Section 2 is a brief description of the cultural context, in terms of the norms related to spousal violence, the structure of marriage, and the nature of work in the region. Section 3 presents data and estimation methods; the empirical results are presented in section 4. Section 5 concludes.

2   Empirical Setting

In many parts of Sub-Saharan Africa, spousal violence is considered an acceptable punishment that husbands inflict on their wives. Existing laws (e.g., Tanzania's Marriage Act of

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[12] Polygyny is the term used for polygamous marriages made up of one husband and multiple wives. Polyandry consists of a wife with multiple husbands.

1971) prohibit corporal punishment by husbands, and grant spouses equal rights to matrimonial property acquired through joint effort. In practice, however, women are often denied these rights. Many women and men throughout Africa agree that a husband may be justified in beating his wife if she does not fulfill her domestic obligations. There is quite a bit of variation, but anywhere from thirty to eighty percent of women in different countries in Africa agree with at least one reason that a husband is justified in beating his wife. In this sense, violence against adult women is a privilege of marriage[13].

Spousal violence—or the threat of it—is a part of women's daily lives, and is discussed as a normal occurrence. Women talk about violence as another burden they must bear. Although women as well as men perceive violence as an appropriate punishment for wives, women who are victims of violence talk about being unfairly punished. A similar distinction emerged in interviews with community leaders in Meatu District, Tanzania: women who were subject to "excessive" beatings, or who were beaten "without reason" had grounds for divorce[14]. However, the fact that a woman has legal grounds for divorce does not imply that she is able to leave the relationship. Limited education coupled with restrictions on land ownership (and asset ownership in general) make leaving an abusive relationship difficult or impossible for many women.

Marital violence takes place in a context of profound gender inequity. Women are at a disadvantage in terms of educational attainment and access to land and property. This is perpetuated by the existence of dual legal frameworks, with traditional laws often contradicting codified laws.

Parenthood confers status to both men and women. However, for many women parenthood is not only an honor but also an obligation. It is defined as a duty of wives to provide children to their husbands. Marriage payments, also referred to as bride price (payments from the groom to

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[13] See Mercer (2002) and Holmboe-Ottesen et al (1991) on gender norms in Tanzania.
[14] 2002 Meatu Village Council Survey

the bride's family), are common throughout the region studied. Although there is substantial

variation in the type and size of payments within and across ethnic groups, there are cases in which

they are explicitly linked to female fertility.

Finally, the nature of work is quite different in this setting. Most men and women are self-

employed in agriculture, so access to land is critical. Sub-Saharan Africa has a long tradition of

women as farmers. It is expected for wives to work on their husband's land. However, this does

not necessarily give them a claim to the output.

3   Data and Estimation Methods

The analysis is based on nationally representative samples from Zambia and Rwanda, as

well as original data collected by the author in Meatu District, Tanzania. This is an important

improvement over existing empirical work based on non-random samples of battered women, or

small samples with limited geographic coverage. Moreover, the majority of the empirical evidence

to date comes from developed countries. The pooled sample consists of a cross-section of 4,588

married couples in Zambia, Rwanda, and Meatu District, Tanzania. Sampling weights adjust for

differential probabilities of selection both within and across countries[15].

Research on domestic violence is limited in part due to the sensitive nature of the subject.

Although the DHS surveys and the author's own questionnaire were designed separately[16], there

are many similarities in the survey protocol and the type of questions included. The protocol of the

DHS and Family surveys was designed to ensure that women feel safe answering all questions. In

all surveys, enumerators were responsible for ensuring that other household members not be

present (or within earshot) at the time the survey was administered. In Tanzania, enumerators were

sent in male-female pairs, and female enumerators fluent in the local language interviewed women.

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[15] A detailed description of the sampling design of all DHS surveys is available at www.measuredhs.com.
[16] At the time the Meatu Family Survey was designed and administered, the Rwanda 2000 and Zambia 2001/02
questionnaires and data were not publicly available.

Although it is impossible to completely rule out underreporting, there is no evidence to suggest these are major underestimates of spousal violence. First, there is no difference in the percentage of married and widowed women who report being victims of spousal violence at some point in the past[17]. Thirty-eight percent of widows surveyed were beaten by their late husbands, while forty-two percent of currently married women have been beaten by their husbands anytime in the past, but the difference is not statistically significant. Separated and divorced women report rates of violence that are nine percent higher than married and widowed women, and this difference is significantly different from zero. It is reasonable to assume that the difference in prevalence reflects an increased likelihood for violent relationships to end up in divorce, rather than a sign of underreporting. However, we cannot rule out the possibility that divorced women feel more comfortable speaking about violence perpetrated by their former husbands than women who currently reside with their spouse. Since there is the same difference in prevalence between divorcées and widows, it would also have to be true that divorced women are more likely to report past abuse than widows, which seems less plausible. Not surprisingly, recent episodes of violence (within the past year) are more common among married women than those who are divorced, separated, or widowed.

A second measurement issue concerns selection based on attitudes towards violence. It would be problematic if women who find violence more acceptable were less likely to report it. Although we cannot test this directly, it is interesting to note that women's attitudes towards violence are not correlated with their exposure. The simple correlation between a belief that a

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[17] Comparisons are based on data from Zambia. In Tanzania, the sample contained very few divorced or widowed women. Of the 280 women surveyed, fourteen were widowed and four were divorced. The small numbers of women in these categories make it impossible to make any meaningful comparisons of prevalence rates by marital status. In Rwanda, questions on domestic violence were posed to men. As in Tanzania, the small numbers of widowed and divorced men in the sample—32 and 45 individuals, respectively--make it impossible to make meaningful comparisons in prevalence rates by marital status.

husband is justified in beating his wife[18] and a history of spousal violence is very low at 0.11. In

Zambia, 89 percent of women who have never been abused agree with at least one reason a

husband is justified in beating his wife, quite close to the 93 percent of women with a history of

violence. The difference is slightly more pronounced in Rwanda, where 71 percent of women who

have been beaten by their husbands agree that a husband is justified in doing so, and 63 percent of

those in non-violent relationships are also in agreement. Though these differences are statistically

significant, they are small in magnitude.

3.1 Demographic and Health Surveys: Zambia and Rwanda

The DHS surveys were conducted in 2000 and 2001/2002 in Rwanda and Zambia,

respectively. Both are nationally representative surveys. However, the domestic violence module

was only administered to a subset of households. Although DHS surveys are mostly standard

across countries, one salient difference—for the purposes of this paper—is the identity of the

respondent to the questions on domestic violence. In Zambia, current and formerly married women

were asked the following question, *"Has your (current/last) husband/partner ever slapped you, hit

you, kicked you, thrown things at you, or done anything else to physically hurt you?"* with a follow

up question on the occurrence of violence within the past twelve months. This is comparable to the

way the question was asked in Tanzania[19]. In contrast, in Rwanda the question was posed only to

men. Although the phrasing of the question was identical, the survey did not include a follow up

question on recent violence (within the past year). The survey protocol used in all locations does

not allow for the domestic violence module to be administered to more than one individual per

household, in order to preserve the privacy and safety of the respondents. Unfortunately, neither

survey administered the module to both men and women--even in separate households.

