AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Does she have a say? The impact of livestock transfer and associated training on women's empowerment: Evidence from Zambia

Work in Progress—Please DO NOT CITE

Kashi Kafle (kafle@illinois.edu)

Hope Michelson (hopecm@illinois.edu)

Alex Winter-Nelson (alexwn@illinois.edu)

Department of Agricultural and Consumer Economics

University of Illinois

Selected Paper prepared for presentation at the 2016 Agricultural & Applied Economics Association Annual Meeting, Boston, Massachusetts, July 31-August 2

Copyright 2016 by Kashi Kafle, Alex Winter-Nelson, and Hope Michelson. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Does she have a say? The impact of livestock transfer and associated training on women's empowerment: Evidence from Zambia[1]

Abstract

This study assesses the impact of livestock transfer and associated training on women's empowerment in Zambia. Women's empowerment is measured with women's 'decision making power' on different farm household activities and resources. Using a two-period panel data from a field experiment in the Copperbelt Province, first, we demonstrate empirically that women's empowerment serves as a key driver of economic wellbeing; it has positive effects on consumption expenditures and dietary diversity. We then use the difference-in-difference method with household level fixed effects and find a significant positive impact of the intervention on both women and men's empowerment measures. While men and women from 'treated' households made most household decisions jointly, the intervention had larger impact on women's decision making power. We demonstrate that the improvement in men and women's decision making power largely comes from expansion in joint decisions. In particular, the intervention helped increase the proportion of joint decisions by 16% in all household activities considered and by 21% in decision spheres related to the transferred assets. The finding is consistent with the prediction of the Nash bargaining model because transferring economic resources to women members leads to pareto optimality in resource allocation only through co-operation between men and women.

JEL codes: O12, J16, D04

Key words: livestock transfer, training, women's empowerment, decision making

[1] This research was made possible by a grant from Elanco Animal Health (USA), and by the cooperation of Heifer International. We are especially grateful to Kevin Watkins (Elanco), James Kasongo (Heifer International), Joyce Phiri (Heifer International) and Djondoh Sikalongwe (Heifer International). Views, opinions and remaining errors are of authors.

1. Introduction

Economic development and women's empowerment may go side by side. On one hand, economic development helps reduce the gender inequality gap and on the other hand empowered women may serve as a key element for economic development (Duflo, 2012; Malhotra and Schuler, 2005; Mehra, 1997). Often, gender inequality gap is associated with poverty as the gap is wider in developing countries and among the poor people. A large body of literature has examined the role of women's empowerment on development outcomes. Empirical evidence suggests that empowered women contribute to household wellbeing and food security (Sharaunga et al., 2015; Wilcox et al., 2015), have healthier children (Doss, 2013; Lundberg et al., 1997), have fewer children and lower child mortality (Dyson and Moore, 1983; Rosenzweig and Schultz, 1982) and contribute to improved nutrition and dietary quality (Malapit et al., 2013). In addition, households with empowered women enjoy greater resource allocation to children and children from empowered mothers are more likely to have better education (Bruce et al., 1995; Garikipati, 2013; Luz and Agadjanian, 2015). In recent years, especially after the millennium development goals (MDG), women's empowerment has become a centerpiece of most developmental interventions (UNDP, 2008). It has caught so much attention that most policy interventions either set women's empowerment as primary goal or aim to achieve developmental goals through women's empowerment (Deere et al., 2013; Deere and Doss, 2006; FAO, 2011; Johnson et al., 2016; Meinzen-Dick et al., 2011). However, despite the substantive evidence on the importance of women's empowerment for overall economic development, empirical evidence on the impact of policy interventions on women's empowerment is rather limited (de Brauw et al., 2014).

Given women's empowerment is an important developmental goal in itself and also a pathway to economic empowerment (Duflo, 2012), it may be of interest for policymakers and

stakeholders to understand how development interventions affect women's empowerment. The increasing trend of developmental interventions to integrate women's empowerment program and the growing popularity of such programs merit a rigorous impact assessment because assessing whether such interventions improve women's empowerment is of inherent value. In this paper, we use data from a field experiment in Zambia to assess the impact of a livestock transfer intervention on women's empowerment. In particular, we first examine a simple but pinpointing policy question; do physical asset transfers and associated training contribute to women's empowerment? We then uncover the underlying mechanism of the impact by assessing the potential source of improvement in women's empowerment – does the intervention provide new decision spheres or increase women's roles in existing spheres? Answering these questions helps us understand the role of livestock transfer and training on women's empowerment as well as uncover the underlying mechanism for it. The intervention is implemented by the NGO Heifer International and it transfers livestock and provides training and education to eligible men and women in rural areas in the Copperbelt Province, Zambia.

The 'training and education' includes comprehensive training on gender and family focus, nutrition and income, passing on the gift, accountability, sustainability and self-reliance, improved animal management and other societal themes. The livestock species donated are meat goats, dairy cows, and draft cattle. In addition, the interventions required women to form and work in self-help groups (SHGs) to be eligible for the program. Later, all SHGs can graduate to cooperatives with increased roles in agricultural production decisions, marketing, and micro-finance. We argue that transferring physical assets and building social capital through training and women's SHGs can improve women's bargaining power and place them in better position both within the household and in the community. Although majority of the existing literature provides evidence of causal

relationship between women's empowerment and micro-credit (Garikipati, 2012; Hashemi et al., 1996; Pitt et al., 2006) and conditional cash transfers (de Brauw et al., 2014), evidence on the impact of a multifaceted policy intervention is limited. Das et al. (2013) assesses BRAC's asset transfers and training intervention on women's empowerment but finds mixed evidence; positive impact on household wellbeing but inconclusive findings about women's empowerment. This study contributes to the literature in multiple ways. Our analysis is unique of its kind to assess the impact of a multifaceted intervention – physical asset transfers and training – on women's empowerment measures. We construct empowerment measures based on women's control and authority over 8 different decision spheres of household activities and identify causal relationship between the 'livestock transfer and training' intervention and women's empowerment. We also assess men's decision making power and demonstrate that improvement in women's empowerment does not imply men's disempowerment because, as the Nash bargaining model predicts, resource transfers to one family member triggers cooperation and expands joint decision making. We demonstrate empirically that examining both women and men's empowerment provides a more complete picture of intra-household decision dynamics and argue that assessment this approach is pivotal for success of policy interventions transferring economic resources.

