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Tanzania ASPIRES

**WOMEN'S WELFARE AND LIVELIHOODS OUTSIDE OF MARRIAGE:
EVIDENCE FROM RURAL TANZANIA**

By

Ayala Wineman



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ABSTRACT

This paper explores the welfare and livelihood strategies of women in rural Tanzania after they exit marriage. We draw from a three-wave individual-level longitudinal survey, using a correlated random effects approach within regression analysis to control for time-invariant individual effects. Attention is given to whether women exit marriage through widowhood or divorce, and whether they subsequently become household heads or join another household. Nearly 40% of widowed or divorced women are not the heads of their households, but instead reside with relatives. We find that women, and particularly widows, are more likely to be poor after marriage exit. Upon widowhood or divorce, women also work longer hours in off-farm employment, and those who become household heads are especially likely to experience a reduction in land access and a heightened reliance on non-farm income, including the receipt of transfers. This underscores the importance of both the non-farm economy and family networks for women's livelihoods after marriage. Results illustrate that women's experiences outside of marriage are diverse and cannot be broadly proxied with a household status of being female-headed.

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ACRONYMS

AE	Adult Equivalent
CRE	Correlated Random Effects
FAO	Food and Agriculture Organization of the United Nations
HH	Household
LSMS	Living Standards Measurement Study
OLS	Ordinary Least Squares
SD	Standard Deviation
SSA	Sub-Saharan Africa
SUR	Seemingly Unrelated Regression
TLU	Tropical Livestock Units
TSh	Tanzanian Shillings

1. INTRODUCTION

Marital status can be an important determinant of living standards for women in Sub-Saharan Africa (SSA). In the development economics literature, women's welfare outside of marriage is often examined through an analysis of gendered household headship (e.g., Appleton 1996; Horrell and Krishnan 2007; Quisumbing, Haddad, and Pena 2001). However, this approach necessarily overlooks unmarried women who are not the household head. It further obscures the potentially divergent effects of widowhood and divorce—a theme not explored in studies that overwhelmingly focus on widowhood (Clark and Brauner-Otto 2015). In this paper, we begin to address this oversight by investigating the welfare outcomes of marriage exit¹ for women in rural Tanzania, inclusive of the various ways a woman may lose or shed her married status.

After marriage, a woman's welfare may suffer if she loses access to land, a key factor of production in agricultural economies. In fact, a number of studies note that women in SSA commonly lose access to land or other assets when they become widowed (Chapoto, Jayne, and Mason 2011; Peterman 2012). At the same time, women may implement coping mechanisms in response to their shifting circumstances. For example, in many developing countries, rural women comprise a significant share of the non-farm workforce (Fontana and Paciello 2010), and the incorporation of off-farm or non-farm activities into a livelihood portfolio may offset the income loss from reduced on-farm options. It is therefore worth evaluating how women's livelihoods are influenced by a change in their marital status, and whether this affects their general welfare.

In this paper, we first describe the frequency with which women in rural Tanzania find themselves *outside* of marriage, whether through widowhood or divorce. We then investigate the following research questions:

- How are women's consumption levels affected by marriage exit, and does this pattern vary depending on whether a woman becomes divorced or widowed, or whether she becomes a household head or not?
- Similarly, how is access to land affected by marriage exit?
- And how do women adjust their livelihood portfolios in response?

These questions are explored through regression analysis that controls for individual fixed (time-constant) effects while accounting for changes in women's marital status over time. As a preview of our results, we find that marriage exit (and widowhood, in particular) is associated with a higher likelihood of poverty. Upon marriage exit, women are also less likely to cite agriculture as their main occupation and more likely to derive income from various off-farm sources, including self-employment and both agricultural and non-agricultural wage labor. Only women who join other households do not seem to experience a significant decline in land access, suggesting that family networks may cushion the effects of being single, at least in this regard.

We contribute to the existing literature on women's livelihoods in developing countries in several ways. First, as noted, we consider the effects of marriage exit on women's welfare in rural Tanzania by exploiting a tracking survey that follows individuals, rather than households, over time. We therefore capture the outcomes for *all* women, including those who shift to (or form) new households after marriage exit. The use of a panel survey further allows us to control for individual fixed effects, unlike cross-sectional analyses of women's welfare (e.g., van de Walle 2013). Second,

¹ We use the term *marriage exit* to refer to the end of marriage, whether through separation, divorce, or widowhood. The term is not intended to imply that marriage exit is voluntary.

we consider the effects of marriage exit along two distinct axes, including how the marriage ended (widowhood or divorce) and a woman's headship position within her post-marriage household. It is common for papers to focus on widowhood (Chapoto, Jayne, and Mason 2011; Peterman 2012; van de Walle 2013), while divorce in SSA has attracted relatively little attention (Clark and Brauner-Otto 2015). Furthermore, we know of no other study that specifically considers the experiences of women who exit marriage and join another's household. Third, in examining the livelihood strategies of women upon marriage exit, we extend the analysis of Chapoto, Jayne, and Mason (2011) by looking beyond agriculture to consider all sources of income. This allows us to discern if and how women compensate for any land lost at the end of their marriage.

The remainder of the paper is organized as follows. Section 2 provides a summary of the literature on women's experiences outside of marriage in (primarily) rural SSA. This covers the topics of women's welfare, as well as land access and participation in rural labor markets. Section 3 introduces the data set and methods used to evaluate our research questions. Section 4 presents descriptive and econometric results, along with a set of robustness checks using alternative variable definitions and model specifications. Section 5 concludes with a summary of the results and a discussion of implications for researchers and program designers.

2. BACKGROUND

Analysts often attempt to identify gendered differences in welfare within developing countries by using female headship as a proxy for gender (Chant 2004; Quisumbing et al. 2014). This is partly because conventional estimates of welfare and poverty are based on household-level measures of income or consumption, and partly because a focus on female- and male-headed households is simpler than a consideration of intra-household gender relations. Several studies have found that female-headed households are, on average, poorer than their male-headed counterparts. For example, Buvinić and Gupta (1997) review 61 studies spanning Africa, Asia, and Latin America, and find that female-headed households are over-represented among the poor in 38 cases. More recently, Kassie, Ndiritu, and Stage (2014) find that female-headed households in Kenya experience greater food insecurity. However, other analysts reach a different conclusion. Studying data from 10 countries in Africa, Asia, and Central America, Quisumbing, Haddad, and Pena (2001) use stochastic dominance tests and find that female-headed households are consistently poorer than male-headed households in just two countries. In Thailand (Klasen, Lechtenfeld, and Povel 2015) and Panama (Fuwa 2000), evidence does not indicate that female-headed households have lower average levels of consumption or income. It seems that relative poverty levels between male- and female-headed households cannot be generalized from one country to the next.

It is also worth noting that the channel through which households become female-headed may translate into diverging levels of welfare (Quisumbing et al. 2014). Such channels include widowhood, divorce, abandonment, polygyny, or a husband's migration. In Uganda (Appleton 1996), Zimbabwe (Horrell and Krishnan 2007), Mali (van de Walle 2013), and India (Drèze and Srinivasan 1997), widow-headed households, in particular, are found to be poorer than other households. In Thailand (Klasen, Lechtenfeld, and Povel 2015) and Zimbabwe (Horrell and Krishnan 2007), *de facto* female-headed households, with male spouses that migrated elsewhere, have significantly higher levels of consumption than male-headed households.