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[18] As measured by agreement with instances in which a husband is justified in beating his wife.
[19] The English translation is "Has your husband ever beaten you?" As in Zambia, there was also a follow-up
question on violence within the past year.

3.2 Tanzania Data

The data used comes from surveys administered in Meatu District, Tanzania, in 2001 and 2002. Meatu is a semi-arid rural district in Western Tanzania. It is poor even by Tanzanian standards, with income per capita in 2001 at USD$184, roughly two-thirds of the World Bank estimate for Tanzania as a whole. About two-thirds of this consumption-based measure of income consists of food produced and consumed at home. The main ethnic group is the Sukuma, which comprise 90 percent of the population. About half of all households report owning some cattle, and 60 percent cultivate cotton, the main cash crop.

The District is divided into three Divisions: Kimali, Kisesa and Nyalanja, and 71 villages. There are large differences between administrative divisions within the District. Of the three Divisions—Kimali, Kisesa, and Nyalanja—households in Nyalanja are larger, poorer, and less educated. There are also differences in ethnic composition and soil aridity within the District, which result in different cropping patterns.

The analysis is based primarily on surveys conducted from June thru August 2002. During this period, a survey of 1,200 representative households was carried out throughout the District. The 2002 Household Survey includes data on household composition, demographics, asset ownership, savings patterns, economic activities and social capital. A separate survey instrument, the Meatu Family Survey, was administered to a subset of women in 280 of the households surveyed. This survey includes information on marriage and fertility history, marital quality, household decision-making, and conflict resolution between spouses, including the prevalence of domestic violence. Community-level data comes from the 2001 and 2002 Village Council Survey, in which community leaders were asked about village history, traditions around marriage and divorce, and composition of the Village Council, among other things. The author was involved in all stages of the data collection process, from survey design and pre-testing to survey administration.

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Three pairs of female and male enumerators administered the Household and Family Surveys. There are no systematic differences in reporting rates by enumerator. All three female enumerators conducting the Family Survey are local residents of Meatu District, and fluent in Swahili and Kisukuma, the vernacular of the largest ethnic group in the District. Household surveys were conducted in Swahili. Family Survey respondents were given the option to answer the survey in Swahili or Kisukuma, and often opted for the latter. In Tanzania, Swahili is widespread – it is the language of instruction in primary school and the language of business and politics. In that sense, it is associated with masculine spheres of action and influence. Many women have little or no formal education and feel more comfortable discussing these issues in Kisukuma. In addition, it is often the language spoken at home by both men and women.

3.3 Sample Statistics

Tables 1 and 2 present descriptive statistics for the samples used throughout the paper. There are two reasons I estimate the model on different samples. First, data on violence within the past year is available for couples in Zambia and Tanzania, but not those in Rwanda. Second, the DHS surveys contain data that is not available for the Tanzania sample. Therefore, I pool the data in three different ways: a sample that includes data from all three countries ("Pooled sample: all regions"), a sample that includes data for both countries in which there is a measure of recent violence ("Zambia and Tanzania"), and a sample that includes both countries in which a DHS survey with a domestic violence module was conducted ("Zambia & Rwanda"). In addition, I present the sample statistics for a subset of the Zambia and Rwanda pooled dataset that consists only of households where both the husband and wife were interviewed ("Zambia & Rwanda-couples only"). This last sample includes data on husbands' and wives' alcohol consumption and attitudes towards violence.

The population studied consists of married couples in primarily rural, agricultural households[20]. There are disparities in the average education level and age of couples. Men are an average of six years older than their wives, at 36 and 30 years of age respectively. The same holds true for educational attainment; on average, men have 5.6 years of education to women's 4.5 years. A quarter of women and 14 percent of men have no formal schooling. This difference persists at almost every educational level, with 55 percent of men and 33 percent of women having at least a primary school education. There are differences among the three regions in terms of overall educational attainment as well as differences by gender. Zambia has both the highest levels of education (at 7.2 for men and 5.2 years for women), and the largest education gap within couples. In Rwanda, both average educational attainment and the overall distributions for husbands and wives are almost identical: roughly a third of men and women have no formal schooling and 35 percent have completed primary school or higher. Households in Meatu District are poor by Tanzanian standards, and tend to be larger and less educated than the rest of Tanzania. This also holds true when comparing them to national averages in Rwanda and Zambia.

Although most adult men and women are married, almost a fifth of all women surveyed have been married before. This suggests that marriage is more fluid than the cross-sectional data implies. Of course, some of the women who have been married before are widows. I do not know the overall share of women whose first marriages end as a result of their husbands' deaths, but I do have this information for the subset of women interviewed in Tanzania. Out of the 280 women surveyed, 47 women had been married previously. Most women who had been married before reported that their marriage ended because they left—either by choice or forced by their husbands. Only seven women were widows. In spite of the small sample size, the numbers from Tanzania suggest that remarriage is an option for divorced women. Overall, twelve percent of women are in

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[20] Sample means calculated using sampling weights that adjust for differential selection probability within the sample and across regions.

polygynous marriages. Half of the women in polygamous marriages are first wives. This does not imply that other wives live in the same household or compound, simply that their husband is married to other women.

3.4 Estimation Strategy

In order to address the non-experimental nature of the data, the explanatory variables are grouped into three broad categories: (i) economic variables, (ii) variables related to the gender composition of the family, and (iii) social and demographic variables. Although the estimated coefficients on the economic variables do not provide information on the underlying theoretical mechanism, they constitute a test of the predicted links between violence and income. The second group of variables relies on exogenous variation in the gender composition of births, child deaths, and relatives for identification. The key assumption for the exogeneity of births and deaths is that there is no systematic discrimination of children by gender that would lead to the death of a disproportionate number of girls (or boys). This assumption is supported by the lack of evidence of female infanticide, selective abortion, differential stopping (related to fertility), or large differences in child nutritional outcomes by gender throughout Sub-Saharan Africa. In terms of the gender of teenagers, identification relies on the absence of differences in fostering patterns by gender for violent and non-violent households. Finally, social and demographic controls facilitate a comparison with existing empirical studies, but also include new variables—controls for polygamy and a wife's rank, for example—that are relevant in this context.

There are three different outcomes Y_{ijc}: (1) a binary variable that takes on a value of "1" if the wife in couple i has ever been beaten by her husband and "0" otherwise; and (2) a binary variable that takes on the value of "1" if the woman has been beaten in the past year and "0" otherwise, and (3) a binary variable that takes on the value of "1" if the woman agrees with a statement that a husband is justified in beating his wife and "0" otherwise.

