DISCUSSION PAPER / 2019.01
ISSN 2294-8651

Did conditional cash transfers in the Productive Safety Net Program empower women in Tigray, north-east Ethiopia?

Megos **Desalegne Gelagay**
Els **Lecoutere**

IOB
Institute of Development Policy
University of Antwerp

Instituut voor Ontwikkelingsbeleid en -Beheer
Institute of Development Policy and Management
Institut de Politique et de Gestion du Développement
Instituto de Política y Gestión del Desarrollo

Postal address:
Prinsstraat 13
B-2000 Antwerpen
Belgium

Visiting address:
Lange Sint-Annastraat 7
B-2000 Antwerpen
Belgium

Tel: +32 (0)3 265 57 70
Fax: +32 (0)3 265 57 71
e-mail: iob@uantwerp.be
http://www.uantwerp.be/iob

DISCUSSION PAPER / 2019.01

Did conditional cash transfers in the Productive Safety Net Program empower women in Tigray, north-east Ethiopia?

Megos **Desalegne Gelagay***
Els **Lecoutere****

January 2019

* Affiliated with the Institute of Development Policy (IOB), University of Antwerp, Prinsstraat 13, 2000 Antwerp, Belgium, megosdesalegneg@gmail.com

** Marie Skłodowska-Curie Postdoctoral Fellow, Institute of Development Policy (IOB), University of Antwerp, Prinsstraat 13, 2000 Antwerp, Belgium, els.lecoutere@uantwerpen.be, +32494835205, Skype – eilecout (Corresponding author)

IOB
Institute of Development Policy
University of Antwerp

Table of Contents

Abstract

Conditional Cash Transfers (CCT), policy instruments for social protection, also have potential to economically empower women. The assessment of the impact of the CCT component in the Productive Safety Net Program in Tigray, Ethiopia, on women's economic empowerment generates important insights for policy and future CCT programs in similar contexts. Not only does it demonstrate a differential impact on diverse aspects of women's economic empowerment, it also shows a heterogeneity in the effects in man- and woman-headed households. Women's access and decision-making power over credit is positively impacted in both types of households, yet, the effect seems larger among woman-headed households, suggesting CCT affect married women differently in this regard. Negative effects are observed as well and call for particular policy attention. Among woman-headed households, CCT reduced women's decision-making power over agricultural production and asset transfers. If this means women received help in agricultural production and safeguarding their assets as part of the program, this might actually be positive, provided women themselves also appreciate sharing decision-making power. Among man-headed households, there is a negative effect on women's time available for leisure, which corroborates other findings of increased work burdens due to conditionalities; but here, this only affects married women.

Keywords: Social protection, Conditional cash transfers; Economic empowerment of women; Heterogeneous impact; Ethiopia.

Acknowledgements: We would like to thank the International Food Policy Research Institute (IFPRI) in Ethiopia for granting permission to use part of their dataset for this study. We express our gratitude to the Institute for Development Policy (IOB) for the support for writing this article. We would like to thank the reviewers of previous versions for their constructive comments.

1. Introduction

Women's empowerment and gender equality are central issues in development policy in sub-Saharan Africa, both from a human rights perspective and from a growth perspective. In rural societies, where agriculture is still the dominant economic sector, there are significant gender gaps in access to productive resources and opportunities (Doss et al. 2011), which, together with a heavy work burden for women who combine productive and reproductive activities (Doss 2015), contribute to significant gender gaps in agricultural productivity. In Ethiopia, for instance, the gender difference in agricultural productivity favouring men is estimated to be 23.4 per cent (Aguilar et al. 2013). The empowerment of women in different domains through promoting gender-transforming development programs and policies is essential to minimise the gender gaps and contribute to sustainable development, not only of the agricultural sector but also the wider society, and food security while achieving gender equity (FAO 2011).

Social protection policies and programs, such as Conditional Cash Transfers (CCT), even if they focus on poverty reduction and human development, have a great potential for promoting economic empowerment of women through improving their income and intrahousehold decision-making power by specifically targeting women (or through their specific modalities and conditions) (Fernald et al. 2008; Doepke & Tertilt 2011; De Brauw et al. 2014). Quantitative evidence of CCT on women's empowerment, and specifically on women's economic empowerment in agriculture, however, is still limited, particularly for sub-Saharan Africa. This study contributes to the literature with an assessment of the impact of the Productive Safety Net Programme (PSNP) in Ethiopia, which has a CCT component, on the economic empowerment of women in rural societies, in man- and woman-headed households. The study focuses on the Tigray region in North-East Ethiopia.

This article is organised as follows: Section 2 reviews key concepts and empirical evidence. Section 3 describes the PSNP, Section 4 methods and data, and Section 5 results. Section 6 concludes with a discussion and policy recommendations.

2. Conditional cash transfer programs and their potential to economically empower women

CCT programs are social protection programs, widely implemented in Latin America and on the rise in sub-Saharan Africa (Fizbein & Schady 2009; Honorati et al. 2015). CCT programs typically have two major objectives: protection from acute poverty through transferring cash which assures a minimum consumption level, and prevention of intergenerational poverty by making investment in children's human capital as the condition for receiving cash transfers (Fizbein & Schady 2009; Yoong et al. 2012; De la O Campos 2015; Bastagli et al. 2016).

The conditions for receiving cash transfers may differ across CCT programs. These include but are not limited to children's school attendance, participation in health services, contributions to public work activities, and other specific behavioural outcomes like improved performance in education (Barrientos & DeJong 2006). CCT programs also differ in the frequency of payments, and the payment modality, for instance cash in hand, cash voucher or savings accounts (Fizbein & Schady 2009; Maldonado et al. 2011).

CCT programs vary with regard to whom is targeted: communities, households, individual men or women. In most cases, CCT programs target poor and vulnerable households. Often, women are among the primary target groups since the program conditions typically relate to women's needs or preferences such as expenditure on children's education, health care, and nutritious food that promote human-capital accumulation (Molyneux 2006; Fizsbein & Schady 2009; Doepke & Tertilt 2011).

There is substantial evidence of the poverty reducing and human development impact of CCT in developing countries (a.o. Fiszbein & Schady 2009; Adato & Hoddinott, 2010; Filmer & Schady 2011; Glewwe & Kassouf 2012). Evidence that CCT also have an (indirect) effect on the (economic) empowerment of women is emerging.

Empowerment has been defined by Kabeer (1999) as a process of change where people acquire the ability to make strategic life choices. Such processes enable women, who have been denied the ability or the freedom to make independent, well-reasoned choices, to acquire such ability and freedom (Agarwal 1997; Kabeer 1999; Gasper & van Staveren 2003). There is no generally accepted definition of the economic empowerment of women. Tornqvist and Schmitz (2009:9), for instance, define women's economic empowerment as the process which increases women's real power over economic decisions that influence their lives and priorities in society. According to Golla et al. (2011:4), a woman is economically empowered when she has both the ability to succeed and advance economically and the power to make and act on economic decisions.

Three complementary pathways of change can be distinguished through which social protection programs like CCT can have an impact on women's (economic) empowerment (Fiszbein & Schady 2009). The first channel is an income effect related to the cash transfer, which can enable women's access and control over productive resources. The second channel is through women's strengthened bargaining power within their households and the wider community. Indirectly women may also gain bargaining power via social networks created by the conditionalities or if the CCT also promote their participation in labour markets, decision-making structures, activities, meetings, and trainings meant to support their productivity capacities. If women can control (part of) the cash transfer, the third channel is a redistribution of intra-household resource allocation in women's favour, which can strengthen women's bargaining position by altering the stakes (Agarwal 1997), and can have distributional effects within the

whole household (Kabeer & Waddington 2015).