Whereas a substantial literature focuses on the effects of widowhood on women in SSA, far less attention has been paid to divorce. However, as observed by Clark and Brauner-Otto (2015), divorce is a primary driver of union dissolution and a significant contributor to household instability. In a study of 33 SSA countries, the authors find that divorce is common in most countries, with rates even exceeding widowhood as a cause of the end of marriage. In Tanzania, for example, 6.9% of unions had ended through widowhood within 20 years after the union was formed, while 30.0% had ended in divorce.² When analyzing the poverty implications of being a single woman in rural Mozambique, Oya and Sender (2009) do distinguish between those who are divorced or widowed. However, with this exception, little is known about the distinct experiences of rural women who become divorced.

Upon marriage exit (and unless she immediately remarries), a woman must necessarily piece together a livelihood that does not involve a male spouse. And because land is fundamental to an agricultural livelihood, land access is a strong determinant of welfare in rural settings (Jayne et al. 2003). Several studies document the frequency with which women in SSA lose access to land after marriage exit. In a household-level longitudinal study from Zambia, Chapoto, Jayne, and Mason (2011) find that over two-thirds of households possess less land following the death of a male household head. In

² Despite a widespread belief that divorce rates are rising in SSA, it seems such rates have remained stable for several decades (Clark and Brauner-Otto 2015).

Tanzania, 52.9% of widows are found to have inherited any assets after their husbands died, and just 38.1% inherited (along with their children) the majority of assets (Peterman 2012). Asset losses may be even more severe for divorcées. According to Yngstrom (2002), newly divorced women in Dodoma, Tanzania are expected to leave the homestead entirely, often returning to their natal families. Along these lines, divorced women in Zimbabwe typically receive none of the household's land or assets, leaving them in a more desperate situation than widows (Horrell and Krishnan 2007). Under Tanzanian law, women and men have equal rights to acquire, use, and deal with property (Law of Marriage Act of 1971; Land Acts of 1999). On paper, the law acknowledges a woman's claim to property that was acquired through joint effort during the marriage. Under the Land Acts, women's inheritance of tribal or family land is governed by local custom, *except* where customs contradict the principle of gender equality (Dancer 2015: 12). However, it is decidedly unclear whether this nuance is translated into women's inheritance equality, in practice.

Therefore, it seems that women's land access is likely to be tenuous after marriage exit. This raises the question of whether women have access to off-farm income-generating opportunities that may at least partly compensate for a lack of farm income. Participation in the non-farm economy is often positively correlated with income and wealth, and is widely viewed as a promising pathway out of poverty (Rijkers and Costa 2012). It is also an important income source for landless or near-landless households that lack other options. According to Ellis and Mdoe (2003), "there is no doubt from the evidence that becoming better off in rural Tanzania involves becoming less reliant on agriculture within a diverse livelihood strategy." Across Africa, rural non-farm enterprises account for approximately 34% of rural income and 9% of rural employment (Haggblade, Hazell, and Reardon 2010).

It is unclear, however, whether women in rural SSA are in a position to exploit opportunities in the non-farm economy. In addition to farm work, their time and energy are often consumed with domestic tasks, which fall disproportionately to women. These include water and fuel collection, food preparation, household upkeep, childcare, and care for the sick and elderly. Beyond this constraint, women seem to be concentrated in irregular, unskilled, and low-return forms of informal employment, and women's activities tend to be spread across fewer sectors, relative to men. In Tanzania, agricultural wages for women are just 69% of men's wages (Fontana and Paciello 2010). Across developing countries, this gender wage gap is evident even when accounting for occupation, industry, and rural/urban locality, with some portion of the gap unexplained—a *male wage premium* (Hertz et al. 2010).

At the same time, there is evidence that women (and especially unmarried women) do avail themselves of off-farm options. Women account for 39% of rural non-farm employment in Africa (Haggblade, Hazell, and Reardon 2010), and unlike in several South Asian countries, women's participation rates in non-farm enterprises in Ethiopia do not differ from men's (Rijkers and Costa 2012). Though married women are likely to have less mobility and weaker claims to their earnings, newly single women may have a greater inclination to engage in off-farm work if their earnings are suddenly more secure (Fontana and Paciello 2010). In both Ghana and Uganda, being a female head is a positive determinant of participation in non-farm income generating activities, even as being female is a negative determinant (Canagarajah, Newman, and Bhattamishra 2001). And while 14% of women in Mozambique are divorced or widowed, this is the case for 37% of rural female wage workers (Oya and Sender 2009). The authors suggest that this association between labor market participation and women's lack of a spouse is likely to run in both directions. For example, some divorced women may have had access to better jobs, thereby enabling them to survive outside of a

union. Other single women are surely compelled to enter the labor market when they lack the financial support of male income earners, or when they lose access to factors of agricultural production, such as land.

3. DATA AND METHODS

This study draws from three waves of the Living Standards Measurement Study (LSMS) for Tanzania, a nationally representative longitudinal data set collected in 2008/09, 2010/11, and 2012/2013 (hereafter referred to as survey years 2009, 2011, and 2013). The LSMS is implemented by the Tanzania National Bureau of Statistics, and is a research initiative within the Development Economics Research Group of the World Bank. The data set captures information on household demographics, income-generating activities, and detailed consumption measures. Appended to the LSMS data set are additional geographically explicit data, including local population density estimates, distances to key services, and long-term average climate variables (NBS 2014). This study also incorporates the LSMS household income estimates from the FAO Rural Income Generating Activities project (FAO 2015). All monetary values are inflated to 2013 Tanzanian shillings (TSh) using the consumer price index.

After the first round of data collection, all adult (≥ 15 years) household members are tracked, including those who had split off from their original households. The survey thus becomes an individual-level longitudinal survey. The original sample included 2,063 rural households, and this paper focuses on the 2,660 women over age 17³ who resided therein. Of these, 2,441 were re-interviewed in the subsequent survey waves, producing a re-interview rate of 91.7%. Regression-based tests for attrition bias, following Wooldridge (2002: 577), confirm that such bias is generally not a concern in our analysis (see Table A1 in the appendix). Once observations are dropped due to incomplete surveys, we are left with 2,374 individuals in our sample. Population weights are included in all analyses, and a balanced panel is used in regressions.

In order to explore how women are affected by widowhood or divorce, variables related to consumption levels, land access, and livelihood portfolios are used as dependent variables in regression analysis. We rely on the general equation:

$$Y_{it} = \alpha + [Marital_Status_{it}]\beta + \mathbf{X}_{it}\boldsymbol{\theta} + \mathbf{C}_i + \varepsilon_{it} \quad (1)$$

where Y_{it} is a given dependent variable for woman i in year t (for example, poverty status), $Marital_Status_{it}$ is an indicator (or set of indicators) of the woman's marital status (for example, the status of being divorced or widowed), \mathbf{X}_{it} is a vector of socioeconomic and geographic characteristics that might otherwise influence the outcome variable, and ε_{it} is a stochastic error term. The focus of our analysis is on β .

For continuous dependent variables, individual time-invariant effects could be controlled for in a linear fixed effects regression. However, a probit model is appropriate for binary dependent variables, while a tobit model is appropriate for dependent variables with a pile-up of observations at zero. Owing to the incidental parameters problem (Greene 2004), these models are not amenable to the inclusion of individual fixed effects. In our analysis, we therefore employ a correlated random effects (CRE) approach to control for time-invariant individual characteristics, which are denoted as \mathbf{C}_i in equation (1). In the CRE approach, the average value of every time-variant regressor for woman i is included as an additional control in the model (Mundlak 1978; Chamberlain 1984). Where multiple dependent variables are related, such as the share of income derived from various

³ This cutoff was selected because the legal age of marriage in Tanzania is 18, and this lower age limit is maintained throughout the paper.

sources, we use a seemingly unrelated regression (SUR). A seemingly unrelated system allows the error terms to be correlated across equations, and further allows for cross-equation (adding-up) constraints on the coefficients.