2. Background

2.1. Measuring women's empowerment

Even though a large body of literature agrees that women's empowerment is contextual and depends on existing gender relations (Garikipati, 2013; Sraboni et al., 2014), reflects women's control over resources (Behrman, 2010), and access to education, income, and assets (Doss, 2013; Garikipati, 2013; Johnson et al., 2016), no unanimity exists as to how we measure empowerment. In the existing literature, the methods of measuring empowerment are often debated and rather

abstract. In addition, the choice of empowerment measures is often dictated by data availability, research questions, and cultural or geographical contexts. Some commonly used measures of women's empowerment include women's decision making power (de Brauw et al., 2014; Doss, 2013; Hou and Ma, 2013; Wiig, 2013), multidimensional index based on women's participation in social and economic activities (Bandiera et al., 2014; Bandiera and Natraj, 2013; Lépine and Strobl, 2013; Hashemi et al., 1996), access to employment and physical mobility (Kandpal et al., 2012), women's empowerment in agriculture index (WEAI) (Alkire et al., 2013; Malapit et al., 2013; Sharaunga et al., 2015), women's entrepreneurial index (Bandiera and Natraj, 2013), and women's time use data (Garikipati, 2012). Garikipati (2012) argues that women's time use data can measure women's empowerment because policy intervention that contributes to women's welfare also affects women's time allocation. Bandiera et al. (2014) takes a different approach and defines women's empowerment as the number of times a respondent provides affirmative answer to questions on women's economic and social status. Hou and Ma (2013) creates a composite index from eight different dimensions of empowerment – physical mobility, economic security, purchase ability, ability to make large decision, relative freedom from family, and political awareness – and argues that a positive score on either any individual dimension or the composite index means empowerment. Unlike other studies, Wiig (2013) interviews both men and women using the same survey instrument and calculates an empowerment index consisting 4 domains and 26 specific decisions. They assign equal weight to both joint and sole decisions and women's (men's) empowerment considers decision making power of the primary woman (man) only.

Despite methodological differences, a common attribute all these measures have is that all of them reflect women's bargaining power, role in decision making, time allocation, and control over household resources and income. The WEAI is a comprehensive tool that brings together

most of these attributes to measure women's empowerment in agrarian settings (Alkire et al., 2013; Malapit et al., 2013). Despite being a standalone comprehensive tool that effectively combines 5 dimension of empowerment – production, resources, income, leadership, time – it employs a complicated methodology and assigns arbitrary weights to its components. It also includes rather abstract indicators that are difficult to measure and interpret, such as speaking in public and autonomy in production (*see* Alkire et al., 2013). The current study does not attempt to provide an alternative method to the WEAI, but we argue that examining the 5 dimensions of the WEAI in isolation may provide deeper insights and a more complete picture of women's empowerment. We concentrate on the first two dimensions of the WEAI, production decisions and control over economic resources, because we are interested to understand how the intervention affects women's decision making power on production activities and access to economic resources. We believe that production activities and control over economic resources are the two domains that can be most affected by asset transfers and associated training.

2.2. Policy interventions and women's empowerment

Women in developing countries lag behind women in developed countries in virtually every aspect of women's empowerment, particularly their economic and social empowerment (Bandiera et al., 2014). Often, policy interventions aim to empower women through education, training, improved access to credit, leadership development, and transfer of economic resources. In most cases, development programs transfer economic resources and/or provide awareness or skill development training to families in need. Such programs often provide training to both men and women but identify women as primary recipients for resource transfers (Banerjee et al., 2015; Das et al., 2013; Jodlowski et al., 2016; Kafle et al., 2016; Rawlins et al., 2014). Transferring assets through women can alter the dynamics of intra-household bargaining and affect women's

empowerment but the literature provides no definitive answer (Garikipati, 2013). Garikipati examines the literature on the relationship between microcredit intervention and women's empowerment in developing countries and finds a mixed evidence; while some studies find positive impact, others find neutral or even negative impact of microcredit intervention on women's empowerment.

Das et al. (2013) assesses the impact of a multifaceted intervention in Bangladesh that also transfers physical assets, primarily livestock, and provides training to rural women but finds the intervention to have ambiguous effect on women's empowerment. Even though beneficiary women had ownership and control over the transferred resource itself, men still had much more control over other assets, investments, and even income generated from the transferred assets. Similarly, another study in Bangladesh finds opposing effects of micro-credit program targeted to women and men as the former had positive effects and the later negatively affected women's empowerment (Pitt et al., 2006). In contrast, Hashemi et al. (1996) finds a positive impact of microcredit intervention on women's empowerment also in Bangladesh. Some other studies also find 'women-focused policy interventions' to have positive impact on women's empowerment (Bandiera et al., 2014; de Brauw et al., 2014), but Yoong et al. (2012) argues that while recipient's gender affects the outcome, transferring resources to women does not guarantee improvement in women's empowerment because men still have control over most assets and income.

de Brauw et al. (2014) finds a significant positive impact of a conditional cash transfers program in Brazil, *Bolsa Familia*, on women's decision making abilities, especially on contraceptive uses, child education, purchase of durable goods, and health services. Bandiera et al. (2014) uses a randomized control trial (RCT) in Uganda to assess the impact of an intervention that provides vocational training as well as awareness education on sex, reproduction, and marriage

to adolescent girls and finds a positive contribution of the intervention contributes to women's empowerment. Similarly, Wiig (2013) assesses land redistribution and joint titling program in Peru and finds a significant improvement on women's empowerment due to the intervention. Hou and Ma (2013) examines the relationship between women's empowerment and maternal health services in Pakistan and finds that improvement in women's decision making power improves maternal health services uptake. However, women from the households with more influential men saw the quite opposite effects. Kandpal et al. (2012) assesses the impact of women's education program in India and finds a significant positive impact of the intervention on women's physical mobility, political representation, and access to employment opportunities. Taking together, these findings suggest that the debate over the relationship of economic resource transfers and women's empowerment is still premature and deserves further research. Duflo (2012) argues that the relationship is not sustainable and needs a continuous policy intervention. Specifically, there is a dearth of literature on the impact of transferring assets and social capital development on women's empowerment. The proposed study addresses the gap in literature and disentangles the empowerment-development nexus by the way of a rigorous impact assessment of physical asset transfer (livestock) and social capital development (training) on women's empowerment.

2.3. Theory

Economic theory offers multiple potential mechanisms of intra-household bargaining. It was believed that the unitary bargaining model was the predominant mechanism until Manser and Brown (1980) introduced the concept of collective bargaining model that considers divorce as a threat point in marriage relationships. Later, Lundberg and Pollak (1993) introduced the 'separate spheres' bargaining model which disagrees with Manser and Brown (1980) and argues that divorce cannot be a threat point in intra-household bargaining model but what constitutes a threat-point is

a non-cooperative equilibrium. Lundberg and Pollak provide an example of cash transfer and argue that cash transfer to women versus men may yield different results because household members have full control over the payoff of household resources under their control. The member who has control over majority of household resources may use non-cooperation, such as reduced work load and refusal to share output, as a threat-point to increase his/her bargaining power. This implies that transferring livestock to women could help increase women's bargaining power in household activities, mainly among livestock related activities. However, Nash bargaining model predicts that strategic non-cooperation by either player leads to pareto inefficiency in household resource allocation and therefore household members are forced to negotiate or cooperate. In addition, altruism also may incentivize household members to come together and cooperate. Doss and Meinzen-Dick (2015) argues that as altruism usually dominates threat-point bargaining, intra-household decision making incorporates both unitary and individual interests of household members. Altruism and Nash bargaining model both imply that even though women have the ownership of transferred animals, they may cooperate with their husbands or other adult males and share decision making roles because non-cooperation leads to inefficiency. As animals are transferred to families through women and both men and women are provided the associated training, we hypothesize that the intervention can affect women's empowerment in multiple ways. We propose following testable alternatives:

Alternative 1. *As women are the primary recipients of both the transferred assets and training, the intervention expands women's decision making roles in multiple decision spheres.*

Alternative 2. *The intervention improves women's decision making power in activities related to the transferred assets with no spillover into other decision spheres.*

Alternative 3. *As a result of training and asset transfers, both men and women's decision making power improves as they move from solitary decisions to joint decisions.*