Apart from protection, prevention, promotion, cash transfers can have a transformative function and tackle the more structural causes of women's vulnerability (De la O Campos 2015). This, however, depends on beneficiaries gaining the capabilities to call the social relations that are at the basis or reinforce their vulnerability and exclusion into question, the extent to which beneficiaries can be meaningfully included in social accountability and citizen engagement mechanisms, and the social protection programs' commitment to challenge structural barriers to women's empowerment (Molyneux et al. 2016).

We reviewed a non-exhaustive selection of evaluations that have assessed the impact of CCT in developing countries on different spheres of women's (economic) empowerment using experimental and quasi-experimental methods (Table 1 presents an overview).

Attanasio and Lechene (2002:156) and Urquieta et al. (2009) studied the impact of the CCT component of the PROGRESA program (later Oportunidades) implemented in Mexico. The PROGRESA program targeted women as the primary cash recipient on the condition that children, including girls, were sent to school and that women attended health services. Women and girls were responsible for meeting the conditions. Their findings suggest that the CCT had a positive impact on women's control and decision-making power over how to use the cash resources. The program also increased girls' school attendance, women's health service attendance, and household budget expenditures on nutritious food and girls' clothes. The fact that men's alcohol and tobacco consumption decreased by 0.3 and 0.4 per cent, respectively, further supports a shift away from resources spent on adult goods and more investment in household public goods with attention for children's needs, including girls, which may relate to increased women's bargaining power in their households.

The BolsaFamilia program, implemented in Brazil, was studied by Attanasio et al. (2005) and by De Brauw et al. (2014). The BolsaFamilia program is conditional on women's health facility attendance and girls' school attendance for the cash payment, and women are the primary recipient of the cash transfer. The studies found that, in urban households, the CCT increased women's decision-making power on the use of contraception, on girls' school attendance, on women's health related expenses, and on expenditures on household durable goods. In rural areas, however, there is no evidence of an increase – rather evidence of a possible reduction - of women's decision-making power on those issues. The limited impact on rural women's decision-making power is probably due to the conditionalities that reduced the time women could allocate to labour. Still, qualitative information suggests that rural women feel they gained respect in their households as a result of the program.

In Colombia, the cash transfers to women in the Familias en Acción program were found to have a significantly positive impact on the quality of food consumed, girls' primary and secondary education, and girls' clothes related expenditures (Attanasio & Mesnard 2006). However, there is no evidence of a reduction of the consumption of adult men goods like alcohol or tobacco due to the program.

In sub-Saharan Africa, the South-African Child Grant Support program increased women's individual income and financial independence, improved women's decision-making power over financial resources, and promoted active engagement of women in nutrition and health care activities as well as children's well-being (Patel et al. 2015). In Malawi, CCT increased women's income and control over cash resources, enhanced girls' school performance, strengthened women's participation in health training programs, and increased women's deci-

sion-making power over fertility. However, these effects declined after the end of the program (Baird et al. 2013).

There is also evidence that CCT may have no impact or sometimes even a negative impact on women's (economic) empowerment. For instance, women may suffer from domestic violence if men's resist women's involvement in the household decision-making and want to maintain control over the cash transfer, the household budget and decision-making. Additionally, in some cases, CCT undermine women's long-term autonomy and economic security, for instance by losing transfers from their husbands, increase women time burden or their empowerment in one domain reduces their decision-making power in other domains (Mayoux 2001; Molyneux 2008; Handa et al. 2009; Molyneux & Thomson 2011; Molyneux 2014; De Brauw et al. 2014). In addition, the focus on women's economic empowerment and particularly on women's control over resources risks losing sight of the fact that empowerment requires challenging unequitable power structures and institutionalised constraints to gender equity (Molyneux 2007; Cornwall 2016).

Our non-exhaustive review of impact assessments of CCT programs provides evidence that CCT can (indirectly) promote women's economic empowerment through increasing their decision-making power and control over cash income and productive resources, thereby promoting beneficial outcomes for women and (girl) children; although some negative impacts may also occur. There is, however, an evidence gap for sub-Saharan African countries. Our impact assessment of a CCT program on women's economic empowerment in Ethiopia will contribute to narrow it.

Additionally, our assessment of impact of the CCT program on women's economic empowerment will distinguish between man-headed households and woman-headed households because the intrahousehold decision-making and resource allocation in man-headed households, who are most often composed of a married or co-habiting couple with dependents, are different from those in woman-headed households, in which an adult woman is mostly the sole decision-maker. Besides, woman-headed households tend to be economically and socially worse off than man-headed households, which could be reflected in differences in women's empowerment even without treatment.

Table 1: Empirical evidence of the impact of CCT on women's empowerment

Sources	CCT Name	Methods	Country and conditionality	Outcomes
Attanasio and Lechene 2002; Urquieta et al. 2009	PROGRESA/ Oportunidades	Quasi-Experimental (DiD, ITT, Dynamic behavioural models)	Mexico (Education and health attendance)	A positive impact on: - women's control over cash resources - women's decision-making power over how to use cash resources - girl's school attendance -women's health service attendance - household budget expenditures on nutritious food and girls' cloths A negative impact on: - men's alcohol and tobacco consumption (decreased by 0.3 and 0.4per cent, respectively)
Attanasio et al. 2005; De Brauw et al. 2014	BolsaFamilia	Quasi-Experimental	Brazil (Education and health attendance)	A positive impact on: - women's decision-making power on the use of contraception - women's decision-making power on girls' school attendance - women's decision-making power on women's health related expenses - women's decision-making power on expenditures on household durable goods in urban households No, or possibly negative, impact: - women's decision-making power on those issues in rural areas,

Attanasio and Mesnard 2006	Familias en Acción (FA)	Quasi-Experimental (DiD)	Colombia (Education and health attendance)	A positive impact on: - the quality of food consumed - girl's primary and secondary education - girls' clothes related expenditures No evidence of impact on: - the consumption of adult men goods like alcohol or tobacco
Patel et al. 2015	South-Africa Child Grant Support (CGS)	Mixed methods	South Africa (Nutrition and child care)	A positive impact on: - women's individual income - women's financial independence - women's decision-making power over financial resources - active engagement of women in nutrition and health care activities - children's well-being
Baird et al. 2013	ZombaCash Transfer (ZCTP)	Experimental (RCT)	Malawi (Education- adolescence girl's school attendance)	A positive impact on: - women's income and control over cash resources - girls' school performance - women's participation in health training programs - women's decision-making power over fertility. However, these effects declined after the end of the program

3. The Productive Safety Net Program

This study will investigate the impact of the CCT component of the Productive Safety Net Program (PSNP) implemented in Ethiopia on the economic empowerment of women, and will focus on Tigray. The PSNP started in 2005 and aims at assuring food consumption and preventing food insecure households in chronically food insecure districts to deplete their assets through providing adequate cash transfers (MoARD 2009). There are two types of transfers in the PSNP: (i) direct and unconditional transfers to food insecure households who cannot provide labour and (ii) CCT to food insecure households who can fulfil the condition to provide labour in public infrastructure development activities. In this study, we focus on the CCT.

The CCT component of the PSNP integrates public works and CCT but with specific features that justify considering it as a CCT. These features include primacy of transfers which implies reliability and regularity of transfers is not jeopardised by (temporary) inability to contribute to public works, uniform benefits per household member, and labour caps to the amount of time household are allowed to contribute in the public works (Lieuw-Kie-Song 2011). Both men and women members of the households eligible for the CCT are expected to participate in public infrastructure development works such as soil conservation, water harvesting, road maintenance, construction of schools and health centres, irrigation, sanitation, and other farming activities (MoARD 2009).