It is important to emphasize that the end of marriage is undoubtedly endogenous. Couples that experience infertility, for example, may be more likely to dissolve the marriage through divorce, and women with wage employment options may be more likely to seek divorce if it means they can survive outside of a union (Oya and Sender 2009). Authors have found conflicting evidence of an association between women's education and higher/lower rates of divorce (Clark and Brauner-Otto 2015; Takyi and Broughton 2006). Once a marriage has ended, women themselves *select* whether to become female heads or join another household, likely with consideration of their expected welfare in each situation. However, by controlling for individual fixed effects, in addition to a rich set of individual, household, and community characteristics, we are able to limit the sources of potential omitted variable bias when exploring our research questions. A similar approach is employed by Peterman (2012) to study the effects of widowhood and inheritance among women in northwestern Tanzania.

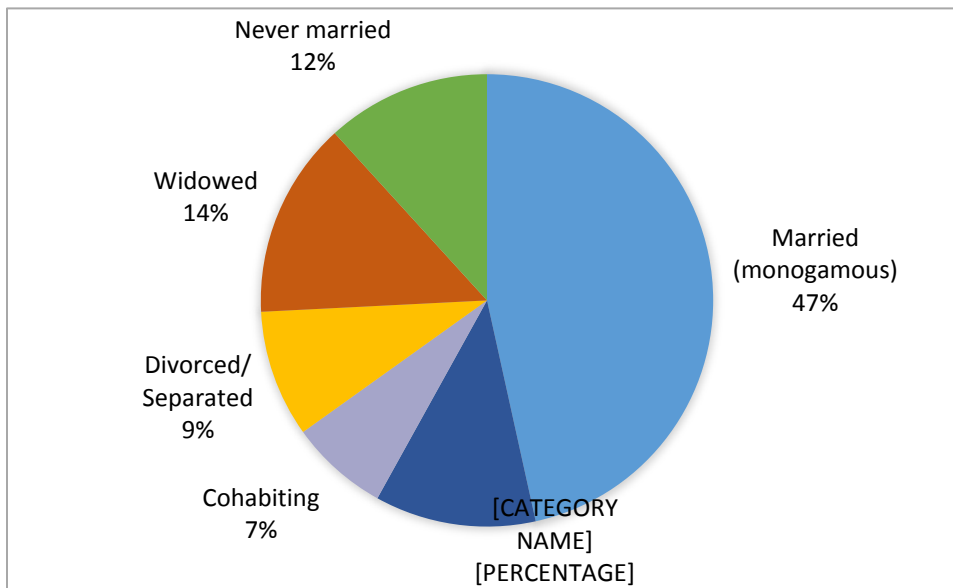
4. RESULTS

4.1. Descriptive Results

Referring to the 2009 survey wave, a majority of rural women over age 17 are married (58.2%) or cohabiting with a partner (7.1%) (Figure 1). 14.1% are widowed, and 9.1% are divorced or separated (hereafter referred to as *divorced*).⁴ Thus, almost one quarter of women are widowed or divorced. (In contrast, far fewer men report that they are widowed (2.1%) or divorced (3.7%). Presumably, men are less likely to outlive their spouses or more likely to remarry after a marriage ends.) Over age 25, just 3.1% of women have never been married. For this reason, the focus of this paper is on women's experiences in divorce and widowhood. The distribution of marital statuses among women does vary by age (Figure 2), with the likelihood of marriage falling after age 40. The likelihood of widowhood rises monotonically, while divorce is relatively constant across the age categories.

As people move in and out of marriage, we also note the previous status of currently married women. This information was collected only in the 2013 survey wave, and only from married (not cohabiting) women. In addition to the women who were then widowed or divorced (23.7% in this year), another 6.8% of women were currently married but had previously been divorced or widowed. This necessarily excludes those who moved immediately from one marriage to the next. We therefore estimate that just under one-third (30.6%) of rural women have experienced life outside of marriage at some point since they were first married.

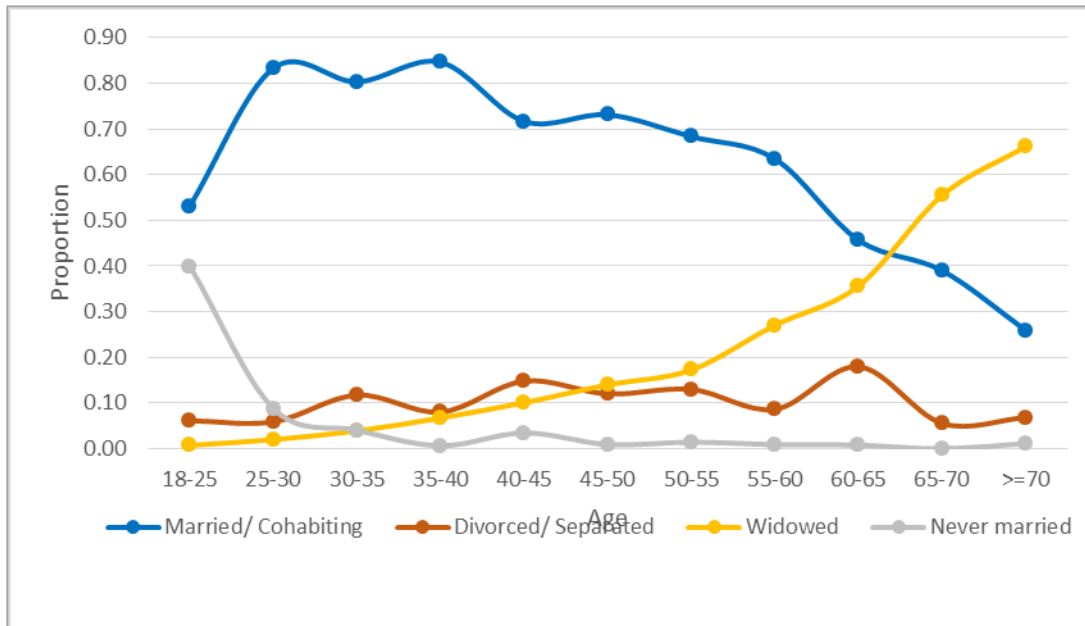
Figure 1. Marital Status of Rural Women (≥ 18 years), 2009



Source: Authors.

⁴ In a setting where union formation is often informal, it can be difficult to distinguish between formal divorces and informal separations (Clark and Brauner-Otto 2015). Hence, we consider both to be forms of union dissolution. However, it is possible that subtle differences may be found between women who report that they are *divorced* versus *separated*.

Figure 2. Marital Status by Age Category among Rural Women, 2009



Source: Authors.

In this paper, we focus not only on women's marital status, but also on their position within the household. Among rural women (again referring to the 2009 survey wave), 55.5% are a spouse⁵ of the household head, and 18.9% are themselves the head. The remaining 25.8% hold another relationship to the head (e.g., child or parent). Thus, over one quarter of women reside in households where they are neither the head nor a spouse. Among women who are widowed or divorced, this value is even higher: 33.8% of widows and 48.0% of women who are divorced are not, in fact, the heads of their households. This raises the question, with whom are these women living? Table 1 shows that they generally reside in the households of their relatives, and the most common relation differs for widows and divorcees—likely because widows are older, on average. Divorced women who are not household heads are most likely to live with their parents, while widows tend to live with their children.