Alternative 4. *Women's position does not improve even after training and asset transfers.*

3. **Data and methods**

3.1. Sample selection

The selection into the treatment followed a two-step process. The first step selected farmer groups, mainly women's self-help groups (SHGs), to receive support from the NGO. The NGO required farmers to form a group and apply for support. Selection criteria required each group to demonstrate appropriate membership with respect to households' capacity and needs, cohesiveness of the group, and other eligibility criteria including a commitment to assemble appropriate equipment, construct animal sheds, and contribute 10% of the total value of donated animals to an insurance fund. The screening implies that both tails of the income distribution are ineligible because the poorest households may not have resources to maintain the animals while non-poor households are excluded based on asset and income criteria. As in (Kafle et al., 2016) and (Jodlowski et al., 2016), we take advantage of the program rollout of the intervention. All eligible groups that are selected for inclusion receive support in a sequence that reflects the rollout. Some eligible groups that were ahead in a queue receive services in an initial round of distributions and are classified as 'early recipients'. Other eligible groups not selected as early recipients are classified as 'Prospectives' and are deferred to receive services until additional resource is available. Since all group members have self-selected to participate, we assume that they are similar in terms of relevant non-observable factors. As long as there are no systematic differences between groups based on timing of application, households in the "Prospective" groups can form a control group for 'early recipients'.

Figure 1 present the selection procedure in detail. The second step in the selection process determined which households in the early recipient groups would receive livestock transfers. While all households in the groups receive training and the benefits of enhanced social capital, only a subset of them initially receive transferred animals. Households that receive animals in the initial distribution are identified as “Originals”. These households receive pregnant animals and are required to pass on the first female off-spring of those animals to other group members, identified as “Pass on the Gift” recipients or “POGs”. Key informant interviews with group members indicated that selection of original recipients was random, but the purity of that randomness is not known. The POGs also represent future adopters, but they receive second generation animals in near future. Their spatial proximity to the originals implies that they may be subject to spillover effects as well as the benefits of training, neither of which are available to the households in the ‘control’ groups. For convenience, when Originals and POGs are called together, we refer to them as ‘treated’ groups and Prospectives as ‘control’ groups.

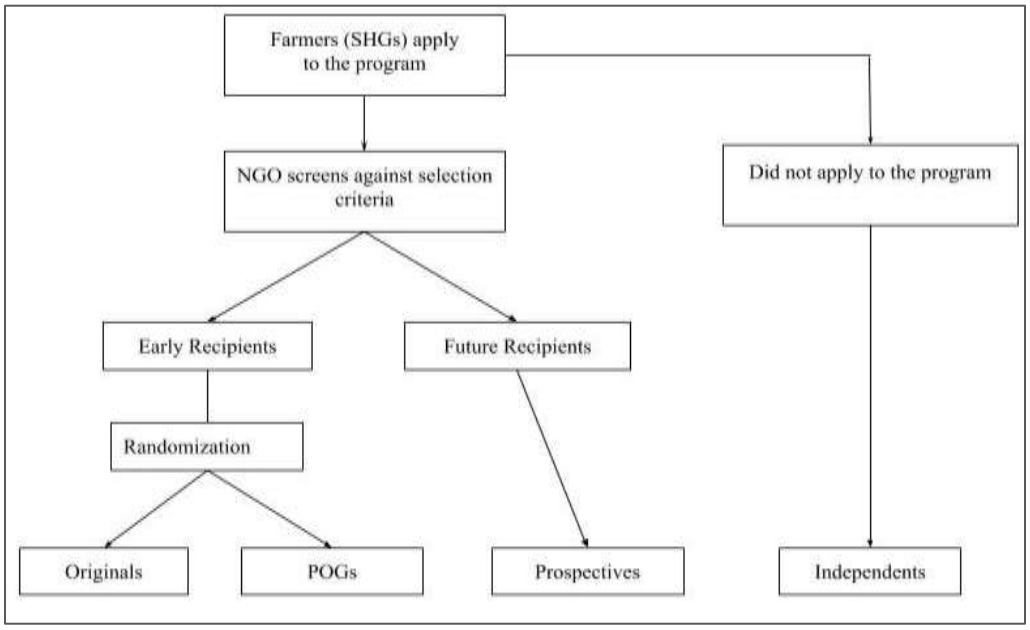

Figure 1. Selection procedure and treatment groups

Finally, the analysis identified a group of households in the communities receiving treatment that had chosen not to participate at all. These 'Independent' households likely differ from the participating households in unobservable ways and are therefore unsuitable as a control group. We exclude these households from this analysis. Based on the ecological and market conditions of the three villages, group members received either one pregnant dairy cow, two pregnant draft cattle, or seven female meat goats. When cattle were distributed the groups received one bull to share as a group to service the females. A male goat was given to each goat recipient in addition to the 7 females. The total value of the asset transfer was similar regardless of the species transferred.

3.2. Data

Data come from a field experiment in the Copperbelt Province in northern Zambia. The field experiment consists a baseline and carefully designed multiple rounds of follow up surveys but this study uses a two-period panel because women's empowerment related questions were administered in two survey rounds only. The baseline for this study is the first follow up survey of the larger field experiment, done in 6 months after the baseline, and the endline for this study is the fourth follow up survey, done in 36 months after the baseline. Using the first follow up survey as baseline should not make a qualitative difference because empowerment is a long run outcome and we do not expect empowerment to change drastically in 6 months. In case the program contributed to women's empowerment in the first 6 months significantly, using the first follow up survey as baseline would underestimate the treatment effect. Table 1 presents the survey characteristics and attrition. The baseline includes 313 households of which 290 households were successfully re-interviewed in the endline giving us a two-period panel of 290 households. The full sample attrition rate is about 7% but POGs and Independents have higher attrition rate at 8%

and 18%, respectively. Higher attrition rate among the Independents is not a concern because they are excluded from the analysis. We rule out the potential attrition bias because further examination of the data finds that households are missing at random and no obvious pattern exists in attrition.

Table 1. Survey characteristics and attrition

Treatment Status	Baseline	Endline	Attrition (%)	Attrition
Originals	104	100	3.8	-4
POGs	105	96	8.6	-9
Independents	37	30	18.9	-7
Prospectives	67	64	4.5	-3
Total	313	290	7.3	-23

Notes. Baseline is the first follow up survey from a larger field experiment we conducted in the Copperbelt Province. See Kafle et al. (2016) and Jodlowski et al. (2016) for details about the experiment and other survey rounds. Independents are excluded from the analysis.

3.4. Empowerment measures and econometric method

We specify two types of empowerment measures to test the four alternatives/propositions presented above. To test the alternative 1 we construct an aggregated empowerment score for both women and men. The empowerment score for women (men) is an arithmetic average of women's (men's) participation scores for 8 decision spheres. The 8 spheres include decision about sending kids to school, animal slaughter decision, live animal sale decision, animal product sale decision, crop produce sale decision, control over farm income, access to loan/credit opportunities, and decision on crop storage/sales. Let's suppose T denotes number of decisions made in the household, T_i denotes number of decisions under each activity domain i, W_i denotes number of decisions under domain i made by female members, M_i denotes number of decisions under domain i made by male members, and J_i denotes number of joint decisions under domain i. Then, women's participation score for domain i (f_i) is calculated as $f_i = \frac{W_i + J_i}{T_i}$, and men's participation score for

domain i (g_i) is calculated as $g_i = \frac{M_i+J_i}{T_i}$. Thus, women's empowerment score is $W_{score} = \sum_i \frac{f_i}{8}$, and men's empowerment score is $M_{score} = \sum_i \frac{g_i}{8}$. By design, both scores range from 0 to 1. Our empowerment score does not distinguish joint decisions from solitary decisions and assigns equal weight to all decision spheres. This approach is consistent with the methods employed in the literature, in particular the women's empowerment in agriculture index (WEAI). We test the second alternative by using men and women's empowerment scores based on 'treatment' related activities only.