The eligible beneficiary households for CCT have been selected using both administrative and community-based selection criteria. Food insecure districts and communities were selected based on the proportion of households who received relief assistance continuously in the past several years. Within those communities, households with a food gap of three or more months per year were eligible for the PSNP. Yet, resources were insufficient to reach all eligible households, and eligibility further depended on local community based criteria, including the status of household assets such as land holding, livestock holding, labour availability, and other means of household income.

The amount of the cash transfer for the beneficiary households depended on the

size of the household. More specifically, in 2010, conditional on the number of days worked per month (with a maximum of five days per adult household member per month over a period of six months), a household received a six-monthly cash transfer equivalent to the total number of days worked by all household members at a compensation of 15 Birr per day.[1] The median transfer for a six-month period in 2010 was 1,700 Birr per household (MoARD 2010; Berhane et al. 2011).

The pathways through which the CCT component of the PSNP in Ethiopia is expected to contribute to women's economic empowerment hinges on access to cash for women, soil and water conservation, public health, and education infrastructure. The pathways of change are depicted in Figure 1. The CCT component of the PSNP allows households to protect their assets from depletion to fulfil food needs and to expand their productive assets, which is expected to lead to improved food security for men and women members of food insecure and poor households. Throughout this process, women are expected to gain economic empowerment.

Gender equity is one of the core principles of the program. It has a strong focus on women's role in food security and the public works are meant to reduce women's time burden in collecting these water and fuel resources and facilitate their daily farming activities (MoARD 2009). The program addresses the particular vulnerabilities of woman headed households and provides them with labour to cultivate their farm. The program further promotes women's participation in community decisionmaking structures including the community based targeting committee and food security task force (MoARD 2009; Holmes & Jones 2011).

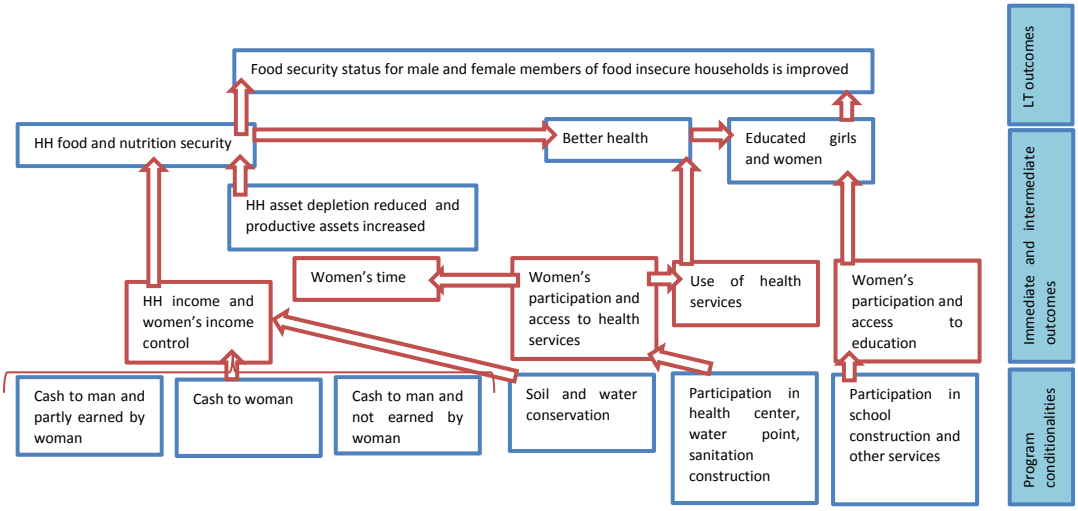
The design of the program, however, has a number of drawbacks in addressing gender equity. At the community level and among staff organizing and implementing the program, there is a lack of awareness raising about the gender dimensions of the program, which may have been required given deeply culturally embedded inequalities among men and women in this context (Holmes & Jones 2011). At the household level, the program does not question the unequal decision-making power over productive household resources such as income, labour, or assets within man-headed households (Holmes & Jones 2011). While both men and women are responsible for the fulfilment of the program conditionalities, specifically in the Tigray region, women, and to lesser extent children, have been more involved in public works as compared to men (MoARD 2009; Holmes & Jones 2011). Another drawback is related to the cash payments. According to the Tigray PSNP coordination office, even if both men and women could receive the cash transfer, it often went to the head of household regardless of who in the household had been regularly participating in the public work activities (Addis Ababa, Personal communication, 4 December 2016).

The relation between the person in the household who received the cash transfer and the potential effects on the empowerment of women therefore needs further exploration. First, in case the cash is transferred to a woman in the household, that woman's decision-making power and control over cash resources at the household level are likely to increase, or her access to that cash can improve her intrahousehold bargaining position. Another reason may be that cash to women improves their financial position which facilitates them to get credit and other financial services (Holmes & Jones 2011). In case the cash is received by a man in the household but that cash is (partly) earned by the participation in public infrastructure works of the women in the household, those women are likely to have some degree of decision-making power and control over those cash resources, especially since it is devised as a household level

[1] In 2010, one dollar was equivalent to16.5 Birr. Gross Domestic Product per capita in 2010 was 341.31 USD (~5600 Birr).

aid instrument. Holmes and Jones (2011) pointed out that women mentioned to have gained respect from their husbands as a result of the regular and joint work on public infrastructure activities. If the cash is transferred to a man and not any woman household member contributed to the public infrastructure works, women may still have some –possibly limited - decision-making power and control over it because of the program's focus on aiding the household. The program assumes that no matter who the cash is transferred to within the household, it must be spend on household food consumption (MoARD 2009), hence women may have some control over those cash resources since such expenditures are more likely to relate to their preferences (Attanasio & Lechene 2002). Some women, however, reported that they would have preferred in-kind transfers in case men are the recipients as women fear men spend a portion of the cash transfer on alcohol and tobacco consumption (Holmes & Jones 2011).

Figure 1: Mechanisms by which PSNP might influence women's economic empowerment



Source: Adapted from De la O Campos (2015)

4. Methods

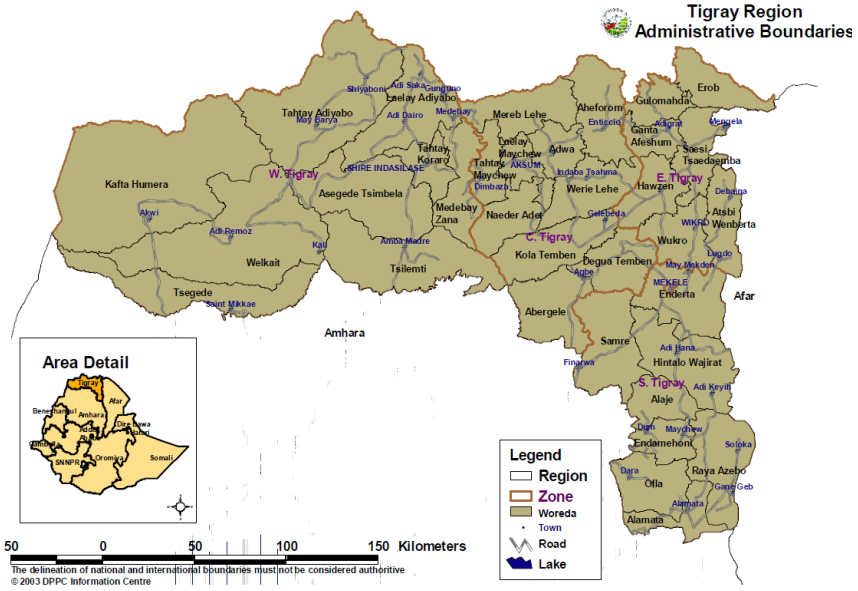
4.1. Data and description of the study site

Tigray is regional state in the north east of Ethiopia, with a population estimated at about five million people of which the majority lives in rural areas (Figure 2). Environmental degradation, erratic and irregular rainfall, high population pressure, lack of diversified economic activities and institutions are troubling the region. In 2011/12, more than 36.5 per cent of the rural population in Tigray were living under the national poverty line (set at 3781 Birr per adult equivalent per year), as compared to 30.4 per cent on a national level (CSA 2012). Tigray was purposely selected for this study because it is the second largest PSNP cash recipient in the country; supporting more than 1.45 million beneficiaries within 30 districts of the Tigray region.