Table 1. Relationship with Household Head among Non-Head Widowed or Divorced Women, 2009 (Proportions)

Living with...	Marital status	
	Widowed	Divorced
Parent/ Step-parent	0.15	0.60
Sibling	0.01	0.12
Child	0.51	0.06
Other relative	0.33	0.21
Non-relative	0.00	0.01
Observations	137	109

Source: Author.

⁵ Following Peterman (2012), both formal marriages and cohabitation are regarded as unions. A woman can report her marital status as *cohabiting*, rather than formally *married*, and still be a *spouse*.

Table 2 provides a set of descriptive statistics for women who are, alternately, the head of their household or spouse to the head, or who hold any other relationship to the head.⁶ These variables will be key to our analysis of the welfare and livelihood outcomes for women outside of marriage. The two measures of welfare that will be used include the value of consumption per adult equivalent (AE) per day and the household poverty status. Consumption is preferred to income as a welfare metric, as it is easier to measure in agricultural settings and is less sensitive to annual or seasonal variability in earnings (Deaton and Zaidi 2002). The value of consumption is the annualized monetary value of household consumption of food and other items, excluding expenditures on tobacco, alcohol, health care, and weddings/funerals. These values are weighted with a Fisher food price index specific to geographic stratum and quarter to reflect the cost of living in different settings (NBS 2014). The household poverty status is determined with reference to the national basic needs poverty line, as specified by the World Bank (2015).

We see that, on average and not conditioned on any other characteristics, female heads live in households with a higher level of per-adult-equivalent consumption, relative to other women. (A discussion of potential scale economies within households is provided among the robustness tests of section 4.3.) At the same time, women who are spouses or household heads do not have significantly different rates of poverty. Table 2 also reveals several intriguing patterns around the individual and household livelihoods of women in each category. Household heads are most likely to have engaged in off-farm work over the past year, including agricultural and non-agricultural wage work, as well as self-employment (business). The data set also captures labor intensity across various activities, in terms of hours worked over the previous week. (Unfortunately, hours spent on domestic maintenance was not asked.) On average, female heads are likely to work the greatest hours in wage work, though spouses work the most hours overall. The households of female heads derive the largest average share of their income from off-farm sources. They draw markedly less than spouses' households from livestock production, while transfers play a more important role in their income portfolios. Note that this categorization is not the only interesting way to disaggregate the sample of rural women. For example, we might have categorized women by their marital status or the intersection of marital status and position in the household. However, Table 2 provides at least a sense of the distribution of key variables in our analysis along one of the main axes to be examined.

Although we cannot claim to isolate exogenous variation in women's marital status, the LSMS data set can be used to trace out the *sequence* of any change in welfare levels that accompanies a change in marital status. Therefore, we exploit the individual-level variation over time in marital status. Among rural women in 2009, Table 3 illustrates the rate of change in marital status over the subsequent four-year interval. Among women who were initially married or cohabiting, a large majority retained the same status by 2013. However, over 10% had since become divorced or widowed.

⁶ From this point forward, analysis is focused on the observations with complete surveys in all three survey waves.

Table 2. Summary Statistics of Rural Women by Head/Spouse/Other Status, 2009

		(1)		(2)		(3)		Tests ^a		
		Spouses		Heads		Other positions in household		(1)=(2)	(1)=(3)	(2)=(3)
		Mean	SD	Mean	SD	Mean	SD			
Welfare	Value of consumption/ AE/ day (1,000s TSh)	2.08	(1.27)	2.24	(1.58)	2.00	(1.19)	***	**	***
	1= HH is poor	0.33	(0.47)	0.31	(0.46)	0.36	(0.48)		***	*
Individual livelihoods	1= Main occupation is agriculture	0.94	(0.24)	0.89	(0.31)	0.70	(0.46)	***	***	***
	1= Agricultural wage worker in past year	0.15	(0.36)	0.22	(0.42)	0.07	(0.26)	***	***	***
	1= Non-agricultural wage worker in past year	0.03	(0.16)	0.05	(0.22)	0.02	(0.14)	***		***
	1= Was self-employed in past year	0.10	(0.30)	0.14	(0.35)	0.03	(0.18)	***	***	***
	Hours of work in past week in:	50.70	(26.75)	47.60	(28.10)	37.06	(28.95)	***	***	***
Household livelihoods	Farm work	19.72	(18.04)	18.31	(17.75)	14.66	(16.35)	***	***	***
	Self-employment (business)	28.70	(17.66)	25.65	(17.07)	21.31	(19.72)	***		**
	Wage work	2.29	(9.08)	3.64	(11.52)	1.10	(6.95)	***		***
	1= HH accesses some land	0.98	(0.14)	0.97	(0.17)	0.99	(0.12)	***	**	***
	Land area per capita (acres)	1.17	(1.87)	0.90	(1.12)	1.05	(1.51)	***	*	
	Share of household income from:									
	All off-farm sources	0.32	(0.34)	0.40	(0.37)	0.30	(0.32)	***		***
	Crop production	0.53	(0.36)	0.51	(0.40)	0.55	(0.34)	***		***
	Livestock production	0.15	(0.25)	0.10	(0.24)	0.15	(0.25)	***		***
	Wage income	0.11	(0.23)	0.08	(0.20)	0.09	(0.19)			
Business	0.13	(0.24)	0.14	(0.27)	0.14	(0.24)				
Transfers	0.08	(0.17)	0.18	(0.29)	0.07	(0.15)	***		***	
Other sources	0.00	(0.01)	0.00	(0.01)	0.00	(0.01)				
Other individual/ household characteristics	Age (years)	37.66	(13.09)	51.05	(15.59)	32.52	(19.14)	***	***	***
	1= Completed primary school	0.48	(0.50)	0.33	(0.47)	0.53	(0.50)	***		***
	Household head's age (years)	45.66	(15.24)	51.05	(15.59)	54.69	(14.85)	***	***	***
	HH size	6.05	(3.17)	4.35	(2.25)	8.24	(4.90)	***	***	***
	Proportion HH <15 or >64 years	0.51	(0.20)	0.55	(0.26)	0.48	(0.17)		***	***
	1= Someone in HH completed primary school	0.75	(0.43)	0.61	(0.49)	0.82	(0.38)	***	***	***
	TLU ^b	3.01	(11.44)	1.50	(5.14)	5.84	(20.57)	***	***	***
	Asset index ^c	0.42	(2.65)	-0.69	(2.55)	1.36	(3.46)	***	***	***
Observations	1,378		443		553					

Note: In column 2, 73.5% of women are widowed or divorced, 23.2% are married or cohabiting, and the remaining 3.3% have never been married. In column 3, these values are 33.5%, 24.5%, and 42.0%, respectively.

^a Asterisks denote the significance level of Tukey tests for a difference in mean values. *** p<0.01, ** p<0.05, * p<0.1 ^bTLU = Tropical Livestock Units

^c Asset index is constructed using principal component analysis, with greater values indicating greater asset wealth.

Table 3. Changes in Marital Status of Rural Women, 2009 to 2013

Marital status 2009 ↓	2013 → Married	Divorced	Widowed	Never married
Married/cohabiting N=1,606	89.5%	5.2%	5.3%	---
Divorced/separated N=204	28.2%	63.4%	8.4%	---
Widowed N=309	5.5%	8.7%	85.8%	---
Never married N=255	41.0%	12.5%	2.1%	44.4%

Among divorced women, roughly one quarter were re-married by 2013, while for widowed women (who are older, on average), this value is much lower. (Cases of a widowed woman later becoming divorced may reflect a short marriage in the interim.)