We construct a second measure, decision ratio, to test the third alternative. As we need to test whether joint decisions increase significantly and solitary decisions decrease at the same time, we create three ratios, one each for joint (*J*), women only (*W*), and men only (*M*) decisions. Each ratio is the proportion of number of joint or solitary decisions to total decisions made. All 55 decisions from the 8 decision spheres are considered and all decisions are weighted equally, irrespective of the domains. The joint decision ratio is defined as $J_{ratio} = \frac{\sum_i J_i}{T}$, women's decision ratio as $W_{ratio} = \frac{\sum_i W_i}{T}$, and men's decision ratio as $M_{ratio} = \frac{\sum_i M_i}{T}$. All three ratios are proportions and therefore range from 0 to 1.

As a validity check of decision scores and ratios, we construct a weighted empowerment index as a third measure. We use the principal component analysis (PCA) method to obtain weights and compute weighted indexes of men and women's decision making power. To calculate women's empowerment index we run PCA on the 8 participation scores for women, $f_1, f_2, \ldots, f_8$, for baseline and endline, separately. Similarly, another PCA was run on men's participation scores, $m_1, m_2, \ldots, m_8$ to calculate men's empowerment index. In both cases, we retain the first principal

component only because it captures the maximum variation present in the data (Filmer and Scott, 2008; McKenzie, 2005; Vyas and Kumaranayake, 2006). In our case the first component explains 26% variation in baseline and 30% variation in endline.

We use the difference-in-difference (DID) method to estimate the impact of the intervention on empowerment outcomes. Combined with the household level fixed effect estimation, the DID approach corrects for endogeneity that may arise from unobserved individual effects (Bertrand et al., 2004). As we have a panel of multiple 'treatment' groups across 2 periods, the estimating equation includes multiple interactions of time and treatment.

$$y_{it} = \alpha_0 + \alpha_1 Time + \beta_1 Original \times Time + \beta_2 POG \times Time + \Pi X + c_i + \varepsilon_{it} \quad (1)$$

where y_{it} is outcome of interest for household *i* at time *t*. $Time$ is a time dummy that equals 1 for endline and 0 for baseline, $Original$ is a treatment indicator that equals 1 for Original group and 0 for others, POG equals 1 for POG group and 0 for others, X is a vector of control variables that includes household size, number of children ages 5 or below, number of children ages 6 to 16, age of the household head, level of education for the head, dummy variable for female head, and dummy variable for married head, c_i is the household level fixed effect, and ε_{it} is idiosyncratic error term. The coefficients of interest are β_1 and β_2; β_1 represents the true program effect and β_2 represents combined effects of spillovers and the "Pass on the Gift" initiative.

4. Results

4.1. Descriptive Statistics

Table 2 presents descriptive statistics and balancing tests for both control variables and outcome variables in the baseline. We use the two-sample t-test and normalized differences for

balancing test. The normalized difference (ND) is a difference between sample means of 'treated' and 'control' groups weighted by the sum of sample variances. The decision rule is that variables with the absolute value of normalized differences greater than 0.25 may indicate violation of balancing assumption and contribute to bias if included in the regression (Imbens and Wooldridge, 2008). In Table 2, variables that are significantly different between 'treated' and 'control' groups are marked with stars. Based on the t-test and normalized differences, household size, number of children ages 6-16, and age of the household head for the 'treated' groups are significantly different from that of the 'control' group. All other observed characteristics of the 'treated' and 'control' groups are not statistically different. Even though household size, number of children, and age of the household head are different for the 'treated' and 'control' groups, they should not contribute to selection bias because sample selection was not based on these characteristics. Balancing tests on outcome variables indicate that all women in the 'treated' and 'control' groups are equally empowered in baseline. Similar results hold for men's decision making power as well but men and women in the Original group made significantly less joint decision then other groups.

On average, households in the 'treated' groups have slightly larger household size than the 'control' groups but the number of younger children ages 0 to 5 is the same across households in both groups. Apparently, the difference in household size comes from the number of children ages 6 to 16 and which indicates a higher dependency ratio among the 'treated' households. About 20% of households are headed by female and about 80% of household heads are married. Household heads from the 'treated' groups are about 2 years older than the heads from 'control' households but all of them have completed primary school only (Table 2). Overall, summary statistics and balancing test results indicate that our sample is fairly balanced and the baseline characteristics are

smoothly distributed across both the recipients and non-recipients.

Table 2. Summary statistics and balancing tests on baseline sample

	Treatment Status			Normalized Difference	
Variables	Original	POG	Prospective	ND1	ND2
Household Size	7.24***	7.10***	5.84	0.36	0.32
	(0.266)	(0.296)	(0.292)		
No. if children 5 or under	1.19	1.22	1.00	0.13	0.15
	(0.101)	(0.099)	(0.134)		
No. of children 6 to 16	2.28*	2.52**	1.84	0.18	0.27
	(0.168)	(0.183)	(0.198)		
Female head (1=Yes, 0=no)	0.21	0.15	0.19	0.04	-0.08
	(0.041)	(0.036)	(0.049)		
Married head (1=Yes, 0=no)	0.82	0.89*	0.78	0.07	0.19
	(0.038)	(0.033)	(0.052)		
Education of head	2.90	3.10	2.94	-0.02	0.08
	(0.142)	(0.158)	(0.165)		
Age of head	51.1***	44.6	43.7	0.35	0.04
	(1.300)	(1.404)	(1.800)		
Women's decision score	0.74	0.80	0.79	-0.12	0.02
	(0.030)	(0.026)	(0.036)		
Men's decision score	0.70	0.77	0.78	-0.16	-0.03
	(0.034)	(0.032)	(0.041)		
Women's decision ratio	0.30	0.23	0.22	-0.25	-0.01
	(0.034)	(0.032)	(0.041)		
Men's decision ratio	0.26	0.20	0.21	0.16	0.02
	(0.030)	(0.027)	(0.036)		
Joint decision ratio	0.44**	0.56	0.57	0.12	-0.01
	(0.035)	(0.036)	(0.045)		
Observations	100	96	64		

Notes. Point estimates are mean and standard errors are in parentheses. Asterisks *, **, and *** indicate level of significance, * $p < .10$, ** $p < .05$, *** $p < .01$, for the test of equality of mean across Original and Prospectives or POG and Prospective.

ND1 and ND2 indicate the value of normalized difference between Originals and Prospectives, and POGs and Prospectives, respectively

Table 3 presents distribution of intra-household decisions made by men and women members jointly or solitarily. The decision ratios are presented for different treatment groups over time. Interestingly, both women and men's solitary decisions decrease after the intervention but there is big increase in the proportion of joint decision. Households in the Original group had the biggest increase in joint decisions from 44% in baseline to 63% in endline followed by POG households, 56% to 65%. This is consistent with the prediction of Nash bargaining model and altruism model and implies that the intervention may have contributed to coherence and cooperation among family members.