To study the impact of the CCT component of the PSNP on women's economic empowerment, we rely on primary cross-sectional data (which is part of a longitudinal survey) collected by the International Food Policy Research Institute (IFPRI) in Ethiopia in 2015. The sampling started from a random sampling of woredas (districts) on a probability proportional to size

basis, stratified by region, within which PSNP beneficiary and non-beneficiary households were randomly sampled in randomly selected enumeration areas within each woreda (Berhane et al. 2017). This ensures participants and non-participants live in similar contexts and have access to the same markets. The sampling and data collection methods are designed to enable the use of matching methods as an identification strategy. The inclusion of the Women's Empowerment in Agriculture Index (WEAI) module in the survey allows measuring the economic empowerment of women in rural contexts.

Figure 2: Map of the Tigray Region



Source: Disaster Prevention and Preparedness Commission (DPPC) Information Centre UN OCHA-Ethiopia

For this study, we made use of a sample of 114 households who are beneficiaries of the CCT component of the PSNP and 316 households who are not beneficiaries of any component of the PSNP, sample sizes that maintain sufficient statistical power.[2] [3] We estimate the impact of participation in the CCT component of the PSNP on women's economic empowerment in sub-samples composed of man-headed households (N=286) and of woman-headed households (N=144), which are still reasonable in size to permit an estimation of impact.[4]

4.2. Identification

We rely on matching as an identification strategy, as was foreseen in the survey design (Berhane et al. 2017). We estimate the effect of participation in the CCT component of the PSNP in each type of household on a range of outcomes of women's empowerment among those who receive it (average treatment effect on the treated) by using propensity score match-

[2] The original sample included 490 (un)conditional cash transfer beneficiary and non-beneficiary households from six woredas in the Tigray region. We excluded 22 households who only received unconditional cash transfers, 11 households that consisted of a single man, and 28 households with missing information on key variables for measuring empowerment. We verified whether the exclusion of these observations did not introduce a selection bias by checking balance in the distribution of observable characteristics (See Table A and B in Annex 1).
[3] n=$kz2p(1-p)d2$ where: n = desired sample size, k number of stages of sampling, z =standard normal deviation, p=proportion of target population estimated to have characteristic, d =degree of accuracy required.
[4] In this study, a woman-headed household refers to a household without an adult men around.

ing (PSM). By matching every possible treatment with a control (non-treated) observation with the most similar observable characteristics, we approximate a valid counterfactual for the treatment groups by constructing comparison groups that can be assumed to be similar prior to treatment (Gertler et al. 2011).

First, we identified observable household characteristics which could have affected PSNP program participation but would not necessarily have been influenced by the program. These include age and education level of the household head, land size, livestock holding, household size, and labour endowment , participation in non-farm business, and whether any other member than the household head had higher education. Secondly, the propensity scores, which are the estimated probabilities that a household participated in the CCT conditional on the observable characteristics, were calculated using a logit regression model. Thirdly, the comparison households have been matched to treatment households on the basis of having the most similar propensity scores (nearest neighbour estimators) (Becker & Ichino 2002; Abadie & Imbens 2006).

There is balance in the distribution of the covariates used for matching after matching the treatment and comparison group and a sufficient level of common support in the distribution of the propensity scores between the treatment and comparison groups (presented in Table C and D and Figure A and B in Annex 2). Hence, relying on the assumption that matching on observable characteristics absorbs any bias that would arise from unobservable differences, we can reasonably assume the treatment and comparison units do not differ to such extent as to doubt their being statistically identical (Gertler et al. 2011:107).

4.3. Measuring women's economic empowerment as an outcome

To measure the economic empowerment of rural women as an outcome of participation in the CCT component of the PSNP we use the ten weighted indicators of the five key domains of empowerment in the WEAI as outcome variables, as well as an aggregate empowerment measure. The WEAI builds on the conceptualization of empowerment that considers the complementarity of the ability to make decisions and the material and social resources needed to carry out those decisions. The key domains are production, resources, income, leadership, and time. The indicators are: 1) input in productive decisions; 2) autonomy in production; 3) ownership of assets; 4) purchase, sale, or transfer of assets; 5) access to and decisions about credit; 6) control over use of income; 7) group membership; 8) speaking in public; 9) workload; and 10) leisure (see Table 2).

First, the indicators listed above are coded in such a way that they take the value one if the main adult woman in the household is considered to score inadequately in that indicator Idi= 1;and Idi= 0 otherwise (Alkire et al. 2013). In Column 3 of Table 2 the adequacy thresholds are described. We use the opposite of each woman's inadequacy score for each indicator (1- Idi) as her adequacy score in the analysis of the impact of the CCT component of the PSNP on each of the ten different indicators of empowerment.

Secondly, once all inadequacy indicators are coded then Ci, the aggregated inadequacy score across the ten indicators for each woman, is computed by summing the weighted inadequacy scores.

$$C_i = W_1 I_{1i} + W_2 I_{2i} + \cdots + W_d I_{di} \quad (3)$$

With W_d the weight attached to indicator *d* with $\sum_{d=1}^{D} W_d$=1 (See Column 4 in Table 2 for the weight attached to each of the indicators).

We used the opposite of the aggregated inadequacy score C_i for each woman, her aggregated adequacy score $E_i = (1 - C_i)$, as the indicator for a woman's economic empowerment in our analysis. A woman is more empowered if her aggregated adequacy score is higher.

Table 2: The domains, indicators, and weights in the WEIAResults

Source: Adapted from Alkire et al. (2013)

Domains	Indicators d	Adequacy if the individual	Weight W_d
Production (1/5)	Input in productive decisions	participates and has at least some input in decisions or if someone else makes the decisions but the individual feels he or she could do so.	1/10
	Autonomy in production	actions are relatively more motivated by his/her own values than by coercion or fear of others' disapproval.	1/10
Resources (1/5)	Ownership of assets	reports having sole or joint ownership of at least one major asset (that excludes poultry, non-mechanised equipment, and small consumer durables).	1/15
	Purchase, sale, or transfer of assets	participates (or can participate) in decisions to buy, sell, or transfer the asset, conditional on the household's owning it.	1/15
	Access to and decisions about credit	belongs to a household that has access to credit (even if they did not use credit), and if the household used a source of credit, the individual participated in at least one decision about it.	1/15
Income (1/5)	Control over use of income	has input into decisions about income generated, conditional on participation in the activity.	1/5

4.4. The status of women's economic empowerment in the study's sample

Before matching the treatment and comparison groups, we looked into the status of women's economic empowerment of the main adult woman in the household in the treatment and comparison groups in the sub-samples of rural woman and man-headed households. Table 3 and 4 present the proportions of women according to (in)adequacies for the ten indicators of empowerment among the treatment and comparison groups in the sub-samples of woman and man-headed households. We tested the significance of difference in proportions between the respective treatment and comparison groups with a Chi-square test.