The estimation equation is as follows:

$$\textbf{(1)} \qquad \Pr\left(Y_{ijc} = 1 \middle| E_{ijc}^1, ..., S_{ijc}^m\right) = F\left(\alpha_c + \sum_k \theta_k E_{ijc}^k + \sum_n \delta_n G_{ijc}^n + \sum_m \gamma_m S_{ijc}^m\right),$$

where $F(.)$ is the standard normal distribution, i denotes couples[21], j denotes sampling clusters, and c denotes country. The error term is assumed to be independent across i and correlated within sampling clusters j. The explanatory variables are grouped into three categories: (i) E_{ijc}^k are k economic variables that include household wealth, male and female education, an indicator for female work outside of the home, and an indicator if women receive compensation in cash or kind for their work. In addition, for women who receive wages, there are five indicators for the share of total household expenditures paid by the female respondent's earnings: none or almost none, less than half, about half, more than half, and all household expenditures. (ii) G_{ijc}^n are n variables related to household composition, including the gender composition of births and child deaths to the female respondent (as well as controls for the total number of births and deaths of children), and measures of the gender and age composition of children and teenagers in the household (including those not born to the female respondent), such as the presence of teenage boys and girls. (iii) Finally, H_{ij}^n are n variables broadly grouped under social and demographic characteristics: couples' ages, household size, marital characteristics including number of years married, an indicator for a polygynous household, an indicator for the rank of the wife in a polygynous household. Some specifications include measures of men and women's alcohol consumption. All specifications using pooled data include country dummies.

None of the three datasets include household consumption expenditures or income measures. However, all three include information on household asset ownership. Therefore, I construct a linear index from a set of asset indicators using principal components analysis to derive

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[21] There is only one couple per household in the sample, so I use the terms interchangeably. Variables such as wealth are calculated at the household level, while others apply specifically to the married couple within that household.

the weights[22]. The asset index serves as a proxy for long-run household wealth. Specifications

include quintiles of the household wealth index. For each household i, the asset index A_i is given

by the following formula: $A_i = f_1*(asset_{1i}-mean(asset_1))/standard\ deviation(asset_1) + …$

$+ f_{10}*(asset_{10i}-mean(asset_{10}))/standard\ deviation(asset_{10})$, where f_n is the weight given by the first

principal component for the nth asset.

Finally, for the subset of households in Tanzania, I estimate a model that includes measures

of social connections to friends and relatives ("social networks") as explanatory variables. The

model is expanded as follows:

$$(2) \qquad \Pr\!\left(Y_{ijc} = 1 \middle| E_{ijc}^1,...,S_{ijc}^m\right) = \quad F\!\left(\alpha_c + \sum_k \theta_k E_{ijc}^k + \sum_n \delta_n G_{ijc}^n + \sum_m \gamma_m S_{ijc}^m + \sum_m \lambda_p N_{ijc}^p\right),$$

where N_{ijc}^p are p measures of connections to friends and relatives. These social connections or

networks are measured as the five friends and five relatives with whom the woman speaks most

frequently. Most, but not all, respondents were able to name five friends and five relatives (referred

to as "links"). Since some respondents fell short of the target number, I include a control for the

total number of links named by the respondent in the regressions. The data includes detailed

information on the relationship to each friend and relative, such as gender, place of residence and

frequency of interaction. Specifically, the variables included are: number of female links, number

of links with whom the woman speaks at least every other day (female and total), and number of

links that reside in the same village (female and total).

The challenge in trying to disentangle the relationship between social networks and

domestic violence is dealing with the endogeneity of networks. Cleary, social interaction is not

random. In that sense, relationships with relatives are less problematic than relationships with

friends, since arguably the frequency of interaction depends more on household structure and

distance to family members than individual choices. However, the quality of the relationships to

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[22] As in Pritchett and Filmer (2001)

family—for example, the frequency and type of interaction—is no longer random. In order to address the endogeneity issues, I use residence prior to marriage to instrument for social links. The exclusion restriction implies that distance to the village of residence affects violence only through its effect on the number and quality of links to friends and relatives, and not directly.

4   Empirical Results

4.1 Income and violence

The main result is that female education, earnings, and household wealth are all related to women's attitudes towards violence, but poor predictors of actual prevalence. Table 3 presents the results on female employment, earnings, and violence[23]. The dependent variable in columns (1) and (2) of Panel A is an indicator that equals 1 if the woman has been beaten by her husband anytime in the past and 0 otherwise; in column (3) the dependent variable equals 1 if the woman was beaten within the last year and 0 otherwise. All tables reports the marginal effects of the variables at the mean of the explanatory variables. Close to 70 percent of women surveyed report doing work other than household chores, of which about half (38 percent of all women) receive compensation in cash or kind for this work. As can be seen in Panel A, female labor force participation is not associated with lower levels of violence, regardless of whether or not it is compensated. The specification includes an indicator for whether the woman did work other than household chores in the past year ("Woman currently working"), as well as an interaction term for those who did work other than household chores and received wages (Woman receives wages"). The coefficients on female employment and earnings are not significantly different from zero for either measure of violence. This result is robust to the use of different measures of female employment: women who worked in the past year, women who report an occupation other than household work, or women who report being self-employed.

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[23] There is no variation in male employment. Virtually all men surveyed report they were working. The data does not contain information on male earnings.

The fact that many women do not work for wages makes it difficult to compare female labor force participation in this context with measures from developed countries. It may be that the relevant distinction is not between women who do chores related to housework—such as carrying water, or gathering firewood—and those that do other kinds of work, but between those who receive compensation for their work and those who do not. Explanatory variables in Panel B include an indicator for whether the woman received compensation in cash or kind in columns (1) and (4), as well as an interaction term for the share of household expenditures paid by the woman's wages in columns (2),(3), and (5). This is a measure of the degree of earnings inequality between the couple. Existing models predicts a negative relationship between the share of female earnings and violence. However, there is no difference in the results. There is no correlation between female earnings and violence, regardless of the share of household expenditures these earnings represent. We cannot reject the hypothesis that the coefficients on the female wage and interaction terms are jointly equal to zero at traditional confidence levels in all specifications.

Panel A also includes estimates of the relationship of female earnings and employment with female attitudes towards violence in columns (4) and (5). Women who work outside of the home are more likely to agree with at least one reason a husband is justified in beating his wife. In the pooled sample for Zambia and Rwanda, 81 percent of women agree with at least one reason a husband is justified in beating his wife. All else equal, women who do work other than household chores are 18 percent (or almost a quarter of the average) more likely to agree than those whose work consists of household chores only. Working for wages reduces the probability of agreement by 7 percent, but the gap in attitudes remains. The attitudinal difference could stem from differences in women's beliefs about what it means to be a "good" wife. It suggests that women who do work other than household chores—a majority of whom work in agriculture—are more likely to subscribe to traditional norms of violence as punishment.

As can be seen in Table 4, although women with formal education are less likely to have a history of spousal violence, the magnitude of the education coefficient is small. Specifically, an additional year of education is associated with 0.5 to 0.8 percent lower probability of violence ever occurring, controlling for other individual and household characteristics. There is no relationship between female education and recent violence. It is problematic to interpret the coefficient of education as causal, particularly in a context where many parents lack the means to send their children to school. Parents who are both willing and able to send their daughters to school might be better off economically and more committed to her future wellbeing. This may be related to their ability to find a good match for her in the marriage market, or to intervene on behalf of their daughter if her husband is violent.