Table 3. Distribution of decision ratios by treatment groups over time

	Women only		Men only		Joint	
Treatment status	Baseline	Endline	Baseline	Endline	Baseline	Endline
Original	0.30	0.19	0.26	0.18	0.44	0.63
	(0.034)	(0.026)	(0.030)	(0.021)	(0.035)	(0.041)
POG	0.23	0.16	0.20	0.18	0.56	0.65
	(0.032)	(0.021)	(0.027)	(0.021)	(0.036)	(0.038)
Prospective	0.22	0.18	0.21	0.23	0.57	0.59
	(0.041)	(0.028)	(0.036)	(0.027)	(0.045)	(0.046)
Full sample	0.26	0.18	0.22	0.19	0.52	0.63
	(0.020)	(0.014)	(0.018)	(0.013)	(0.022)	(0.024)
Observations	260	259	260	259	260	259

Notes: Point estimates are mean and standard errors are in parentheses.
Decision ratios are the proportions of decisions made by women, men, or jointly to total decisions made

Table 3 presents men and women's decision score across different treatment groups in baseline and endline. Men's decision making power increases irrespective of the treatment status but women's decision score increased for treated households and decreased for control households. Unlike decision ratios, decision scores value joint and solitary decisions equally. As a result any increase in men and women's decision making power comes from increase in joint decision making.

Table 4. Distribution of decision scores by treatment groups over time

	Women*		Men	
Treatment status	Baseline	Endline	Baseline	Endline
Original	0.74	0.81	0.70	0.80
	(0.030)	(0.019)	(0.034)	(0.026)
POG	0.80	0.83	0.77	0.83
	(0.027)	(0.019)	(0.032)	(0.022)
Prospective	0.79	0.77	0.78	0.81
	(0.036)	(0.027)	(0.041)	(0.028)
Full sample	0.77	0.81	0.74	0.81
	(0.018)	(0.012)	(0.020)	(0.015)
Observations	260	259	260	259

Notes: Point estimates are mean and standard errors are in parentheses
*Women's (men's) score is the weighted score of women's (men's) participation in intra-household decision making. Joint and solitary decisions are equally weighted.

We break down the decision scores and ratios by individual decision spheres. Table 5 presents women's decision scores over the 8 decision spheres for Originals and Prospectives over time. Women's decision making power expands in all decision spheres but crop storage and sale but the magnitude of change in much bigger among the Originals compared to the Prospectives. After the intervention, recipient women are clearly seeing increased roles in most household activities and their roles increased more than it would have increase in the absence of the intervention. Similar results hold for decision ratios (Figure 2) as the change in the proportion of joint decisions increased for all decision spheres but crop storage/sale decisions. Table A1 in the Appendix presents full results for both joint and women's solitary decision ratios and the results are consistent with the results for decision scores.

Table 5. Women's decision scores by individual decision spheres

Decision spheres	Originals		Prospectives	
	Baseline	Endline	Baseline	Endline
Sending kids to school	0.78	0.91	0.88	0.88
	(0.042)	(0.029)	(0.042)	(0.042)

Animal slaughter	0.55	0.89	0.55	0.72
	(0.049)	(0.029)	(0.062)	(0.054)
Live animal sale	0.23	0.89	0.17	0.72
	(0.042)	(0.029)	(0.048)	(0.054)
Animal product sale	0.22	0.27	0.02	0.09
	(0.042)	(0.045)	(0.016)	(0.037)
Crop produce sale	0.56	0.69	0.50	0.75
	(0.049)	(0.042)	(0.062)	(0.047)
Off-farm income	0.17	0.24	0.19	0.33
	(0.036)	(0.041)	(0.048)	(0.058)
Access to loan/credit	0.62	0.70	0.67	0.73
	(0.047)	(0.045)	(0.057)	(0.053)
Crop storage/sale	0.15	0.05	0.09	0.13
	(0.036)	(0.022)	(0.037)	(0.042)
Observations	100	100	64	64

Notes: Point estimates are mean and standard errors are in parentheses. All decision spheres, except sending kids to school, involve multiple decisions and the women's empowerment score is the ratio of number of female made decisions to number of total decision made in the household

Figure 2 presents the change in the proportion of joint decisions between baseline and endline survey rounds for the Originals and Prospectives. The change is always bigger for the Originals across all decision spheres but the crop storage/sale decisions. The change in much bigger across the decision spheres directly related to the transferred assets.

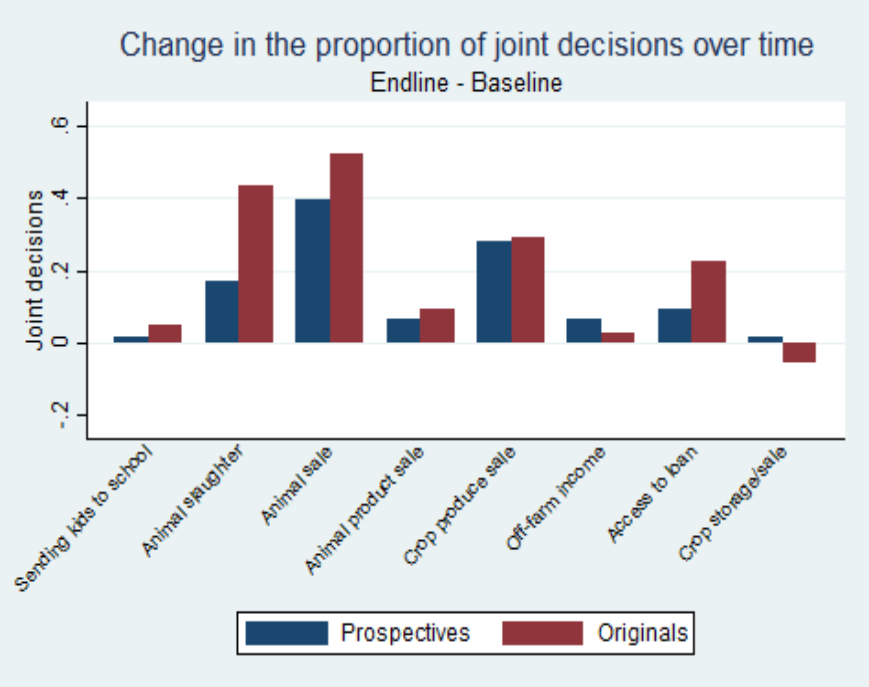

Figure 2. Change in the joint decision ratio over time

4.2. Estimated Results

We first show empirically that the women's empowerment is pivotal for household wellbeing. Then we use empowerment measures as outcome variables and assess the impact of the intervention on women and men's decision making power. We also estimate the impact on men's decision making power because assessment of the dynamics of intra-household decision making may be incomplete without knowing men's position within the household. Expansion in one's decision making abilities may not mean shrinkage in other's decision making abilities. So it is crucial to assess how the intervention affects male members of the recipient households.