In our econometric analysis, we will also explore the welfare and livelihood outcomes for women who exit marriage and either become a household head or join another household. Among the women who became divorced or widowed since 2009, 72.3% were household heads in 2013, while the remaining 27.8% had joined other households. In this same group, 27.1% had migrated at least 5 km from their 2009 residence, although this is higher for divorced women (at 42.4%). Note that women can become divorced or separated when their husbands abandon them, thus remaining in the very same residence after their marital status changes. All women who migrated upon marriage exit settled in another rural (not urban) area.

4.2. Econometric Results

Using equation (1), we now turn to an econometric analysis of the welfare and livelihood outcomes associated with becoming widowed or divorced. In Table 4, women's welfare as a dependent variable is captured using either the value of consumption per AE per day or the household poverty status. To conserve space, only the key coefficients are presented here, although full results of select models are provided in the appendix (Table A2). On average, and holding other variables constant, becoming divorced or widowed is not significantly associated with a change in women's consumption levels (column 1). This remains the case when marital status is disaggregated into distinct categories for widowhood or divorce (column 2) or status as head of household (column 3). However, on average, consumption following the end of marriage is significantly lower for women who become widowed, as compared with those who exit marriage through divorce ($P=0.007$). These insignificant *average* changes in consumption may mask the extent to which marriage exit renders women vulnerable to poverty. Indeed, the results of columns 4-6 show that women are more likely to be poor when they find themselves outside marriage, and this is especially true for widows. (Note that these results would differ when using alternative poverty lines. Table A3 in the appendix illustrates that marriage exit is not significantly associated with falling below the 50th percentile of consumption values, although it *is* associated with slipping below the 25th percentile.)

Table 4. Welfare after Widowhood and Divorce among Rural Women (CRE Regressions)

	(1)	(2)	(3)	(4)	(5)	(6)
	Value of consumption/ AE/ day (TSh)			Poverty status (1= Poor)		
	CRE-OLS ^a			CRE-probit		
1= Divorced or widowed	39.85			0.08***		
	(0.66)			(0.01)		
1= Divorced		163.08			0.05	
		(0.12)			(0.10)	
1= Widowed		-192.89			0.12***	
		(0.11)			(0.00)	
1= Head (divorced or widowed)			130.64			0.07**
			(0.28)			(0.04)
1= Not head (divorced or widowed)			-75.91			0.09*
			(0.49)			(0.05)
Individual, household, and community characteristics	Y	Y	Y	Y	Y	Y
Mean values of time-variant regressors	Y	Y	Y	Y	Y	Y
P > F (Divorced = Widowed)		0.007			0.084	
P > F (Head = Not head)			0.161			0.722
Observations	7,122	7,122	7,122	7,122	7,122	7,122

Coefficients (linear models) or average partial effects (nonlinear models); P-values in parentheses; Standard errors clustered at individual level; *** p<0.01, ** p<0.05, * p<0.1

^a A CRE-OLS model is the same as a fixed effects linear regression when using a balanced panel.

How do women's economic activities change after exiting marriage? In Table 5, variables that capture individual income-generating activities are used, in turn, as dependent variables.⁷ Only the key coefficients (β in equation (1)) are shown. Results indicate that women are significantly less likely to cite agriculture as their main occupation after they are no longer married (panel A, column 1). They are, however, more likely to have engaged in agricultural and non-agricultural wage work, as well as self-employment (columns 2-4). They are likely to have worked significantly longer hours in the previous week, though this seems to occur mostly through time dedicated to wage work (columns 5-8). It therefore seems that, when rural women are no longer married, they engage more often and more intensively in off-farm activities. Panel B does not demonstrate that these individual livelihood responses necessarily differ for women who become widowed or divorced. Meanwhile, Panel C presents some evidence that women who become household heads *pivot* away from agriculture in a more pronounced manner than those who claim another position in their post-marriage household.

⁷ As noted, tobit models are appropriate when dependent variables are characterized by a lower bound pile-up at zero. Greater than 20% of values are reported as zero for hours of farm work (32.8%), business (67.5%), wage work (89.9%), and total work hours (21.5%).

Table 5. Women's Individual Livelihoods after Widowhood and Divorce (CRE Regressions)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	1= Agriculture as main occupation CRE-probit	1= Agricultural wage work	Past year 1= Non- agricultural wage work CRE-probit	1= Self- employed	Hours farm work	Past week ^a Hours self- employed CRE- tobit	Hours wage work ^b	Hours worked in past week
PANEL A								
1= Divorced or widowed	-0.05** (0.03)	0.06** (0.04)	0.06*** (0.00)	0.09*** (0.00)	-0.61 (0.63)	1.26 (0.20)	3.72*** (0.00)	4.91*** (0.01)
All other control variables from Table 4	Y	Y	Y	Y	Y	Y	Y	Y
PANEL B								
1= Divorced	-0.05* (0.07)	0.08** (0.03)	0.07*** (0.01)	0.09*** (0.01)	-1.06 (0.45)	1.04 (0.36)	4.85*** (0.00)	5.02** (0.01)
1= Widowed	-0.06* (0.05)	0.03 (0.44)	0.05* (0.09)	0.10** (0.03)	0.21 (0.91)	1.77 (0.19)	2.43** (0.04)	4.82** (0.05)
All other control variables from Table 4	Y	Y	Y	Y	Y	Y	Y	Y
PANEL C								
1= Divorced or widowed (Head)	-0.08** (0.01)	0.06* (0.08)	0.07** (0.01)	0.14*** (0.00)	-0.04 (0.98)	1.22 (0.29)	3.96*** (0.00)	5.94*** (0.01)
1= Divorced or widowed (Not head)	-0.03 (0.41)	0.07 (0.16)	0.06 (0.11)	0.03 (0.54)	-1.35 (0.44)	1.29 (0.37)	4.58** (0.02)	3.67 (0.15)
All other control variables from Table 4	Y	Y	Y	Y	Y	Y	Y	Y
Observations	7,122	7,122	7,122	7,122	7,122	7,122	7,122	7,122

Coefficients or average partial effects; P-values in parentheses; Standard errors clustered at individual level; *** p<0.01, ** p<0.05, * p<0.1

^a The LSMS survey is administered year-round, such that patterns related to employment in the previous week should not be influenced by seasonality. ^b Type of wage work in the past week is not available.

Table 6. Household Livelihoods after Women's Widowhood and Divorce (CRE Regressions)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					Share HH income from... ^a			
	1= HH accesses land	Land area per capita (acres)	Share HH income from off- farm sources	Crop production	Livestock	Wage work	Self- employment	Transfers
	CRE-probit	CRE-OLS	CRE-OLS			CRE- SUR ^b		
PANEL A								
1= Divorced or widowed	-0.04** (0.02)	-0.11 (0.17)	0.05** (0.03)	-0.02 (0.52)	-0.04** (0.04)	0.02 (0.19)	-0.001 (0.96)	0.03** (0.02)
All other control variables from Table 4	Y	Y	Y	Y	Y	Y	Y	Y
PANEL B								
1= Divorced	-0.06** (0.01)	-0.14 (0.14)	0.06** (0.03)	-0.04 (0.16)	-0.02 (0.26)	0.04* (0.06)	-0.01 (0.65)	0.04** (0.02)
1= Widowed	-0.01 (0.66)	-0.05 (0.57)	0.04 (0.23)	0.03 (0.49)	-0.07*** (0.01)	-0.01 (0.80)	0.02 (0.49)	0.02 (0.30)
All other control variables from Table 4	Y	Y	Y	Y	Y	Y	Y	Y
PANEL C								
1= Divorced or widowed (Head)	-0.07*** (0.01)	-0.32*** (0.00)	0.12*** (0.00)	-0.05* (0.07)	-0.05*** (0.01)	0.03* (0.07)	0.01 (0.49)	0.06*** (0.00)
1= Divorced or widowed (Not head)	-0.00 (0.87)	0.16 (0.19)	-0.03 (0.29)	0.03 (0.37)	-0.02 (0.37)	0.01 (0.72)	-0.02 (0.32)	0.01 (0.69)
All other control variables from Table 4	Y	Y	Y	Y	Y	Y	Y	Y
Observations	7,122	7,122	7,122	7,122	7,122	7,122	7,122	7,122