Table 4 also presents estimates of the relationship between household wealth and violence. Estimating this relationship is complicated by the fact that violence can have negative effects on the health and productivity of women and other household members, and thus reduce income. Over time, we would expect to see these income differences reflected in levels of wealth. Nevertheless, a measure of wealth based on asset ownership is less problematic than measures of household consumption or income, particularly to examine the relationship of longer-term economic status with recent episodes of violence. Moreover, four out of ten assets measured in the DHS surveys—and used in the calculation of the wealth index—cannot be sold for cash: access to piped water or a covered well, electricity, ownership of a toilet or latrine, and cement or finished floors. Other studies have used measures of wealth based on the assets included in the DHS surveys, and have found the measure to be quite robust[24].

I find no relationship between violence and measures of relative household wealth, controlling for the couple's age and education levels. The omitted category in columns (2), (3), (5) and (6) is the bottom wealth quintile. Although the point estimates on the wealth quintile dummies

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[24] Filmer and Pritchett (2001)

are negative, they are not significantly different from zero. For the recent violence outcome, the point estimates on the wealth quintile dummies range from -2.1 percent (9 percent of mean prevalence) to -5.1 percent (21 percent of mean prevalence). The results are unchanged if the category included is the poorest quintile of the wealth distribution, or if the model is estimated separately for Zambia and Tanzania. The point estimate of the coefficient on the bottom quintile is positive (2.8 percent, equal to 11 percent of mean prevalence), but it is not statistically different from zero. In columns (3) to (6), the dependent variable equals 1 if the couple has a history of violence and 0 otherwise. Again, the coefficients on the wealth quintile dummies are not significantly different from zero. Moreover, the signs are not consistently negative and the relative magnitudes are smaller. For the pooled sample, the coefficient on the second (20%-40%) and fourth (60%-80%) wealth quintile dummies are -2.0 percent (5.5 percent of average prevalence) and -1.0 percent , respectively. The coefficients on the third and fifth quintiles are positive, and 3.0 percent and 0.0 percent respectively.

Although there is no systematic relationship between violence and measures of household wealth, relative wealth does predict female attitudes towards violence. Table 5 presents estimations of probit models in which the dependent variable equals "1" if the woman agrees with the statement about a husband being justified in beating his wife, and "0" otherwise. In general, women with more formal education are less likely to agree with any of the statements, as expected. Similarly, women in the highest income quintile are less likely to agree with the statements than women in any other income quintile. In fact, there is a non-linear relationship of household wealth and female attitudes. If the coefficient were constrained to be linear, the sign would be negative (and significantly different from zero). However, this is driven by the very large negative coefficient for women in the top wealth quintile.

As a robustness test for the asset index, I use detailed data on asset ownership in Meatu to construct two measures of wealth. One index is calculated using only data on ownership of the ten

assets collected in the DHS survey. The other is based on ownership of thirty-two durables included in the household surveys. The simple correlation between the two indices is very high at 0.76 (using data for all 1,210 households surveyed). There is a quite a bit more variation in the detailed asset index, which almost takes on a distinct value for each household. In contrast, the index based on ten assets takes on only twelve distinct values. However, for several of the assets measured in the DHS surveys—access to running water and electricity, car and refrigerator ownership--there is little or no variation within Meatu District. We would expect to see variation if we were to measure asset ownership at the national level, which is the case for Zambia and Rwanda.

For the subset of data for which it is available (Meatu District), I instrument measures of household asset ownership with a history of extreme rainfall at the village level. The instrument consists of the number of years that a village experienced drought or flooding in the decade prior to the survey. For rural agricultural households, one would expect recent rainfall to be strongly correlated with income, but not necessarily wealth. However, rainfall patterns are likely correlated with wealth over a longer period of time. In Meatu, the correlation is not strong enough to make for an appropriate instrumental variable. The IV estimate of the wealth coefficient is negative, but not significantly different from zero, mainly due to lack of statistical precision.

4.2 Gender Composition of Household Members

Table 6 presents results related to the gender composition of household members. I find no relationship between gender composition of births and violence. The result does not change if gender composition is defined as the number of sons (controlling for the total number of children), or the proportion of sons to total births. However, households that have experienced the death of a child are more likely to have a history of violence. This result is driven by the death of sons, not daughters. For the pooled Rwanda and Zambia sample, the death of a son increases the probability of violence ever occurring by 3.6 percent, roughly ten percent of prevalence. The magnitude of the

coefficient is striking, especially when examined relative to the results for female education. It is not implausible that violent households may present additional risks to children's health, and therefore children, especially infants, may be more likely to die in violent households. However, the fact that increased violence is correlated with the death of sons and not daughters implies that these negative effects of violence would have to disproportionately affect boys, which is unlikely. Nevertheless, this result is precisely identified only if Rwanda is included in the sample. I add region dummies to the specification in order to rule out the possibility that the results are driven by regional differences in the intensity of the violence during the Rwandan Genocide. The results are robust to the inclusion of region dummies.

Perhaps this is not surprising. After all, the gender of a child is not something women can control. In conversation, people often talk about fertility and childbearing as being "in the hands of God". In response to a question about plans for future children, a thirty-two year old woman who had given birth nine times said, "I am asking God to stop sending me children"[25]. Caring for children is an entirely different matter. This is largely seen as a female responsibility. Many men and women agree that a husband is justified in beating his wife if she neglects the children.

Finally, the presence of teenage boys is negatively correlated to recent episodes of violence, but not to a history of violence. Specifically, the presence of an additional teenage boy is associated with a 5 percent decrease in the probability of violence within the past year. This is equivalent to 20 percent of the dependent variable's mean. Additional teenage girls, or younger children of either gender have no effect on violence. Given the widespread occurrence of fostering throughout Sub-Saharan Africa, it may be problematic to assume that household composition—particularly when it comes to children—is exogenous. However, the differences in the results for teenage girls and younger children imply that identification would only be threatened if fostering patterns differ by age and gender. A recent paper by Akresh (2003) set in rural Burkina Faso finds

[25]Interview by author in Meatu District, Tanzania

that the number of older girls increase the probability a family will send a child away, but no relationship between family demographics and the probability of receiving a foster child. However, there is no way to know whether these patterns differ for violent and non-violent households.

4.3 Social and Demographic Factors

Polygyny

The most salient result for both measures of violence is that women in polygynous marriages are significantly more likely to be victims of violence. In Rwanda and Zambia, I can identify all polygynous households, as well as the rank of the wife being interviewed. Although the result holds true for all women in polygynous households, prevalence is much higher for first wives. This may seem surprising given the perceived social prestige associated with being a first wife. However, women in Tanzania reported in informal interviews that men use beatings as a way of "chasing away" their wives. In community surveys, leaders made a distinction between "justified" and "excessive" violence of husbands against their wives, the latter being grounds for divorce. It appears as though men may use violence deliberately to drive their first wives away. The result is also consistent with the increased likelihood of men taking on a second wife if they are dissatisfied with their first marriage.