Table 6 presents the effects of both women and men's decision making power on poverty and food security outcomes in baseline. Results indicate that women's empowerment has significant positive effects on household consumption expenditures and dietary diversity and are consistent with previous findings and claims (Duflo, 2012; Sharaunga et al., 2015; Wilcox et al., 2015). This implies that empowered women serve as a vehicle for economic development and it

is critical for policy makers and researchers to understand the impact of development interventions on women's empowerment. Negative effects of household size on consumption expenditures implies that the sample households are likely resource poor. We also run separate regressions for men's empowerment index and the results are similar. Interestingly, men's decision making power also has positive effects on food expenditures and dietary diversity. This implies a high degree of correlation between men and women's decision making abilities as the source of improvement in their decision making power is expansion in joint decisions.

Table 6. Effect of women's empowerment on expenditures and dietary diversity†

	Log (Total expenditure)	Log (Food expenditure)	Household dietary diversity
Women's empowerment index	0.08***	0.09***	0.22**
	(0.028)	(0.028)	(0.101)
Men's empowerment index	0.04	0.06***	0.26**
	(0.034)	(0.033)	(0.122)
Household size	-0.08***	-0.09***	0.05
	(0.022)	(0.022)	(0.098)
Other controls‡	Yes	Yes	Yes
Observations	260	260	260

Notes. Standard errors are in parentheses, level of significance * $p < .10$, ** $p < .05$, *** $p < .01$.
The women's empowerment index is calculated by running the principal component analysis method on women's participation scores for 8 decision spheres.
Total and food expenditure are in Kwacha per capita per week. Household dietary diversity is calculated using USDA FANTA's approach, includes 13 food groups.
‡Other controls include number of children ages 5 or under, aged 6 to 16, indicators for female head and married head, and age and education of head
†Results are obtained from simple OLS regression on baseline data.

Table 7 presents the impact of the intervention on decision ratios. Results indicate that the proportion of joint decision among women and men in the Original households has increased by 16% while the proportion of solitary decisions have decreased by more than 8%. However, the dynamics of household decisions among women and men in the POG households is unaffected by the intervention. Absence of the impact among POG households indicates the implicit difference

between transferring 'original' animals and passing second generation animals as a gift. To assess whether the impact differs by decision spheres related to transferred assets and other decisions, we disaggregate the 8 decision spheres to 'treatment' related activities and other activities. Treatment related activities include decisions about live animal sale, animal product sale, and animal slaughter and other activities include remaining 5 decision spheres.

Results presented in the second half of Table 7 indicate that women and men in both Original and POG households increased joint decisions on treatment related activities by about 21%. However, the proportions of men and women's solitary decisions have decreased by 12%, and 18%, respectively. We also calculate the empowerment ratios for 'other activities' not related to the transferred assets and estimate the impact on them. Results are presented in Table A2 in Appendix and indicate that the intervention had no impact on women and men's decision making power over 'other activities'.

Table 7. Impact on women and men's decision making power

	All decisions			Treatment related decisions		
	Joint	Female only	Male only	Joint	Female only	Male only
Endline	0.01	-0.04	0.03	0.15**	0.01	0.06
	(0.049)	(0.035)	(0.038)	(0.073)	(0.066)	(0.055)
Original x Endline	0.16***	-0.08*	-0.09*	0.21**	-0.12*	-0.18***
	(0.061)	(0.044)	(0.051)	(0.086)	(0.074)	(0.065)
POG x Endline	0.08	-0.03	-0.05	0.21**	-0.06	-0.09
	(0.063)	(0.044)	(0.050)	(0.089)	(0.080)	(0.067)
Household Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	520	520	520	520	520	520

Notes. Standard errors in parentheses, significance level, * $p < .10$, ** $p < .05$, *** $p < .01$
Household controls include household size, number of children ages 5 or under, number of children ages 6 to 16, indicators for female head and married head, and level and squared of age and education of head

Table 8 presents the impact of the intervention on decision scores. Unlike the decision ratios, decision scores assign equal weights to both joint and solitary decisions. Women's decision

making power increases by 9%, but men see no significant improvement on their decision making position due to the intervention. We also estimate the impact of the intervention on decision scores for activities related to transferred assets and other activities and discover that the intervention has positive but not significant impact on decision scores. Like the decision rations, the intervention had no impact at all on men and women's decision scores for 'other activities'. This highlights the importance of considering joint and solitary decisions separately because when we combine both joint and solitary decisions together, any increase in joint decisions may have been offset by the decrease in solitary decisions.

Table 8. Impact on women and men's empowerment scores

	All activities		Treatment related activities	
	Women	Men	Women	Men
Endline	-0.03	0.04	0.16**	0.22***
	(0.039)	(0.036)	(0.075)	(0.077)
Original x Endline	0.09*	0.06	0.08	0.03
	(0.051)	(0.047)	(0.085)	(0.086)
POG x Endline	0.06	0.02	0.16*	0.12
	(0.049)	(0.045)	(0.090)	(0.092)
Household Controls	Yes	Yes	Yes	Yes
Observations	520	520	520	520

Notes. Standard errors in parentheses, significance level, * $p < .10$, ** $p < .05$, *** $p < .01$
Household controls include household size, number of children ages 5 or under, number of children ages 6 to 16, indicators for female head and married head, and level and squared of age and education of head

Finally, we estimate the impact of the intervention on men and women's empowerment indexes obtained from the principal component analysis (PCA) on participation scores for the 8 decision spheres. Although joint and solitary decisions are weighted equally to compute the 8 participation scores, the PCA method assigns different weights to its components and therefore impact on the index can be different from impact on decision ratios and scores. Results are presented in Table 9 and indicate that the intervention has a significantly expanded women's

decision making roles but the impact on men's decision making power is negative, albeit it is not significant. This implies that when joint and solitary decisions are combined together, the negative impact on solitary decisions may mask the expansion in joint decisions. Overall, results indicate that the intervention helped bring men and women together and expand joint decisions. In particular, women's decision making power has expanded much more than men's decision making power and this finding is robust to different empowerment measures.

Table 9. Impact on women and men's empowerment index

	All activities	
	Women	Men
Endline	-0.42*	-0.06
	(0.24)	(0.19)
Original x Endline	0.59**	-0.07
	(0.28)	(0.23)
POG x Endline	0.35	-0.03
	(0.28)	(0.22)
Household Controls	Yes	Yes
Observations	520	520

Notes. Standard errors in parentheses, significance level, * $p < .10$, ** $p < .05$, *** $p < .01$
Household controls include household size, number of children ages 5 or under, number of children ages 6 to 16, indicators for female head and married head, and level and squared of age and education of head

5. Conclusion

Results show that the intervention, livestock transfer and training, helped expand cooperation in intra-household decision making; primarily it improved women's decision making power. The results also indicate that expansion on men and women's decision making power largely comes from increased roles in activities directly related to the transferred assets. In particular, the intervention helped increase the proportion of joint decisions by 16% in all household activities considered and by 21% in decision spheres related to the transferred assets. Both men and women's solitary decisions regarding all 8 decision spheres decreased by 9% but

the proportion of solitary decisions on activities related to the transferred assets decreased by more than 12%. The intervention also contributed to increase in joint decisions among POG households, but the impact was limited to the decision spheres related to the transferred assets only. When solitary and joint decisions are weighted equally and combined together to form a decision score for both men and women, the positive impact of the intervention subsided. Women still experienced small improvement in their decision making roles, but men's decision making power showed no significant improvement. We argue that this finding highlights a need of considering joint and solitary decisions separately because when combined together, the expansion in joint decisions is probably masked by the reduction in solitary decisions resulting to underestimation of the true impact of the intervention.