Table 3: Descriptive women's empowerment indicators in woman-headed households

Domain	Outcome indicators	PSNP Beneficiaries		Non- PSNP Beneficiaries		
		Freq.	%	Freq.	%	x^2
Production	Input in productive decisions					
	Adequate(1)	45	88.24	92	98.92	7.99***
	Inadequate(0)	6	11.76	1	1.08	
	Autonomy in production					
	Adequate(1)	50	98.04	91	97.85	0.01
	Inadequate(0)	1	1.96	2	2.15	
Resources	Ownership of assets					
	Adequate(1)	50	98.04	93	100	2.09
	Inadequate(0)	1	1.96	0	0.00	
	Purchase, sale, or transfer of assets					
	Adequate(1)	48	94.12	91	97.85	1.29
	Inadequate(0)	3	5.88	2	2.15	
	Access to and decisions about credit					
	Adequate(1)	29	56.86	42	45.14	1.81
	Inadequate(0)	22	43.14	151	54.84	
Income	Control over use of income					
	Adequate(1)	50	98.04	87	93.55	1.65
	Inadequate(0)	1	1.96	6	6.45	
Leadership	Group member					
	Adequate(1)	31	60.78	55	59.14	0.04
	Inadequate(0)	20	39.22	38	40.86	
	Speaking in public					
	Adequate(1)	26	49.02	40	43.01	0.84
	Inadequate(0)	25	50.98	53	56.99	
Time	Workload					
	Adequate(1)	46	90.20	69	74.19	5.74**
	Inadequate(0)	5	9.80	24	25.81	
	Leisure					
	Adequate(1)	29	56.86	57	61.29	0.27
	Inadequate(0)	22	43.14	36	38.71	
	n=144					

*Authors' computation from IFPRI survey data (2017); *** significance level 1 per cent; ** 5 per cent; * 10 per cent*

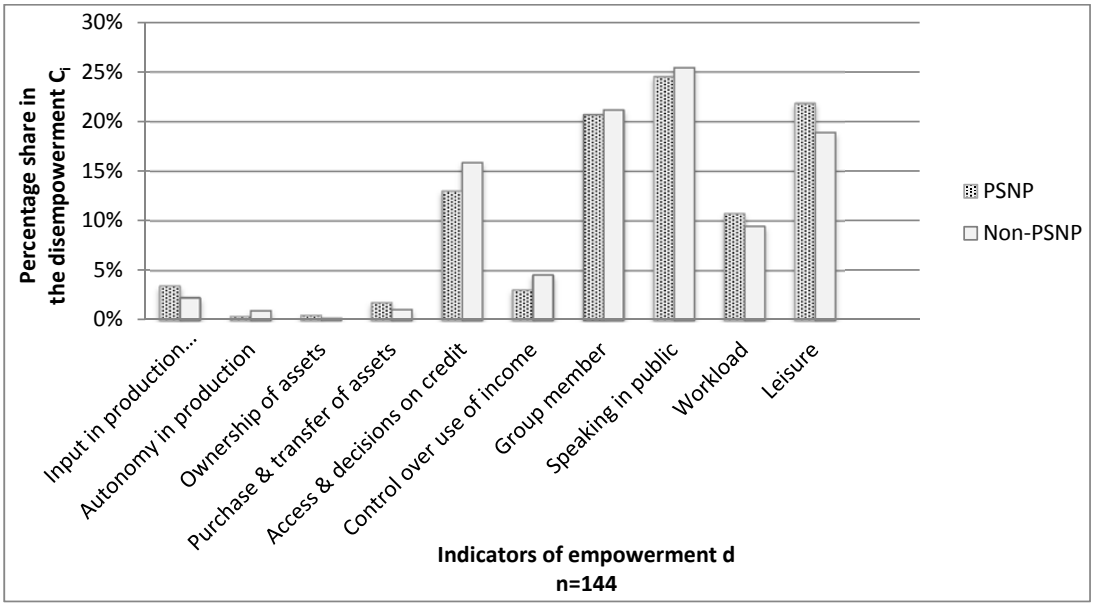
Table 4: Descriptive women's empowerment indicators in man-headed households

Domain	Outcome indicators	PSNP Beneficiaries		Non- PSNP Beneficiaries		
		Freq.	%	Freq.	%	x^2
Production	Input in productive decisions					
	Adequate(1)	60	95.24	216	96.86	0.36
	Inadequate(0)	3	4.76	7	3.14	
	Autonomy in production					
	Adequate(1)	1	1.59	5	97.76	2.51
	Inadequate(0)	62	98.41	218	2.24	
Resources	Ownership of assets					
	Adequate(1)	62	98.41	221	99.10	0.20
	Inadequate(0)	1	1.59	2	0.90	
	Purchase, sale, or transfer of assets					
	Adequate(1)	4	6.35	6	2.69	1.69
	Inadequate(0)	59	93.65	217	97.31	
	Access to and decisions about credit					
	Adequate(1)	34	53.97	90	40.36	3.68*
	Inadequate(0)	29	46.03	133	59.64	
Income	Control over use of income					
	Adequate(1)	60	95.24	219	98.21	1.55
	Inadequate(0)	3	4.76	4	1.79	
Leadership	Group member					
	Adequate(1)	33	52.38	118	52.91	0.01
	Inadequate(0)	30	47.62	105	47.09	
	Speaking in public					
	Adequate(1)	24	38.10	88	39.46	0.04
	Inadequate(0)	39	61.90	135	60.54	
Time	Workload					
	Adequate(1)	40	63.49	127	56.95	0.87
	Inadequate(0)	23	36.51	96	43.05	
	Leisure					
	Adequate(1)	28	44.44	122	54.71	2.07
	Inadequate(0)	35	55.56	101	45.29	
		n=286				

*Authors' computation from IFPRI survey data (2017); *** significance level 1 per cent; ** 5 per cent; * 10 per cent*

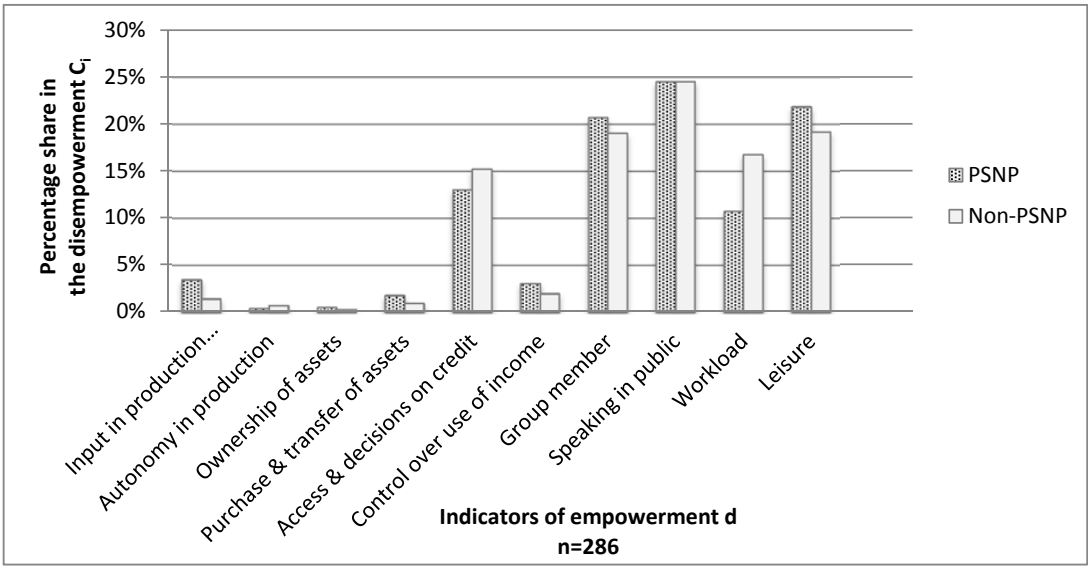
It is also enlightening to look into the contribution of each domain of empowerment to the weighted aggregate inadequacy score Ci as a measure of disempowerment. Figure 3 and 4 visualise the decomposition of the weighted aggregate inadequacy score Ci and reveal the extent to which each of the indicators in the five domains contribute to women's disempowerment in the treatment and comparison group in the sub-sample of woman-headed households; respectively in the sub-sample of man- headed households.