Women in polygynous marriages are significantly more likely to be victims of violence within the past year as well as any time in the past. Table 8 shows women in polygynous marriages are 7 percent more likely to have been beaten within the past year. This result is driven by higher prevalence rates for first wives. The results for the second measure of violence are similar: prevalence is higher for polygynous households and driven by higher rates of violence against first wives in polygynous marriages.

Age and Marital Duration

All else equal, older men are less likely to have beaten their wives in the past year as well as to have ever used violence against their wives. The results are presented in Table 7. Ceteris paribus, prevalence rates of recent violence decrease by 3 to 8 percent (equivalent to 13 and 30 percent of mean prevalence, respectively) per decade of a man's life. The probability of violence ever taking place is 5-10 percent lower for each decade of a man's life, all else equal. Not surprisingly, the probability of having ever been a victim of spousal violence increases with female age. However, it is not female age itself, but years of exposure that increases the probability of violence. Once marital duration is included in the specification, the coefficient on female age is no longer significantly different from zero.

The assumption here—as with all cross-sectional results—is that it is valid to compare older and younger men. In other words, we are interpreting differences between older and younger men as representative of changes over a man's lifetime. It is unlikely that the negative coefficient on male age is the result of differences in reporting. This result is consistent across samples, and in particular, holds for both female and male reports of violence. However, there are other possible interpretations of the relationship between age and violence. There may be cohort-specific levels or trends in domestic violence, or changes over time affecting all cohorts equally. Disentangling cohort-specific levels or trends in the prevalence of violence from changes over time cannot be done with cross-sectional data.

Alcohol consumption

As can be seen in Table 9, alcohol consumption of men is positively and significantly associated with a history of violence. The evidence on a link between male alcohol consumption and recent episodes of violence is less clear. I estimate the model for the subset of households for which data on female and male alcohol consumption are available. The direction of causality is not clear. Psychologists maintain that individuals prone to violence are also more likely to become

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substance abusers. However, the results are consistent with previous findings in both developed and less developed countries that violent men are more likely to consume (and abuse) alcohol and other drugs.

Social networks

The results presented in Table 10 suggest that both the type of relationship and the gender of the link are important. Relationships to friends and relatives with whom the woman interacts frequently (at least every other day), and/or those who live in the same village, are negatively related to violence within the past year. An additional link (friend or relative) residing in the same village is associated with a 1.4 decrease in the probability of recent violence. The same holds true for friends and relatives with whom the woman interacts every other day: an additional link is associated with a decrease in the probability of violence of 1.4 percent. The gender of the link is also significant. An additional female link in the same village is associated with a decrease in the probability of violence of 2.9 percent. Similarly, an additional female link with whom the woman speaks at least every other day is associated with a 3.9 percent decrease in the probability of violence. The magnitude of the coefficients is large relative to the average probability; close to a third and a fourth of prevalence. The coefficient on the number of female relatives is not significantly different from zero (see column 1).

The measures that capture the frequency of interaction are problematic in the sense that a negative correlation could also arise if women who are beaten tend to isolate themselves from their friends and relatives. In this sense, the measure that captures the physical proximity of links is less problematic. Although physical proximity (residing in the same village) probably enables more frequent interaction, the measure itself does not contain any information about the quality of the relationship. The fact that the coefficients on links in the same village are negatively correlated with violence, large in magnitude, and significantly different from zero support the idea that factors that affect a woman's network may impact violence directly, regardless of personality differences

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among women. I take this further by using distance to village of origin as an instrument for social networks. Table 11 presents IV estimates for the relationship between family networks (relatives) and domestic violence. Although the point estimate is negative and almost identical in magnitude to the Linear Probability Model, the IV estimated coefficient is no longer statistically different from zero due to a lack of precision. Nevertheless, the results provide suggestive evidence to support the idea that friends and relatives play a protective role in the prevention of violence.

5   Conclusions

A better understanding of the factors that drive violence within households is critical, particularly in settings with high prevalence. This paper examines the economic and social determinants of violence using a representative sample that spans three countries in East Africa: Rwanda, Tanzania, and Zambia. The results of the paper have implications for the way economists model violence in the context of household decision-making, as well as practical implications for the design of interventions aimed at improving the status of women in less developed countries.

Economic and psychological theories of violence predict a negative relationship with female employment and earnings. I find that household wealth, female education and earnings are correlated with women's attitude towards violence, but are poor predictors of actual prevalence. The evidence does not support an understanding of spousal violence as driven primarily by economic factors. In this setting, social and demographic factors such as household composition, marital structure and social networks affect women's vulnerability to violence. In terms of household composition, I do not find a relationship between violence and the gender mix of children born to the woman. However, I do find a relationship with the gender of children who pass away. The probability of violence increases with the death of a son, but not a daughter. This result is consistent with the discursive evidence for son preference in the region. Furthermore, the presence of teenage boys reduces the probability of recent violence (as measured by occurrence within the last year), but is not associated with a lower probability of violence having occurred in

the past. Although the mechanism is not clear, the results suggest teenage boys may be willing and able to intervene on behalf of their mother (or other female relative), thus reducing the likelihood of spousal violence. All else equal, prevalence is substantially higher for first wives in polygamous marriages. Finally, the results also support the link between social isolation and women's increased vulnerability to violence. Using a unique dataset from Tanzania, I find that women with more links to friends and relatives, particularly women, are less likely to have been victims of violence within the past year.

The findings highlight the limitations of modeling violence in a rational choice framework. If violence, like other commodities, is subject to bargaining, the implication is that improvements in women's bargaining power (that could stem from increases in education, earnings, or changes in the conditions of the marriage market) will lead to reductions in violence, all else equal. The absence of empirical support for the theoretical predictions, and the link between violence and alcohol consumption, provide suggestive evidence against the characterization of violence as instrumental.

The findings do not necessarily imply that increased economic opportunities for women outside of marriage will fail to make them better off. Rather, the results may reflect the fact that in the absence of broader changes in gender norms--including the introduction or strengthening of institutional supports for women--existing economic opportunities do not constitute an alternative to marriage and thus will not reduce spousal violence. A broader definition of female empowerment should include freedom from bodily harm, consistent with Amartya Sen's definition of development as a collection of personal freedoms.

The results also have important implications for program design and the timing of interventions. Programs aimed at reducing domestic violence in the region should target women in urban areas and those in polygynous households. Women may be more vulnerable following the death of a son. Furthermore, the absence of a relationship between female income and violence

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also has implications for other types of programs aimed at improving the status of women. For example, micro-credit programs are widespread in less developed countries, and often explicitly target women. It is widely believed that the expansion of economic opportunities available to women will automatically lead to an improvement in female well-being. However, the results suggest it may not be appropriate to assume economic opportunities will lead to decreases in domestic violence. Programs that aim to reduce domestic violence need to address this explicitly, and work with both men and women to do so.

Future work can build on these results to address several questions. First, it is critical to incorporate the severity and frequency of violence in the analysis. Available measures of violence do not distinguish between a woman who was slapped by her partner and one who was brutally beaten. The aim is not to minimize certain forms of violence, but to recognize that it may not be appropriate to group women whose lives are threatened by extreme violence to those who have experienced violence as an isolated incident. In addition to improving existing measures of domestic violence, it is crucial to move beyond cross-sections and collect panel data. This would allow for the empirical investigation of the dynamics of violence, and would enable researchers to address the role of household formation and dissolution.