Coefficients or average partial effects; P-values in parentheses; Standard errors clustered at individual level; *** p<0.01, ** p<0.05, * p<0.1

In Table 6, variables that capture household-level livelihoods are used as dependent variables. Once women exit marriage, they are significantly less likely to reside in a household that accesses land (panel A, column 1), again indicating a shift away from a farm-based livelihood. Accordingly, women's households derive a significantly larger share of income from off-farm sources (column 3). In a system of seemingly unrelated equations, the shares of household income derived from various sources are treated as dependent variables.^{8,9} Results show that women's households receive a smaller income share from livestock and a larger share from transfers, following marriage exit (column 8). In Panel B, we see that only divorcées see a significant reduction in the likelihood of accessing land, and a statistically significant increase in the share of income drawn from wage work. In Panel C, it is again evident that these patterns are more prominent among women who become household heads. These women see a significant decrease in land area accessed per capita, a diminished reliance on on-farm production (crop or livestock), and a compensatory increase in the share of income from transfers. The results of Tables 5 and 6 indicate that women's post-marriage experiences are dramatically different for those who are absorbed into another household versus those who become heads of their own households.

4.3. Robustness Checks

In this section, we verify that the associations between the marriage exit and women's subsequent welfare and livelihood strategies are robust across different variable definitions and model specifications. First, note that household consumption, when measured as the value of consumption per AE, may not account for any economies of scale found within households (Drèze and Srinivasan 1997; van de Walle 2013). Without accounting for this benefit, the relative welfare of smaller households may be over-estimated, even when controlling for household size and accounting for the lesser needs of children through an estimation of adult equivalents. Furthermore, the average household size of female heads is substantially smaller than others' households (Table 2). Following Horrell and Krishnan (2007)¹⁰, we now re-estimate consumption as *household consumption/ AE^φ / day*, where the number of adult equivalents is first raised to a scale economies parameter (φ). The condition of no economies of scale is represented with $\varphi=1$, while smaller values of φ imply greater economies of scale. Results using this alternate measure of consumption (Table A4 in the appendix) show that becoming widowed is now significantly associated with reduced consumption, particularly when we assume large scale economies to be present ($\varphi = 0.5$). However, the key results remain broadly consistent with our earlier discussion.

In our econometric analysis, the sample is defined as all women over age 17 who resided in rural households as of 2009. What happens when we focus only on the effect of exiting marriage, rather than re-entering marriage after widowhood or divorce? When we repeat our analysis with the sample restricted to women who were married or cohabiting in 2009, the results confirm that the effects of

⁸ The shares of income across six exhaustive income sources (including an additional category of *other* income) necessarily sum to one. In a seemingly unrelated regression, including all six equations would render the residuals' covariance matrix singular. We have therefore dropped the equation for the share of income from other sources, and the parameters can be retrieved from the adding-up restriction that the coefficients of each explanatory variable must sum to zero across all six equations. However, as we are not interested in this equation, the results are not presented here.

⁹ These shares can be negative in cases where a household realized a negative return on a particular activity. Therefore, a linear model (rather than a tobit model) is appropriate. The standard errors are extremely consistent when independent linear regressions are used (CRE-OLS), rather than a CRE-SUR.

¹⁰ van de Walle (2013) also adjusts for scale economies, albeit with respect to per capita (not per AE) consumption.

marriage exit are as portrayed in section 4.2. (These results are not presented here, owing to space constraints, but are available upon request.) Finally, we also examine how the results are affected when men are included in the analysis. In this case, equation (1) is augmented to include an indicator for being a woman and the interaction of being a woman and being divorced or widowed. The results of key models are provided in Table A5. This shows that, indeed, men's levels of consumption and land access *increase* upon widowhood or divorce (columns 2 and 4), and we cannot reject the null hypothesis that the outcomes for women are of equal magnitude in the opposite direction. Upon exiting marriage, both men and women reside in households with a greater emphasis on off-farm income sources (column 6).

5. CONCLUSIONS

5.1. Summary of Results

In this paper, we have explored the welfare effects of widowhood and divorce among women in rural Tanzania, as well as the changes in livelihood strategies that accompany their altered marital status. Several noteworthy patterns emerge. First, both divorce and widowhood are common, and approximately one third of rural women have experienced life outside of marriage since they were first married. The well-being of women outside of marriage is evidently a salient topic in this setting. Furthermore, 39.4% of divorced or widowed women are not the heads of their households, indicating that the experiences of female heads (and female-headed households) should not necessarily be conflated with women's broader experiences outside of marriage.

Second, after widowhood or divorce, women in rural Tanzania are more likely to be categorized as poor, even as this does not translate into an *average* reduction in consumption levels. Widows are significantly more likely to see a decline in welfare. Third, following widowhood or divorce, women are more likely to find themselves with a smaller farm or even with zero access to land. (Recall that all such women in our sample remain in rural areas.) This is generally consistent with the conclusion reached by Chapoto, Jayne, and Mason (2011) regarding widows' land access in rural Zambia. Relatedly, upon marriage exit, women in rural Tanzania seem to rely more heavily on off-farm income sources, including wage work, self-employment, and the receipt of transfers. We cannot know the extent to which this is a compensatory response to the involuntary loss of land held during marriage (Peterman 2012) and therefore the diminution of a farm-based livelihood, versus a tactical response to the change in household composition. Nevertheless, it underscores the importance of the rural non-farm economy for women outside of marriage.

Fourth, women's welfare and livelihood trajectories seem to be particularly influenced by whether a woman becomes (or perhaps remains) a household head versus joining another (usually a relative's) household. Women's families seem to protect them from the loss of land access experienced by new female heads. At the same time, these women do not experience such a dramatic shift in their livelihoods; they are not more likely to participate in non-farm income earning activities over the past year, and they do not reside in households with a significantly different distribution of income sources. In contrast, women who become household heads seem to experience (on average) a striking pivot away from agriculture. These women also rely more heavily on transfers, a pattern observed in several analyses of female-headed households (Appleton 1996; Horrell and Krishnan 2007; Quisumbing, Haddad, and Pena 2001).

5.2. Research and Policy Implications

This paper serves as a reminder that a research focus on female-headed households may not represent a holistic consideration of women's experiences outside of marriage. Rather, attention should also be paid to unmarried women holding other positions in the household. Furthermore, as the welfare outcomes of marriage exit differ according to the exit channel (i.e., widowhood or divorce), analysts may find it useful to avoid generalizations of women's post-marriage experiences. We further acknowledge that this paper captures only the short-term effects of marriage exit on women. However, it is possible that more severe welfare effects may emerge over a longer term, or

that negative outcomes may be ameliorated with adequate time to adjust to the shock. Future research should explore this question.