Figure 3: Contribution of the ten indicators to disempowerment of women in woman-headed households



Source: Authors' computation from IFPRI data (2017) applying Alkire and Foster (2011a, 2011b: in Alkire et al. 2013)

Figure 4: Contribution of the ten indicators to disempowerment of women in man-headed households



Source: Authors' computation from IFPRI data (2017) applying Alkire and Foster (2011a, 2011b: in Alkire et al. 2013)

4.5. Estimation of the impact of the CCT component of the PSNP on women's economic empowerment

Subsequently, we estimated the average treatment effect on the treated (ATT) of the CCT component of the PSNP on the aggregate indicator Ei for women's economic empowerment. The results presented in Table 5 show that is no significant impact of participation in the CCT component of the PSNP on women's economic empowerment as measured with the

aggregate indicator Ei in the sub-sample of man-headed households, nor in the sub-sample of woman-headed households.

Table 5: Estimates of ATT, using PSM, of the participation in the CCT component of the PSNP on the aggregate indicator Ei for women's economic empowerment among woman- and man-headed households

	Estimated ATT using nearest neighbour PSM estimator within the sample of	
Outcome variable	**Woman-headed households**	**Man-headed households**
Aggregate empowerment score (E_i)	0.005	0.003
	(0.026)	(0.023)

Source: Authors' computation from IFPRI survey data (2017)

*Notes: *** significance level 1 per cent; ** 5 per cent; * 10 per cent; Standard errors in parentheses. Each cell represents the coefficient for a separate regression using nearest neighbour matching on propensity scores*

Even if we did not observe a significant impact of the treatment on an aggregate indicator of empowerment, differential impacts of the program across different domains of empowerment are not impossible. In Table 6 we present the ATT estimates on the adequacy scores of each of the ten different indicators of empowerment (1- Idi) as outcome variables, in the sub-samples of man- and woman-headed households.

The results show that women's access to and decision-making power over credit is significantly increased due to participation in the CCT component of the PSNP at the 10 per cent significance level, both in the sub-sample of man- and woman-headed households. The impact on access to and decision-making power over credit of the main adult woman in the household appears to be larger among the woman-headed households (21.6 percentage point (pp) increase), than among the man-headed households (14.3 pp increase).

Apart from access and decision-making over credit, we find that the CCT component of the PSNP has not caused any significant increases in other aspects of empowerment of the main adult woman in the household, and even seems to have reduced women's economic empowerment in some aspects. Differences between woman- and man-headed households emerge however. Among woman-headed households, participation in the CCT component of the PSNP had a negative effect on women's input in productive decisions (11.8 pp decrease). These include decisions about activities like cash-crop and food-crop farming, and livestock keeping. Participation in the CCT component of the PSNP also had a negative impact on women's (involvement in) decision-making about buying, selling or transferring assets among woman-headed households (5.9 pp decrease). Among man-headed households, participation in the CCT component of the PSNP caused an important decrease of women's satisfaction with the time available for leisure (22.2 pp decrease).

Despite the sample sizes being smaller in the woman-headed household than in the man-headed household sub-sample, larger effects and effects on more aspects of empowerment – some negative - have been observed among woman-headed households than among man-headed households. This indicates there are meaningful differences in the way participation in the CCT component of the PSNP affects women's economic empowerment in woman-headed households and man-headed households.

Table 6: Estimates of ATT, using PSM, of the participation in the CCT component of the PSNP on indicators for women's economic empowerment among woman and man-headed households

Domain	Outcome indicators	Estimated ATT using PSM nearest neighbour estimator within the sample of	
		Woman-headed households	Man-headed households
Production	Input in productive decisions	-0.118***	-0.016
		(0.042)	(0.033)
	Autonomy in production	0.000	0.000
		(0.027)	(0.015)
Resources	Ownership of assets	-0.020	-0.016
		(0.019)	(0.028)
	Purchase, sale, or transfer of assets	-0.059*	-0.032
		(0.032)	(0.039)
	Access to and decisions about credit	0.216*	0.143*
		(0.110)	(0.081)
Income	Control over use of income	0.117	0.000
		(0.075)	(0.038)
Leadership	Group membership	0.000	0.079
		(0.131)	(0.098)
	Speaking in public	0.137	0.023
		(0.121)	(0.096)
Time	Workload	0.078	0.032
		(0.085)	(0.095)
	Leisure	-0.000	-0.222**
		(0.126)	(0.098)
	N	**144**	**286**

Source: Authors' computation from IFPRI survey data (2017)

*Notes: *** significance level 1 per cent; ** 5 per cent; * 10 per cent; Standard errors in parentheses. Each cell represents the coefficient for a separate regression using nearest neighbour matching on propensity scores*

5. Discussion

This study contributes to the literature and a policy debate about the potential of conditional cash transfer (CCT) for women's empowerment with an assessment of the impact of the CCT component in the Productive Safety Net Programme (PSNP), implemented in Ethiopia, on the economic empowerment of women in rural societies in the Tigray region in North-East Ethiopia.

The study demonstrated that participation in the CCT component of the PSNP has had an impact on some aspects of women's economic empowerment, but that this impact has not always been for the better. It showed differential effects in man- and woman-headed households.

In fact, the only positive impact of participation in the CCT component of the PSNP on women's economic empowerment is on women's access to and decision-making about credit. Interestingly – and importantly – that impact seems larger among woman-headed households - where we can assume the main adult woman is single - than among man-headed households - where we can assume the main adult woman is married to the male head of the household. This finding can mean two things. First, women in woman-headed households may have had more limited access to credit than women in man-headed households, for instance by a lack of collateral or social networks. The fact that the PSNP offers the opportunity to form saving and loan associations among women and that being PSNP participants facilitates access to microfinance services in the study area, may have expanded the potential to access credit for women in woman-headed households more than for women in man-headed households. A second reason for a larger impact among women in woman-headed households may be the fact that women in man-headed households (partly) have to share - or in the worst case are denied involvement in - accessing and decision-making over credit; whereas single women can keep sole access and decision-making power over credit if they have it.

The negative effects of participation in the CCT component of the PSNP on the decision-making power over agricultural production, and over the purchase or transfer of assets of women in woman-headed households could be worrying. But they could also point to an improvement of women's livelihoods. In fact, as part of the conditionalities in the PSNP, public work activities have also been undertaken on private land belonging to woman-headed households with severe labour shortages. Such activities included assistance in land preparation, sowing, weeding, and harvesting activities (MoA 2015). Hence, some of the farming activities of woman-headed households may have been decided jointly with the PSNP public work groups, facilitators and extension agents. In addition, protecting beneficiaries from transferring or selling out their productive assets is one of the objectives of the PSNP (MoARD 2009). This may explain why some women reported a decrease in their decision-making power over the transfer of assets. Another reason for decreased decision-making power over agricultural production and assets maybe an increase of renting out farm land for sharecropping in exchange for labour or capital, like the use of oxen for ploughing, as is commonly done by capital or labour poor woman-headed households (Dorosh & Rashid 2012). Thus, the decrease in decision-making power about agricultural production activities and assets may be due to increased sharing of decision-making power by the PSNP beneficiary women, who are the head of their households, while such decisions remain independently taken by the female heads in non-beneficiary woman-headed households. It is difficult to apprehend how the PSNP beneficiary women, who are the head of their households, feel about sharing decision-making power about agricultural production, and

about the purchase and transfer of assets with external actors. They might appreciate this; or feel disempowered. This would have to be explored further with qualitative interviews to gauge women's sense of agency and autonomy and with a (quantitative) assessment of the evolution in farm productivity and asset security.