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Table 1: Descriptive statistics
Sample means and standard deviation

	Pooled sample: all regions	Zambia and Tanzania	Zambia and Rwanda	Zambia and Rwanda— couples only
1(Woman ever beaten by her husband/partner)	0.36 (0.48)	0.43 (0.50)	0.36 (0.48)	0.38 (0.48)
1(Woman beaten by husband/partner in the last year)	--	0.24 (0.43)	--	--
Female education (years)	4.5 (3.5)	5.2 (3.4)	4.5 (3.5)	4.5 (3.5)
Male education (years)	5.6 (4.0)	7.1 (3.7)	5.7 (4.0)	5.6 (3.9)
Female age (years)	30.3 (8.3)	29.4 (8.2)	30.3 (8.2)	29.9 (8.0)
Male age (years)	36.2 (9.9)	36.3 (10.6)	36.2 (9.9)	35.5 (8.9)
1(Polygynous household)	0.12 (0.32)	0.16 (0.36)	0.12 (0.32)	0.10 (0.30)
Household size	5.5 (2.4)	5.6 (2.5)	5.5 (2.3)	5.4 (2.3)
1(Rural area)	0.75 (0.43)	0.68 (0.47)	0.75 (0.43)	0.76 (0.43)
Marital duration	11.3 (8.4)	11.5 (8.5)	11.3 (8.4)	10.8 (8.1)
1(Woman married before)	0.18 (0.38)	0.22 (0.41)	0.18 (0.38)	0.16 (0.37)
Total births to woman	3.9 (2.8)	3.9 (2.8)	3.9 (2.8)	3.8 (2.7)
Number of observations	4588	3516	4359	1912

Notes: Sample mean and standard deviation. Observations are weighted to account for differential selection probability--both within the sample as well as across countries. Data for Zambia and Rwanda is from the most recent DHS surveys (Zambia 2001/02 and Rwanda 2000). Tanzania data comes from the Meatu Family Survey 2002, Meatu Household Survey 2002, and Village Council Survey 2001.

Table 2: Descriptive statistics by country
Sample means and standard deviation

	Zambia	Rwanda	Tanzania (Meatu)
1(Woman ever beaten by her husband)	0.42 (0.49)	0.26 (0.44)	0.27 (0.44)
1(Woman beaten by husband in the last year)	0.23 (0.42)	--	0.12 (0.32)
Female education (years)	5.0 (3.4)	4.0 (3.6)	3.7 (3.4)
Male education (years)	7.0 (3.7)	4.2 (3.8)	4.6 (3.3)
Female age (years)	29.4 (8.2)	31.4 (8.1)	33.3 (12.0)
Male age (years)	36.3 (10.8)	36.5 (9.0)	39.9 (13.4)
1(Polygynous household)	0.17 (0.37)	0.07 (0.25)	0.11 (0.31)
Household size	5.6 (2.4)	5.5 (2.2)	8.0 (4.4)
1(Rural area)	0.73 (0.44)	0.78 (0.42)	1.00 (0.00)
Marital duration	11.5 (8.5)	11.1 (8.2)	13.2 (11.4)
1(Woman married before)	0.22 (0.41)	0.13 (0.33)	0.18 (0.38)
Total births to woman	3.9 (2.8)	4.0 (2.7)	5.1 (3.3)
Number of observations	2387	1072	229

Notes: Sample mean and standard deviation weighted by selection probability--both within the sample as well as across countries. Data for Zambia and Rwanda is from the most recent DHS surveys (Zambia 2001/02 and Rwanda 2000). Tanzania data comes from the Meatu Family Survey 2002, Meatu Household Survey 2002, and Village Council Survey 2001.

Table 3: Female Employment, Earnings and Violence

	Panel A: Dependent variable				
	Woman beaten anytime in the past		Woman beaten in the past year	Woman agrees with at least one reason a husband is justified in beating his wife	
	Zambia and Rwanda (1)	Zambia (2)	Zambia (3)	Zambia (4)	Zambia and Rwanda (5)
1(Woman currently working)	-2.33 (2.34)	-1.09 (2.52)	2.15 (2.00)	14.44 (2.54)***	17.84 (3.14)***
1(Woman receives wages, in cash or kind)	2.29 (2.12)	2.33 (2.57)	-1.57 (2.09)	-7.30 (2.19)***	-6.48 (1.93)***
(Mean of dep. variable)*100	39.0	43.0	24.0	88.0	81.0
Number of observations	4188	3282	3282	3262	4161

	Panel B: Dependent variable				
	Woman beaten anytime in the past			Woman beaten in the past year	
	Zambia & Rwanda (1)	Zambia & Rwanda (2)	Zambia (3)	Zambia (4)	Zambia (5)
1(Woman receives wages)	1.55 (1.90)	2.11 (2.51)	2.67 (2.75)	-0.11 (1.79)	0.56 (2.30)
1(Woman receives wages)* 1(Woman's earnings pay for half or more of all household expenditures)		-0.90 (2.89)	-0.93 (3.10)		-1.11 (2.49)
(Mean of dependent var.)*100	39.0	39.0	43.0	24.0	24.0
Number of observations	4357	4354	3242	3282	3279

Notes: Results unchanged for different definitions of labor force participation (e.g., reporting on occupation, self-employment). Robust standard errors allowed to be clustered in parenthesis. Table presents marginal effects calculated at the average of the explanatory variables. Marginal effects and standard errors have been multiplied by 100 for ease of interpretation. All specifications include standard controls: couples' education and ages, wealth index, household size, an indicator for polygyny, an indicator for rural areas, and country dummies.

Table 4: Economic vulnerability and violence

	Woman beaten by her husband in the past year		Woman beaten by her husband anytime in the past.			
	Zambia and Tanzania (1)	Zambia and Tanzania (2)	Zambia and Tanzania (3)	Zambia and Tanzania (4)	Pooled sample (5)	Zambia and Rwanda (6)
Female education, years	-0.28 (0.30)	-0.30 (0.28)	-0.6 (0.3)*	-0.5 (0.3)*	-0.8 (0.3)***	-0.5 (0.3)*
Male education, years	-0.38 (0.27)	-0.39 (0.28)	-0.1 (0.32)	-0.0 (0.3)	-0.1 (0.3)	-0.1 (0.3)
1(Wealth quintile 1)		2.8 (2.3)		0.2 (0.3)		
1(Wealth quintile 2)	-2.2 (2.5)		-1.2 (3.2)		-2.0 (2.2)	-2.3 (2.5)
1(Wealth quintile 3)	-2.1 (2.4)		0.6 (2.9)		2.9 (2.7)	2.3 (2.6)
1(Wealth quintile 4)	-5.1 (3.0)		1.2 (3.7)		-1.4 (3.0)	-1.6 (2.9)
1(Wealth quintile 5)	-3.0 (4.1)		4.0 (5.1)		0.3 (0.4)	0.4 (0.4)
(Mean of dep. var.)*100	24.0	24.0	43.0	43.0	37.0	37.0
Number of observations	3512	3512	3513	3513	4585	4359

The header row above columns (1)–(6) spans: "Dependent variable". Columns (1)–(2) under "Woman beaten by her husband in the past year"; columns (3)–(6) under "Woman beaten by her husband anytime in the past."