Our results confirm that rural women tend to lose access to land upon marriage exit, and this is true not only at the household level (as seen in Zambia (Chapoto, Jayne, and Mason 2011)) but also on a per capita basis. As land is fundamental to an agricultural livelihood and is an important determinant of welfare in rural settings, this suggests that programs and policies should aim to ensure that women retain access to land even outside of marriage. Tanzanian law recognizes that women have a legitimate claim to land that had been held jointly during marriage, and further affirms that inheritance practices ought to reflect gender equality. However, it seems that more effort and resources are needed to ensure that women's statutory rights are implemented in practice. As our results indicate that women's post-marriage land access is somewhat protected by family networks, any trend that affects the degree of family support is also relevant to women's welfare. In northern Tanzania, where land scarcity is rising, Dancer (2015: 34) has observed that women's natal families are now less likely to shelter them upon the dissolution of marriage. Further research is needed to understand whether such a trend is broadly affecting women's welfare outside of marriage, and whether relatives regard the provision of transfers and an invitation to join their household as substitutes.

At the same time, our results also underscore the importance of the rural non-farm economy in women's livelihood portfolios. Although this does not seem to fully insulate women from a higher likelihood of poverty after marriage exit, it does represent a potential lever to bolster women's welfare. Programs and policies should be designed to advance women's access to non-farm economic activities and to improve the returns to women's off-farm labor. In a roundabout way, efforts to strengthen women's off-farm options may ultimately support their on-farm activities if women can use their earnings to purchase land through the market. In northwestern Tanzania, Wineman and Liverpool-Tasie (2016) find that it is somewhat common for female household heads to purchase land after the end of their marriage, although women's engagement with the land market is not well studied. Policy makers would surely benefit from a more complete understanding of how women stitch together a livelihood outside of marriage.

APPENDIX

Table A1. Tests for Attrition Bias

Dependent variable	Model	Coefficient on $R_{i,t+1}$	P-value
Value of consumption/ AE/ day (TSh)	CRE-OLS	-371.11	(0.11)
1= Poor	CRE-probit	0.26	(0.27)
1= Agriculture as main occupation	CRE-probit	0.26	(0.14)
1= Agricultural wage work	CRE-probit	-0.05	(0.81)
1= Non-agricultural wage work	CRE-probit	-0.58	(0.13)
1= Self-employed	CRE-probit	0.17	(0.39)
Hours farm work (past week)	CRE-tobit	5.03	(0.12)
Hours self-employed (past week)	CRE-tobit	-4.73	(0.23)
Hours wage work (past week)	CRE-tobit	-23.99**	(0.05)
Hours worked in past week	CRE-tobit	-6.14	(0.17)
1= HH accesses land	CRE-probit	0.19	(0.44)
Land area per capita (acres)	CRE-OLS	0.03	(0.76)
Share HH income from...			
Off-farm sources	CRE-OLS	-0.04	(0.40)
Crop production	CRE-SUR	0.04	(0.45)
Livestock	""	0.002	(0.93)
Wage work	""	-0.05	(0.19)
Self-employment	""	0.01	(0.80)
Transfers	""	-0.0001	(1.00)

Note: We test for attrition bias using a dummy variable method (Wooldridge 2002: 577) with the following regression:

$$Y_{it} = \alpha + \tau R_{i,t+1} + [Marital_Status_{it}] \beta + \mathbf{X}_{it} \boldsymbol{\theta} + C_i + \varepsilon_{it} \quad (\text{A.1})$$

This is based on equation (1), as introduced in section 4. $Marital_Status_{it}$ is an indicator of being either widowed or divorced. Added to equation (1) is $R_{i,t+1}$, a binary indicator for whether woman i remains in the panel at time $t + 1$. Therefore, only years 2009 and 2011 are included in these regressions, and if the key coefficient (τ) is significant, it indicates attrition bias.

Table A2. Welfare after Widowhood and Divorce among Rural Women (Select Full Results)

	(2)	(5)
	Value of consumption/ AE/ day (TSh)	Poverty status (1= Poor)
	CRE-OLS	CRE-probit
1= Divorced	163.08 (0.12)	0.05 (0.10)
1= Widowed	-192.89 (0.11)	0.12*** (0.00)
Age (years)	-3.33 (0.76)	0.00 (0.97)
1= Individual has completed primary school	-116.09 (0.25)	0.02 (0.65)
Age of HH head	-10.20*** (0.00)	0.00 (0.13)
HH size	-138.59*** (0.00)	0.04*** (0.00)
Proportion of HH members <15 or >64 years	-576.67*** (0.00)	0.11** (0.03)
1= Someone in HH has completed primary school	-84.08 (0.27)	-0.01 (0.58)
1= HH experienced a working-age (15-64) death in past 2 years	39.14 (0.65)	-0.03 (0.43)
TLU	11.47*** (0.00)	-0.00*** (0.01)
Asset index	129.22*** (0.00)	-0.06*** (0.00)
Distance to nearest town (>20,000 pop.) (km)	-4.09 (0.24)	-0.00 (0.67)
Distance to nearest agricultural market (km)	-2.19 (0.31)	0.00 (0.78)
Time to fetch water in dry season (hours)	-0.04 (0.87)	-0.00 (0.13)
Population density (persons/ km ²)	0.08*** (0.00)	-0.00*** (0.00)
Average annual rainfall (mm)	0.07 (0.41)	-0.00 (0.85)
Average annual temperature (°C * 10)	-3.55 (0.83)	-0.00 (0.19)
1= Year is 2011	-139.20*** (0.00)	0.08*** (0.00)
1= Year is 2013	67.17 (0.24)	0.02 (0.22)
Individual mean values of all time-variant regressors	Y	Y
Observations	7,122	7,122

Coefficients or average partial effects; P-values in parentheses; Standard errors clustered at individual level; *** p<0.01, ** p<0.05, * p<0.1

Table A3. Welfare after Widowhood and Divorce (With Alternative Poverty Lines, CRE-Probit)

	(1)	(2)	(3)	(4)	(5)	(6)
	Poverty status (1= Below 50 th percentile)			Poverty status (1= Below 25 th percentile)		
1= Divorced or widowed	-0.03 (0.28)			0.05** (0.04)		
1= Divorced		-0.06* (0.07)			0.03 (0.34)	
1= Widowed		0.02 (0.66)			0.10*** (0.00)	
1= Head (divorced or widowed)			-0.04 (0.22)			0.06* (0.10)
1= Not head (divorced or widowed)			-0.01 (0.74)			0.05 (0.18)
All other variables from Table 4	Y	Y	Y	Y	Y	Y
Observations	7,122	7,122	7,122	7,122	7,122	7,122

Average partial effects; P-values in parentheses; Standard errors clustered at individual level; *** p<0.01, ** p<0.05, * p<0.1

Table A4. Welfare after Widowhood and Divorce (With Scale Economies Parameters, CRE-OLS)

	(1)	(2)	(3)	(4)	(5)	(6)
	Value of consumption/ AE/ day (TSh)					
	Scale economies parameter = 0.9			Scale economies parameter = 0.5		
1= Divorced or widowed	13.83 (0.89)			-138.84 (0.27)		
1= Divorced		146.08 (0.18)			13.36 (0.92)	
1= Widowed		-235.95* (0.07)			-426.30*** (0.01)	
1= Head (divorced or widowed)			80.43 (0.53)			-172.71 (0.29)
1= Not head (divorced or widowed)			-71.08 (0.55)			-95.64 (0.55)
All other variables from Table 4	Y	Y	Y	Y	Y	Y
Observations	7,122	7,122	7,122	7,122	7,122	7,122

Coefficients; P-values in parentheses; Standard errors clustered at individual level; *** p<0.01, ** p<0.05, * p<0.1

Table A5. Welfare and Livelihoods after Widowhood and Divorce for Men and Women (CRE-OLS)