Women in man-headed households experienced a negative impact on their satisfaction with their time available for leisure as a result of participation in the CCT component of the PSNP. This effect is not present among woman-headed households. This suggests that the conditionalities of the PSNP, such as contributing to public works, negatively affects women's time availability and may overburden them; and that this is mainly an issue for married women in man-headed households. The difference in the time burden effect on women in the two groups of households (woman-headed and man-headed) could have arisen from the difference in the number of dependents or from differential access to resources (labour) from the program. In the study sample, the woman-headed households have fewer dependents as compared to the man-headed households. Moreover, the PSNP provides labour for the woman-headed households to support their farming activities including plowing farmland, sowing, weeding, harvesting and other productive activities. De Brauw et al. (2014) also hinted at the time pressure that the conditionalities of the Bolsa Familia program brought along for rural women in the man-headed households. This result suggests that the dynamics of women's time burden in the woman-headed and man-headed households require more attention in future research; and needs programs and policy to be conscious about possible implications for women's time use.

The evidence of a differential impact on diverse aspects of women's economic empowerment is interesting for policy and program designers to uncover what a program with CCT can and cannot achieve in this context. Its contribution to the wider literature and the policy debate on the effects of CCT on women's empowerment consists of demonstrating the heterogeneity of these effects in different types of households, more specifically man-headed households and woman-headed households.

From a policy perspective, we can learn from the study that the design and the implementation of the CCT component of the PSNP should be adapted to achieve the economic empowerment of women beyond access and decision-making about credit, which is within control of the program to some extent. The key challenge for the PSNP is achieving the economic empowerment of women in other domains – beyond the direct control of the program - that is likely to be hindered by gender norms and roles, and, thus, requires elements that explicitly and effectively support transformation.

Finally, a crucial insight for policy makers and for the program implementers is that the CCT component of the PSNP can have negative effects on women's economic empowerment; and that CCT programs should be (re)designed and implemented in ways that can avoid such negative effects. Additional qualitative research may be needed to understand the reasons behind the observed negative effects of the program; and how woman feel about these.

References

Abadie, A., & Imbens, G. W. (2006). Large sample properties of matching estimators for average treatment effects. *econometrica*, *74*(1), 235-267.

Adato, M., & Hoddinott, J. (2010). *Conditional cash transfers in Latin America*. Washington D.C.: International Food Policy Research Institute.

Agarwal, B. (1997). ''Bargaining'' and gender relations: Within and beyond the household. *Feminist economics*, *3*(1), 1-51.

Aguilar, A., Carranza, E., Goldstein, M., Kilic, T. & Oseni, G. (2014). Decomposition of gender differentials in agricultural productivity in Ethiopia. *Policy Research Working Paper No. 6764*. Washington D.C.: The World Bank.

Alkire, S., Meinzen-Dick, R., Peterman, A., Quisumbing, A., Seymour, G. & Vaz, A. (2013). The women's empowerment in agriculture index. *World Development*, *52*, 71-91.

Attanasio, O., & Mesnard, A. (2006). The impact of a conditional cash transfer programme on consumption in Colombia. *Fiscal studies*, *27*(4), 421-442.

Attanasio, O., & Lechene, V. (2002). Tests of income pooling in household decisions. *Review of economic dynamics*, *5*(4), 720-748.

Attanasio, O., Fitzsimons, E., & Gomez, A. (2005). The impact of a conditional education subsidy on school enrolment in Colombia. *Report Summary Familias 01*. London: Institute for Fiscal Studies.

Baird, S.J., Chirwa, E., De Hoop, J., & Özler, B. (2013). Girl power: cash transfers and adolescent welfare. Evidence from a cluster-randomized experiment in Malawi. *NBER Working Paper* 19479. Chicago: National Bureau of Economic Research.

Barrientos, A.,& DeJong, J. (2006). Reducing child poverty with cash transfers: A sure thing?. *Development policy review*, *24*(5), 537-552.

Bastagli, F., Hagen-Zanker, J., Harman, L., Barca, V., Sturge, G., Schmidt, T., & Pellerano, L. (2016). *Cash transfers: what does the evidence say. A rigorous review of programme impact and the role of design and implementation features*. London: Overseas Development Institute.

Becker, S.O., & Ichino, A. (2002). Estimation of average treatment effects based on propensity scores. *The stata journal*, *2*(4), 358-377.

Berhane, G., Hoddinott, J., & Kumar, N. (2017). The impact of Ethiopia's Productive Safety Net Programme on the nutritional status of children, 2008–2012. *ESSP Working Paper 99*. Washington D.C.: International Food Policy Research Institute.

Berhane, G., Hoddinott, J., Kumar, N., & Seyoum Taffesse, A. (2011). *The impact of Ethiopia's productive safety nets and household asset building programme: 2006–2010*. Washington, DC: International Food Policy Research Institute.

Central Statistical Agency (CSA) (2012). Agricultural sample survey 2011/2012. *Statistical bulletin, 4(532).* Addis Ababa: Central Statistical Agency.

Cornwall, A. (2016). Women's empowerment: What works?. *Journal of International Development*, *28*(3), 342-359.

De Brauw, A., Gilligan, D.O., Hoddinott, J., & Roy, S. (2014). The impact of Bolsa Família on women's decision-making power. *World Development*, *59*, 487-504.

De la O Campos, A.P. (2015). Empowering rural women through social protection. *Rural Transformations Technical Papers Series #2.* Rome:

Social Protection Division at Food and Agriculture Organization of the United Nations

Disaster Prevention and Preparedness Commission (DPPC) Information Centre UN OCHA-Ethiopia (2003). Available at: https://reliefweb.int/map/ethiopia/ethiopia-tigray-region-administrative-boundaries [Accessed December 14, 2018]

Doepke, M., and Tertilt, M. (2011). *Does female empowerment promote economic development? Policy Research Working Papers*. Washington D.C.: The World Bank.

Dorosh, P., and Rashid, S. (2012). *Food and Agriculture in Ethiopia. Progress and Policy Challenges*. Philadelphia, Pennsylvania: University of Pennsylvania Press, 1-17.

Doss, C., Deere, C.D., Oduro, A., Swaminathan, H., Suchitra, J. Y., Lahoti, R., Baah-Boateng W. (2011). *The gender asset and wealth gaps: Evidence from Ecuador, Ghana, and Karnataka, India.* Bangalore: Indian Institute of Management Bangalore.

Doss, C. (2015). *Debunking the myth of female labor in African agriculture.* [Blog post]. Retrieved from: www.ifpri.org/blog/debunking-myth-female-labor-african-agriculture [Accessed December 19, 2017].

Fernald, L.C., Gertler, P.J., & Neufeld, L.M. (2008). Role of cash in conditional cash transfer programmes for child health, growth, and development: an analysis of Mexico's Oportunidades. *The Lancet*, *371*(9615), 828-837.

Filmer, D., & Schady, N. (2011). Does more cash in conditional cash transfer programs always lead to larger impacts on school attendance?. *Journal of Development Economics*, *96*(1), 150-157.

Fiszbein, A., & Schady, N.R. (2009). Conditional cash transfers: reducing present and future poverty. *Policy Research Report*. Washington DC: The World Bank.