Notes: Robust standard errors allowed to be clustered in parenthesis. Table presents marginal effects calculated at the average of the explanatory variables. Marginal effects and standard errors have been multiplied by 100 for ease of interpretation. They should be interpreted as probabilities, in percentage. All specifications include standard controls: couples' education and ages, wealth index, household size, an indicator for polygyny, an indicator for rural areas, and country dummies.

Table 5: Female Attitudes toward Violence

A husband is justified in beating his wife if she…	Panel A: Dependent variable: Woman agrees with the statement below					Woman agrees with at least one statement
	goes out without telling him	neglects the children	argues with him	refuses sex with him	burns the food	
	Zambia and Rwanda					
	(1)	(2)	(3)	(4)	(5)	(6)
Female education, years	-1.10 (0.33)***	-1.21 (0.32)***	-0.52 (0.33)	-1.56 (0.35)***	-0.97 (0.32)***	-1.02 (0.28)***
Male education, years	-0.01 (0.31)	-0.13 (0.28)	-0.72 (0.31)**	-0.22 (0.32)	-0.52 (0.30)*	-0.36 (0.24)
1(Wealth quintile 2)	4.83 (2.71)*	5.80 (2.42)**	7.57 (2.62)***	3.82 (2.52)	3.30 (2.59)	4.12 (2.19)*
1(Wealth quintile 3)	3.28 (2.78)	3.07 (2.53)	7.23 (2.92)**	1.67 (2.95)	0.07 (2.74)	1.85 (2.24)
1(Wealth quintile 4)	-0.21 (2.94)	-0.26 (3.01)	3.28 (3.09)	-0.03 (3.04)	-1.38 (3.07)	0.01 (2.40)
1(Wealth quintile 5)	-12.87 (4.51)***	-13.68 (4.32)***	-8.44 (4.18)**	-16.66 (4.03)***	-14.70 (4.04)***	-10.48 (3.96)***
(Mean of dep. var.)*100	67.0	62.0	42.0	48.0	40.0	80.0
Number of observations	4304	4302	4284	4245	4297	4328

Notes: Robust standard errors allowed to be clustered in parenthesis. Table presents marginal effects calculated at the average of the explanatory variables. Marginal effects and standard errors have been multiplied by 100 for ease of interpretation. They should be interpreted as probabilities, in percentage. All specifications include standard controls: couples' education and ages, wealth index, household size, and indicator for polygyny, an indicator for rural areas, and country dummies.

Table 6: Household Gender Composition

Panel A: Dependent variable
Woman beaten by her husband in the past year.

	Zambia (1)	Zambia (2)	Zambia & Rwanda (3)	Zambia (4)	Zambia & Rwanda (5)	Zambia & Rwanda (6)
Proportion of boys in total births	0.10 (2.23)	0.32 (2.25)	--		--	--
# of teenage boys in household		-4.96 (2.09)**	--		--	--
# of teenagers in household		-0.24 (1.66)	--		--	--
# boys < =12 in household		0.55 (1.26)	--		--	--
# children <=12 in household		-0.76 (1.53)				
# of sons who have died			--	0.86 (1.93)	--	--
# of children who have died			--	1.25 (1.48)	--	--
# of births		-0.44 (0.60)	--	-0.70 (0.66)	--	--
(Mean of dep. var.)*100	24.0	24.0		24.0		
Number of obs.	3287	3287		3287		

Panel B: Dependent variable
Woman beaten by her husband anytime in the past.

	Zambia (1)	Zambia (2)	Zambia & Rwanda (3)	Zambia (4)	Zambia & Rwanda (5)	Zambia & Rwanda (6)
Proportion of boys in total births	1.39 (2.69)	0.09 (2.77)	0.67 (3.29)			
# of teenage boys in household		-3.00 (2.31)	-2.67 (1.98)			
# of teenagers in household		-1.68 (1.98)	-0.07 (1.78)			
# of boys <= 12 in household		0.29 (1.34)	0.52 (1.30)			
# children <=12 in household		0.77 (1.57)	0.64 (1.47)			
# of sons who have died				1.58 (2.58)	3.52 (1.40)**	3.65 (2.07)*
# of daughters who have died						0.62 (1.37)
# of children who have died				0.38 (1.69)		0.22 (1.44)
# of births		0.75 (0.63)	1.69 (0.60)***	1.64 (0.85)*	1.71 (0.61)***	2.09 (0.77)***
(Mean of dep. var.)*100	43.0	43.0	38.0	43.0	38.0	38.0
Number of obs.	3287	3287	4359	3287	4359	4359

Notes: Robust standard errors allowed to be clustered in parenthesis. Table presents marginal effects calculated at the average of the explanatory variables. Marginal effects and standard errors have been multiplied by 100. They should be interpreted as probabilities, in percentage. All specifications include standard controls: couples' ages and education, wealth index, household size, and indicator for polygyny, an indicator for rural areas, and region dummies. The results are unchanged when the specification includes dummies for regions in Zambia and Rwanda.

Table 7: Age and Marital Duration

| | Panel A: Dependent variable
Woman beaten by her husband in the past year. | | | | |
	Zambia and Tanzania (1)	Zambia and Tanzania (2)	Zambia and Tanzania (3)	Pooled data: all regions (4)	Zambia & Rwanda (5)
Female Age (years)	-0.30 (0.19)	-0.54 (0.34)		--	--
Male age (years)	-0.27 (0.14)[*]	-0.29 (0.14)[**]	-0.83 (0.31)[***]	--	--
Difference in age (husband's age minus wife's age)			0.54 (0.34)	--	--
Marital duration (years)		0.18 (0.32)	0.18 (0.32)	--	--
(Mean of dep. var.)*100	24.0	24.0	24.0		
Number of observations	3512	3504	3504		

| | Panel B: Dependent variable
Woman beaten by her husband anytime in the past. | | | | |
	Zambia and Tanzania (1)	Zambia and Tanzania (2)	Zambia and Tanzania (3)	Pooled data: all regions (4)	Zambia & Rwanda (5)
Female Age (years)	0.58 (0.21)[***]	-0.40 (0.39)			
Male age (years)	-0.52 (0.17)[***]	-0.59 (0.17)[***]	-0.98 (0.35)[***]	-0.68 (0.29)[***]	-0.71 (0.30)[***]
Marital duration (years)		1.12 (0.34)[***]	1.41 (0.36)[***]	1.36 (0.30)[***]	1.39 (0.31)[***]
Difference in age (husband's age minus wife's age)			0.44 (0.40)	0.28 (0.32)	0.29 (0.32)
(Mean of dep. var.)*100	43.0	43.0	43.0	38.0	38.0
Number of observations	3513	3505	3505	4571	4346

Notes: Robust standard errors allowed to be clustered in parenthesis. Table presents marginal effects calculated at the average of the explanatory variables. Marginal effects and standard errors have been multiplied by 100 for ease of interpretation. They should be interpreted as probabilities, in percentage. For example, each year a man ages is associated with a 0.5 percent (or 0.005) decrease in incidence. All specifications include standard controls: couples' education, wealth index, household size, and indicator for polygyny, an indicator for rural areas, and country dummies.