	(1)	(2)	(3)	(4)	(5)	(6)
	Value of consumption/ AE/ day (TSh)		Land area per capita (acres)		Share HH income from off-farm sources	
1= Divorced or widowed	204.08** (0.01)	581.41*** (0.00)	0.07 (0.36)	0.49*** (0.00)	0.05** (0.02)	0.03 (0.37)
1= Female and divorced or widowed		-541.75*** (0.01)		-0.60*** (0.00)		0.02 (0.62)
1= Female	-14.89 (0.64)	2.45 (0.94)	-0.05 (0.49)	0.02 (0.83)	-0.003 (0.74)	-0.01 (0.53)
All other variables from Table 4	Y	Y	Y	Y	Y	Y
P>F(Divorced/ widowed = [female*divorced/ widowed])		0.655		0.151		
P>F(Divorced/ widowed = [female*divorced/ widowed] = 0)						0.047
Observations	13,245	13,245	13,245	13,245	13,245	13,245

Coefficients; P-values in parentheses; Standard errors clustered at individual level; *** p<0.01, ** p<0.05, * p<0.1

REFERENCES

- Appleton, S. 1996. Women-headed Households and Household Welfare: An Empirical Deconstruction for Uganda. *World Development* 24.12: 1811–1827.
- Buvinić, M. and G.R. Gupta. 1997. Female-headed Households and Female-maintained Families: Are they Worth Targeting to Reduce Poverty in Developing Countries? *Economic Development and Cultural Change* 45.2: 259–280.
- Chamberlain, G. 1984. Panel Data. In *Handbook of Econometrics, Vol. 2* (pp. 1247-1318), ed. Z. Griliches and M.D. Intriligator. North Holland, Netherlands: Elsevier.
- Canagarajah, S., C. Newman, and R. Bhattamishra. 2001. Non-Farm Income, Gender, and Inequality: Evidence from Rural Ghana and Uganda. *Food Policy* 26.4: 405–420.
- Chant, S. 2004. Dangerous Equations? How Female-headed Households Became the Poorest of the Poor: Causes, Consequences, and Cautions. *IDS Bulletin* 35.4: 19–26.
- Chapoto, A., T.S. Jayne, and N.M. Mason. 2011. Widows' Land Security in the Era of HIV/AIDS: Panel Survey Evidence from Zambia. *Economic Development and Cultural Change* 59.3: 511–547.
- Clark, S. and S. Brauner-Otto. 2015. Divorce in Sub-Saharan Africa: Are Unions Becoming Less Stable? *Population and Development Review* 41.4: 583–605.
- Dancer H. 2015. *Women, Land, and Justice in Tanzania*. Suffolk: James Currey.
- Deaton, A.S. and S. Zaidi. 2002. *Guidelines for Constructing Consumption Aggregates for Welfare Analysis*. Living Standards Measurement Study Working Paper No. 135. Washington, DC: World Bank.
- Drèze, J. and P.V. Srinivasan. 1997. Widowhood and Poverty in Rural India: Some Inferences from Household Survey Data. *Journal of Development Economics* 54.2: 217–234.
- Ellis, F. and N. Mdoe. 2003. Livelihoods and Rural Poverty Reduction in Tanzania. *World Development* 31.8: 1367–1384.
- Food and Agriculture Organization of the United Nations (FAO). 2015. Rural Income Generating Activities Database. Available at: www.fao.org/economic/riga/riga-database/en/.
- Fontana, M. and C. Paciello. 2010. Gender Dimensions of Agricultural and Rural Employment: Differentiated Pathways Out of Poverty. A Global Perspective. In *Gender Dimensions of Agricultural and Rural Employment: Differentiated Pathways Out of Poverty* (pp. 1–72). Rome: FAO.
- Fuwa, N. 2000. The Poverty and Heterogeneity among Female-headed Households Revisited: The Case of Panama. *World Development* 28.8: 1515–1542.
- Greene, W. 2004. Fixed Effects and Bias Due to the Incidental Parameters Problem in the Tobit Model. *Econometric Reviews* 23.2: 125–47.
- Haggblade, S., P. Hazell, and T. Reardon. 2010. The Rural Non-Farm Economy: Prospects for Growth and Poverty Reduction. *World Development* 38.10: 1429–1441.

- Hertz, T., P. Winters, E.J. Quinones, C. Azzarri, and B. Davis. 2010. Gender Wage Gaps in Rural versus Urban Areas. In *Gender Dimensions of Agricultural and Rural Employment: Differentiated Pathways Out of Poverty* (pp. 140–154). Rome: FAO.
- Horrell, S. and P. Krishnan. 2007. Poverty and Productivity in Female-headed Households in Zimbabwe. *Journal of Development Studies* 43.8: 1351–1380.
- Jayne, T.S., T. Yamano, M. Weber, D. Tschirley, R. Benfica, A. Chapoto, and B. Zulu. 2003. Smallholder Income and Land Distribution in Africa: Implications for Poverty Reduction Strategies. *Food Policy* 28.3: 253–275.
- Kassie, M., S.W. Ndiritu, and J. Stage. 2014. What Determines Gender Inequality in Household Food Security in Kenya? Application of Exogenous Switching Treatment Regression. *World Development* 56: 153–171.
- Klasen, S., T. Lechtenfeld, and F. Povel. 2015. A Feminization of Vulnerability? Female Headship, Poverty, and Vulnerability in Thailand and Vietnam. *World Development* 71: 36–53.
- Mundlak, Y. 1978. On the Pooling of Time Series and Cross Section Data. *Econometrica* 46.1: 69–85.
- National Bureau of Statistics (NBS). 2014. Basic Information Document, National Panel Survey 2012-13. Dar es Salaam: NBS.
- Oya, C. and J. Sender. 2009. Divorced, Separated, and Widowed Women Workers in Rural Mozambique. *Feminist Economics* 15.2: 1–31.
- Peterman, A. 2012. Widowhood and Asset Inheritance in Sub-Saharan Africa: Empirical Evidence from 15 Countries. *Development Policy Review* 30.5: 543–571.
- Quisumbing, A.R., L. Haddad, and C. Pena. 2001. Are Women Overrepresented among the Poor? An Analysis of Poverty in 10 Developing Countries. *Journal of Development Economics* 66.1: 225–269.
- Quisumbing, A.R., R. Meinzen-Dick, T.L. Raney, A. Croppenstedt, J.A. Behrman, and A. Peterman. 2014. Closing the Knowledge Gap on Gender in Agriculture. In *Gender in Agriculture: Closing the Knowledge Gap*, ed. Quisumbing, et al. Rome: The Food and Agriculture Organization of the United Nations.
- Rijkers, B. and R. Costa. 2012. Gender and Rural Non-Farm Entrepreneurship. *World Development* 40.12: 2411–2426.
- Takyi, B.K. and C.L. Broughton. 2006. Marital Stability in Sub-Saharan Africa: Do Women's Autonomy and Socioeconomic Situation Matter? *Journal of Family and Economic Issues* 27.1: 113–132.
- van de Walle, D. 2013. Lasting Welfare Effects of Widowhood in Mali. *World Development* 51: 1–19.
- Wineman, A. and L.S. Liverpool-Tasie. 2016. Land Markets and Women's Land Access in Northwestern Tanzania. Selected presentation at the World Bank Land and Poverty Conference, March 14-16. Washington, DC.
- Wooldridge, J. 2002. *Econometric Analysis of Cross Section and Panel Data*. Cambridge: Massachusetts Institute of Technology Press.

World Bank. 2015. *Tanzania Mainland Poverty Assessment: Main Report*. Washington, DC: World Bank.

Yngstrom, I. 2002. Women, Wives, and Land Rights in Africa: Situating Gender beyond the Household in the Debate over Land Policy and Changing Tenure Systems. *Oxford Development Studies* 30.1: 21–40.