The results imply that awareness/educational training on gender and other societal themes may be more effective when combined with physical asset transfers such as livestock because ownership of economic resources increase bargaining power of the owner which, as the Nash bargaining model predicts, eventually leads to pareto optimality through cooperation. Big increase in joint decisions accompanied by a decrease on the proportion of solitary decisions indicate that the intervention helped move households toward gender equity and shared responsibilities in day-to-day activities. In general, larger impact on the Original households and minimal or no effect on the POG households implies that transferring physical assets combined with a comprehensive training on gender and other societal themes may place women in better position and help increase their roles in household decision making.

Overall, our findings imply that policy interventions that provide educational and awareness training to women may benefit from augmenting physical asset transfers in their program and vice-versa because economic resource transfer contributes to co-operation between

household members which eventually leads to better resource allocation, gender equity, and shared responsibilities. In addition, as we discover an expansion in joint decisions is accompanied by a reduction in solitary decisions, our findings indicate a need of change in the traditional view of intra-household decisions because traditional approaches that combine joint and solitary decisions together may underestimate the ‘true’ dynamics of intra-household decision making.

References

Alkire, S., Meinzen-Dick, R., Peterman, A., Agnes Quisumbing, Seymour, G., Vaz, A., 2013. The Women's Empowerment in Agriculture Index. World Dev. 52, 71–91. doi:http://dx.doi.org/10.1016/j.worlddev.2013.06.007

Bandiera, O., Burgess, R., Goldstein, M., Buehren, N., Gulesci, S., Rasul, I., Sulaiman, M., 2014. Women's empowerment in action: evidence from a randomized control trial in Africa [WWW Document]. URL http://sticerd.lse.ac.uk/ (accessed 3.2.16).

Bandiera, O., Natraj, A., 2013. Does Gender Inequality Hinder Development and Economic Growth? Evidence and Policy Implications. World Bank Res. Obs. 28, 2–21. doi:10.1093/wbro/lks012

Banerjee, A., Duflo, E., Goldberg, N., Karlan, D., Osei, R., Parienté, W., Shapiro, J., Thuysbaert, B., Udry, C., 2015. A multifaceted program causes lasting progress for the very poor: Evidence from six countries. Science 348, 1260799.

Behrman, J.R., 2010. The International Food Policy Research Institute (IFPRI) and the Mexican PROGRESA Anti-Poverty and Human Resource Investment Conditional Cash. World Dev., The Future of Small FarmsIncluding Special Section: Impact Assessment of Policy-Oriented International Agricultural Research (pp. 1453–1526) 38, 1473–1485. doi:10.1016/j.worlddev.2010.06.007

Bertrand, M., Duflo, E., Mullainathan, S., 2004. How much should we trust differences-in-differences estimates? Q. J. Econ. 119, 249–275.

Bruce, J., Lloyd, C.B., Leonard, A., Engle, P.L., Duffy, N., 1995. Families in Focus: New Perspectives on Mothers, Fathers, and Children. The Population Council, One Dag Hammarskjold Plaza, New York, NY 10017.

Das, N., Yasmin, R., Ara, J., Kamruzzaman, M., Davis, P., Behrman, J., Roy, S., Quisumbing, A.R., 2013. How Do Intrahousehold Dynamics Change When Assets Are Transferred to Women? Evidence from BRAC's Challenging the Frontiers of Poverty Reduction — Targeting the Ultra Poor Program in Bangladesh (SSRN Scholarly Paper No. ID 2405712). Social Science Research Network, Rochester, NY.

de Brauw, A., Gilligan, D.O., Hoddinott, J., Roy, S., 2014. The Impact of Bolsa Família on Women's Decision-Making Power. World Dev. 59, 487–504. doi:10.1016/j.worlddev.2013.02.003

Deere, C.D., Doss, C.R., 2006. The Gender Asset Gap: What Do We Know and Why Does It Matter? Fem. Econ. 12, 1–50. doi:10.1080/13545700500508056

Deere, C.D., Oduro, A.D., Swaminathan, H., Doss, C., 2013. Property rights and the gender distribution of wealth in Ecuador, Ghana and India. J. Econ. Inequal. 11, 249–265. doi:10.1007/s10888-013-9241-z

Doss, C., 2013. Intrahousehold Bargaining and Resource Allocation in Developing Countries. World Bank Res. Obs. 28, 52–78. doi:10.1093/wbro/lkt001

Doss, C.R., Meinzen-Dick, R., 2015. Collective Action within the Household: Insights from Natural Resource Management. World Dev. 74, 171–183. doi:10.1016/j.worlddev.2015.05.001

Duflo, E., 2012. Women Empowerment and Economic Development. J. Econ. Lit. 50, 1051–1079. doi:10.1257/jel.50.4.1051

Dyson, T., Moore, M., 1983. On Kinship Structure, Female Autonomy, and Demographic Behavior in India. Popul. Dev. Rev. 9, 35–60. doi:10.2307/1972894
FAO, 2011. The State of Food and Agriculture 2010-2011. Women in agriculture: Closing the gender gap for development. Food and Agricultural Organization (FAO), Rome.
Filmer, D., Scott, K., 2008. Assessing Asset Indices. The World Bank.
Garikipati, S., 2013. Microcredit and Women's Empowerment: Have We Been Looking at the Wrong Indicators? Oxf. Dev. Stud. 41, S53–S75. doi:10.1080/13600818.2012.744387
Garikipati, S., 2012. Microcredit and Women's Empowerment: Through the Lens of Time-Use Data from Rural India: Microcredit and Women's Empowerment in Rural India. Dev. Change 43, 719–750. doi:10.1111/j.1467-7660.2012.01780.x
Hashemi, S.M., Schuler, S.R., Riley, A.P., 1996. Rural Credit Programs and Women's Empowerment in Bangladesh. World Dev. 24, 635–653.
Hou, X., Ma, N., 2013. The effect of women's decision-making power on maternal health services uptake: evidence from Pakistan. Health Policy Plan. 28, 176–184. doi:10.1093/heapol/czs042
Imbens, G., Wooldridge, J., 2008. Recent developments in the econometrics of program evaluation (CeMMAP working papers No. CWP24/08). Centre for Microdata Methods and Practice, Institute for Fiscal Studies.
Jodlowski, M., Winter-Nelson, A., Baylis, K., Goldsmith, P.D., 2016. Milk in the Data: Food Security Impacts from a Livestock Field Experiment in Zambia. World Dev. 77, 99–114. doi:10.1016/j.worlddev.2015.08.009
Johnson, N.L., Kovarik, C., Meinzen-Dick, R., Njuki, J., Quisumbing, A., 2016. Gender, Assets, and Agricultural Development: Lessons from Eight Projects. World Dev. 83, 295–311. doi:10.1016/j.worlddev.2016.01.009
Kafle, K., Winter-Nelson, A., Goldsmith, P., 2016. Does 25 cents more per day make a difference? The impact of livestock transfer and development in rural Zambia. Food Policy 63, 62–72. doi:10.1016/j.foodpol.2016.07.001
Kandpal, E., Baylis, K., Arends-Kuenning, M.P., 2012. Empowering Women through Education and Influence: An Evaluation of the Indian Mahila Samakhya Program (IZA Discussion Papers No. 6347). Institute for the Study of Labor (IZA).
Lépine, A., Strobl, E., 2013. The Effect of Women's Bargaining Power on Child Nutrition in Rural Senegal. World Dev. 45, 17–30. doi:10.1016/j.worlddev.2012.12.018
Lundberg, S., Pollak, R.A., 1993. Separate Spheres Bargaining and the Marriage Market. J. Polit. Econ. 101, 988–1010.
Lundberg, S.J., Pollak, R.A., Wales, T.J., 1997. Do Husbands and Wives Pool Their Resources? Evidence from the United Kingdom Child Benefit. J. Hum. Resour. 32, 463–480. doi:10.2307/146179
Luz, L., Agadjanian, V., 2015. Women's decision-making autonomy and children's schooling in rural Mozambique. Demogr. Res. 32, 775–795. doi:10.4054/DemRes.2015.32.25
Malapit, H.J.L., Kadiyala, S., Quisumbing, A.R., Cunningham, K., Tyagi, P., 2013. Women's Empowerment in Agriculture, Production Diversity, and Nutrition: Evidence from Nepal: (IFPRI discussion papers No. 1313). International Food Policy Research Institute (IFPRI).
Malhotra, A., Schuler, S.R., 2005. Measuring Empowerment: Cross-disciplinary Perspectives. World Bank Publications.