Table 8: Marital structure

	Zambia & Tanzania	Zambia	Zambia	Zambia	Pooled sample	Zambia & Rwanda
	Panel A: Dependent variable Woman beaten by her husband in the past year.					
1(Polygynous household)	7.21 (2.44)***				--	--
1(First wife in polygynous hh)		11.36 (3.43)***	11.37 (3.44)***	11.27 (3.45)***	--	--
1(Other wife in polygynous hh)		3.97 (3.10)	3.97 (3.10)	3.93 (3.08)	--	--
Share of boys in total births	NO	NO	YES	YES		
Gender and presence of teenagers	NO	NO	NO	YES		
Economic and demographic variables	YES	YES	YES	YES		
(Mean of dep. variable)*100	24.0	24.0	24.0	24.0		
Number of observations	3512	3287	3287	3287		
	Panel B: Dependent variable Woman beaten by her husband anytime in the past.					
1(Polygynous household)	3.92 (2.61)				6.07 (2.59)**	
1(First wife in polygynous hh)		12.37 (3.67)***	12.42 (3.65)***	12.16 (3.69)***		12.72 (3.64)***
1(Other wife in polygynous hh)		-3.07 (3.32)	-3.07 (3.32)	-3.38 (3.31)		0.41 (3.30)
Share of boys in total births	NO	NO	YES	YES	NO	YES
Gender and presence of teenagers	NO	NO	NO	YES	NO	YES
Economic and demographic variables	YES	YES	YES	YES	YES	YES
(Mean of dep. var.)*100	43.0	43.0	43.0	43.0	38.0	38.0
Number of observations	3513	3287	3287	3287	4585	4359

Notes: Robust standard errors allowed to be clustered in parenthesis. Table presents marginal effects calculated at the average of the explanatory variables. Marginal effects and standard errors have been multiplied by 100. They should be interpreted as probabilities, in percentage. All specifications include standard controls (labeled as "Economic and demographic variables" in the table: couples' ages and education, wealth index, household size, and indicator for polygyny, an indicator for rural areas, and region dummies. The results are robust and quantitatively similar when the specification includes controls for gender of births (share of sons, number of sons, total births) and marital duration.

Table 9: Alcohol Consumption

	Dependent variable					
	Indicator equal to 1 if woman beaten by her husband anytime in the past, and 0 otherwise.				Indicator equal to 1 if woman beaten by her husband in the past year, and 0 otherwise.	
	Zambia & Rwanda	Zambia & Rwanda	Zambia	Zambia	Zambia	Zambia
	(1)	(2)	(3)	(4)	(5)	(6)
1(Wife ever consumed alcohol)	2.9 (2.9)		7.5 (4.4)*			
1(Husband ever consumed alcohol)	11.6 (3.0)***		11.6 (4.0)***			
1(Wife ever drunk)		1.0 (4.5)		6.3 (5.9)		
1(Husband ever drunk)		14.1 (2.1)***		12.3 (3.5)***		
# of days wife consumed alcohol in past 90 days					3.4 (1.5)**	
# of days husband consumed alcohol in past 90 days					0.2 (0.1)***	
# of days wife drunk in past 90 days						11.4 (6.0)*
# of days husband drunk in past 90 days						0.1 (0.1)
(Mean of dep. var.)*100	39.5	39.6	46.0	46.0	25.0	25.0
Number of observations	1899	1835	834	834	834	834

Notes: Alcohol consumption data is self-reported and based on separate interviews with the husband and wife. Robust standard errors allowed to be clustered in parenthesis. Table presents marginal effects calculated at the average of the explanatory variables. Marginal effects and standard errors have been multiplied by 100 for ease of interpretation. They should be interpreted as probabilities, in percentage. All specifications include standard controls: couples' education and ages, wealth index, household size, an indicator for polygyny, an indicator for rural areas, and country dummies.

Table 10: Links to family and friends

	Dependent variable Woman beaten by her husband in the past year.				
	Meatu, Tanzania (1)	Meatu, Tanzania (2)	Meatu, Tanzania (3)	Meatu, Tanzania (4)	Meatu, Tanzania (5)
# of female links (friends and relatives)	-0.74 (0.96)				
# of links who live in the same village		-1.39 (0.76)**	0.55 (1.10)		
# of female links who live in the same village			-2.86 (1.52)*		
# of links with whom the woman speaks at least every other day				-1.38 (0.81)*	1.18 (1.17)
# of female links with whom the woman speaks at least every other day					-3.86 (1.38)***
# of total links (friends and relatives)	-1.78 (1.70)	-1.29 (1.63)	-0.96 (1.61)	-1.26 (1.70)	-0.90 (1.54)
Standard controls	YES	YES	YES	YES	YES
(Mean of dep. variable)*100	12.0	12.0	12.0	12.0	12.0
Number of observations	227	227	227	227	227

Notes: Table presents the marginal effects estimated at the average level of the explanatory variables. Robust standard errors clustered by village in parentheses. *** Denotes statistical significance at the 99 percent level, ** 95 percent significance level, and * 90 percent significance. Individual characteristics are female age and education level. Marriage characteristics are indicators for whether the woman has been married before and for polygynous household. Household characteristics are household size and a wealth index based on asset ownership.

Table 11: Networks and violence

	Panel A: Instrumental Variable Estimates	
	Dependent variable	
	Woman beaten by her husband in the past year, and 0 otherwise.	
	IV-2SLS	IV-2SLS
	(1)	(2)
Number of links who live in the same village	-1.21	
	(3.31)	
Number of links with whom the woman speaks at least every other day		-1.43
		(3.91)
Number of total links to relatives	YES	YES
Standard controls	YES	YES
(Mean of dep. variable)*100	12.0	12.0
Number of observations	227	227

	Panel B: First Stage Regressions	
	Dependent variable	
	Number of friends and Relatives in the same village	Number of friends and relatives the woman speaks to at least every other day
	OLS	OLS
	(2)	(1)
1(Woman resided in the same village prior to marriage)	1.40	1.18
	(0.32)***	(0.26)***
Standard controls	YES	YES
F-stat (instrument only)	18.5	20.8
(Prob > F)	(0.00)	(0.00)
(Mean of dep. variable)*100	7.2	7.0
Number of observations	227	227

Notes: Robust standard errors clustered by village in parentheses. *** Denotes statistical significance at the 99 percent level, ** 95 percent significance level, and * 90 percent significance. In IV specifications, links are instrumented with an indicator for whether the women resided in the same village prior to marriage. Individual characteristics are female age and education. Marriage characteristics include an indicator for whether the woman has been married before and an indicator for polygynous household. Household characteristics are household size and wealth as measured by the asset index.