Manser, M., Brown, M., 1980. Marriage and Household Decision-Making: A Bargaining Analysis. Int. Econ. Rev. 21, 31–44. doi:10.2307/2526238
McKenzie, D., 2005. Measuring inequality with asset indicators. J. Popul. Econ. 18, 229–260.
Mehra, R., 1997. Women, Empowerment, and Economic Development. Ann. Am. Acad. Pol. Soc. Sci. 554, 136–149.
Meinzen-Dick, R., Johnson, N.L., Quisumbing, A., Njuki, J., Behrman, J., Rubin, D.B., Peterman, A., Waithanji, E.M., 2011. Gender, Assets, and Agricultural Development Programs: A Conceptual Framework. International Food Policy Research Institute, Washington, DC.
Pitt, M.M., Khandker, S.R., Cartwright, J., 2006. Empowering Women with Micro Finance: Evidence from Bangladesh. Econ. Dev. Cult. Change 54, 791–831. doi:10.1086/503580
Rawlins, R., Pimkina, S., Barrett, C.B., Pedersen, S., Wydick, B., 2014. Got milk? The impact of Heifer International's livestock donation programs in Rwanda on nutritional outcomes. Food Policy 44, 202–213. doi:http://dx.doi.org/10.1016/j.foodpol.2013.12.003
Rosenzweig, M.R., Schultz, T.P., 1982. Market Opportunities, Genetic Endowments, and Intrafamily Resource Distribution: Child Survival in Rural India. Am. Econ. Rev. 72, 803–815.
Sharaunga, S., Mudhara, M., Bogale, A., 2015. The Impact of "Women"s Empowerment in Agriculture' on Household Vulnerability to Food Insecurity in the KwaZulu-Natal Province. Forum Dev. Stud. 42, 195–223. doi:10.1080/08039410.2014.997792
Sraboni, E., Malapit, H.J., Quisumbing, A.R., Ahmed, A.U., 2014. Women's Empowerment in Agriculture: What Role for Food Security in Bangladesh? World Dev. 61, 11–52. doi:10.1016/j.worlddev.2014.03.025
UNDP, 2008. Innovative Approaches to Promoting Women's Economic Empowerment.
Vyas, S., Kumaranayake, L., 2006. Constructing socio-economic status indices: How to use principal components analysis. Health Policy Plan. 21, 459–468.
Wiig, H., 2013. Joint Titling in Rural Peru: Impact on Women's Participation in Household Decision-Making. World Dev. 52, 104–119. doi:10.1016/j.worlddev.2013.06.005
Wilcox, C.S., Grutzmacher, S., Ramsing, R., Rockler, A., Balch, C., Safi, M., Hanson, J., 2015. From the field: Empowering women to improve family food security in Afghanistan. Renew. Agric. Food Syst. 30, 15–21. doi:10.1017/S1742170514000209
Yoong, J., Rabinovich, L., Diepeveen, S., 2012. The Impact of Economics Transfers to Women vs. Men: A Systematic Review. EPPI-Centre, Social Science Research Unit, Institute of Education, University of London.

Appendix

Table A1. Distribution of decision ratios by decision spheres over time

Decision spheres	Originals				Prospectives			
	Female only decisions		Joint decisions		Female only decisions		Joint decisions	
	Baseline	Endline	Baseline	Endline	Baseline	Endline	Baseline	Endline
Sending kids to school	0.14	0.22	0.64	0.69	0.13	0.11	0.75	0.77
	(0.035)	(0.042)	(0.048)	(0.046)	(0.042)	(0.039)	(0.055)	(0.053)
Animal slaughter	0.36	0.27	0.18	0.62	0.26	0.26	0.29	0.46
	(0.047)	(0.043)	(0.039)	(0.046)	(0.055)	(0.053)	(0.057)	(0.061)
Live animal sale	0.12	0.26	0.11	0.63	0.09	0.24	0.08	0.47
	(0.033)	(0.042)	(0.030)	(0.045)	(0.037)	(0.052)	(0.034)	(0.061)
Animal product sale	0.09	0.05	0.13	0.22	0.02	0.03	0.00	0.06
	(0.029)	(0.022)	(0.034)	(0.042)	(0.016)	(0.022)	(0.000)	(0.030)
Crop produce sale	0.23	0.06	0.33	0.63	0.14	0.11	0.37	0.65
	(0.040)	(0.020)	(0.046)	(0.045)	(0.041)	(0.036)	(0.060)	(0.055)
Off-farm income	0.10	0.14	0.07	0.10	0.09	0.17	0.09	0.16
	(0.028)	(0.034)	(0.026)	(0.029)	(0.037)	(0.046)	(0.035)	(0.046)
Access to loan/credit	0.21	0.06	0.42	0.64	0.13	0.09	0.54	0.63
	(0.039)	(0.024)	(0.048)	(0.047)	(0.041)	(0.035)	(0.061)	(0.059)
Crop storage/sale	0.10	0.05	0.06	0.00	0.06	0.08	0.03	0.05
	(0.029)	(0.022)	(0.022)	(0.000)	(0.030)	(0.034)	(0.022)	(0.027)
Observations	100	100	100	100	64	64	64	64

Notes: Point estimates are mean and standard errors are in parentheses. Male only decisions are not presented but they follow the similar pattern observed in case of female only decisions

Table A2. Impact on activities not-related to the transferred assets

	Decision scores			Decision ratios	
	Female	Male	Joint	Female only	Male only
Endline	-0.04	0.04	0.01	-0.06	0.05
	(0.043)	(0.040)	(0.048)	(0.041)	(0.045)
Original x Endline	0.04	0.04	0.09	-0.06	-0.04
	(0.059)	(0.054)	(0.063)	(0.054)	(0.064)
POG x Endline	0.02	0.03	0.05	-0.02	-0.02
	(0.056)	(0.052)	(0.062)	(0.053)	(0.059)
Household Controls	Yes	Yes	Yes	Yes	Yes
Observations	520	520	520	520	520

Notes. Standard errors in parentheses, significance level, * $p < .10$, ** $p < .05$, *** $p < .01$