Food and Agriculture Organization of the United Nations (FAO). (2011). *Women in agriculture, Closing the gender gap for development. The state of food and agriculture 2010-11.* Rome: FAO.

Gasper, D., & van Staveren, I. (2003). Development as Freedom-And As What Else?. *Feminist Economics*, *9*(2-3), 137-161.

Gertler, P.J., Martinez, S., Premand, P., Rawlings, L., & Vermeersch, C. (2011). *Impact Evaluation in Practice*. Washington D.C.: The World Bank.

Glewwe, P., & Kassouf, A.L. (2012). The impact of the Bolsa Escola/Familia conditional cash transfer program on enrollment, dropout rates and grade promotion in Brazil. *Journal of development Economics*, *97*(2), 505-517.

Golla, A.M., Malhotra, A., Nanda, P., Mehra, R., Kes, A., Jacobs, K., & Namy, S. (2011). *Understanding and measuring women's economic empowerment.* Washington D.C.: International Centre for Research on Women.

Handa, S., Peterman, A., Davis, B., & Stampini, M. (2009). Opening up Pandora's box: The effect of gender targeting and conditionality on household spending behavior in Mexico's PROGRESA program. *World Development*, *37*(6), 1129-1142.

Holmes, R., & Jones, N. (2011). *Public Works Programmes in Developing Countries, Reducing Gendered Disparities in Economic Opportunities?* Paper prepared for the International Conference on Social Cohesion and

Development, 20 - 21 January 2011, Paris, France. London: Overseas Development Institute. Retrieved from: www.odi.org/publications/5384-public-works-programmes-developing-countries-reducing-gendered-disparities-economic-opportunities [Accessed May 5, 2018].

Honorati, M., Gentilini, U., & Yemtsov, R.G. (2015). *The state of social safety nets 2015*. Washington D.C.: The World Bank Group.

Kabeer, N., & Waddington, H. (2015). Economic impacts of conditional cash transfer programmes: a systematic review and meta-analysis. *Journal of Development Effectiveness*, *7*(3), 290-303.

Kabeer, N. (1999). Resources, agency, achievements: Reflections on the measurement of women's empowerment. *Development and change*, *30*(3), 435-464.

Lieuw-Kie-Song, M. (2011). Integrating public works and cash transfers in Ethiopia: implications for social protection, employment and decent work. *Working Paper No. 84*. Brasilia: International Policy Centre for Inclusive Growth.

Maldonado, J.H., Pérez, I.G., & Orjuela, C.A.B. (2011). Conditional Transfer and Financial Inclusion Programs: Opportunities and challenges in Latin America. *Proyecto Capital, In Short*, *22*, 1-13.

Mayoux, L. (2001). Tackling the down side: Social capital, women's empowerment and micro-finance in Cameroon. *Development and change*, *32*(3), 435-464.

Ministry of Agriculture (MoA) (2015). *Productive Safety Net Program Phase IV Implementation Manual Version 1.0*. Addis Ababa: Ministry of Agriculture.

Ministry of Agriculture and Rural Development (MoARD) (2009). *Food Security Program 2010-2014, Productive Safety Net Program.* Addis Ababa: Ministry of Agriculture and Rural Development.

Ministry of Agriculture and Rural Development (MoARD) (2010). *Productive Safety Net Program, Program Implementation Manual.* Addis Ababa: Ministry of Agriculture and Rural Development .

Molyneux, M., & Thomson, M. (2011). Cash transfers, gender equity and women's empowerment in Peru, Ecuador and Bolivia. *Gender & Development*, *19*(2), 195-212.

Molyneux, M., Jones, W.N., & Samuels, F. (2016). Can cash transfer programmes have 'transformative' effects?. *The Journal of Development Studies*, *52*(8), 1087-1098.

Molyneux, M. (2007). The chimera of success: gender ennui and the changed international policy environment. *Feminisms in development: Contradictions, contestations and challenges*, *9*, p.227.

Molyneux, M. (2006). Mothers at the service of the new poverty agenda: progresa/oportunidades, Mexico's conditional transfer programme. *Social Policy & Administration*, *40*(4), 425-449.

Molyneux, M. (2008). *Conditional Cash Transfers, A Pathway to Women's Empowerment? Pathway Publication. Retrieved from:* www.pathwaysofempowerment.org/PathwaysWP5-website.pdf [Accessed May 6, 2018].

Molyneux, M. (2014). *Conditionalities, Cash and Gender Relations. United Nations Research Institute for Social Development*. Retrieved from: www.unrisd.org/sp-hr-molyneux [Accessed

April 29, 2018].

Patel, L., Knijn, T., & Van Wel, F. (2015). Child Support Grants in South Africa: A Pathway to Women's Empowerment and Child Well-being?. *Journal of Social Policy*, *44*(2), 377-397.

Tornqvist, A., & Schmitz, C. (2009). Women's economic empowerment: scope for Sida's engagement. *Working Paper December*. Stockholm: Swedish International Development Cooperation Agency (SIDA).

Urquieta, J., Angeles, G., Mroz, T., Lamadrid-Figueroa, H., & Hernandez, B. (2009). Impact of oportunidades on skilled attendance at delivery in rural areas. *Economic Development and Cultural Change*, *57*(3), 539-558.

Vaz, A., Pratley, P., & Alkire, S. (2016). Measuring Women's Autonomy in Chad Using the Relative Autonomy Index. *Feminist economics*, *22*(1), 264-294.

Yoong, J., Rabinovich, L., & Diepeveen, S. (2012). The impact of economic resource transfers to women versus men: a systematic review. *Institute of Education technical report*. London: University of London, EPPI-Centre.

Annex 1 – Balance in excluded and retained samples

Table A: Checking balance in the distribution of observable characteristics in the group of excluded observations and the retained samples for the woman-headed households

Covariates	Coefficients	Std. Err.	Z- value	P-value
Age of household head	0. 0799	0. 05017	1.59	0.111
Education level of household head	0. 1154	0. 4087	0.28	0.778
Other household member with higher education	0. 1569	0. 2693	0.58	0.560
Household size	0. 0435	0. 6162	-0.07	0.944
Household labour endowment	2.5509	1.6958	1.50	0.133
Tropical livestock units	1.8403	1.2564	1.46	0.143
Land size	0.1996	0.3565	0.56	0.575
Household's participation in non-farm business	-1.9161	2.0777	-0.92	0.356
Constant	-4.6748	3.6729	-1.27	0.203
	0.3561	Log pseudolikelihood = -18.243799		
	20.18	Prob> chi2 = 0.0097		

Table B: Checking balance in the distribution of observable characteristics in the group of excluded observations and the retained samples for the man-headed households

Covariates	Coefficients	Std. Err.	Z- value	P-value
Age of household head	-0.0076	0. 0173	-0.44	0.660
Education level of household head	0. 1266	0.1315	0.96	0.336
Other household member with higher education	-0.0011	0.0841	-0.01	0.990
Household size	0.0659	0.1595	0.41	0.680
Household labour endowment	-0.4056	0.3067	-1.32	0.186
Tropical livestock units	0.0646	0.3067	0.62	0.535
Land size	0.1801	0.1251	1.44	0.150
Household's participation in non-farm business	0.6445	1.0631	0.61	0.544
Constant	2.5595	1.1441	2.24	0.025
Pseudo R2=	0.0397	Log pseudolikelihood = -73.550654		
LR chi2(13) =	6.09	Prob> chi2 = 0.6376		

Annex 2 – Identification using propensity score matching

Table C: Balance test for propensity score and covariates for woman-headed households

Variables		Mean			% reduction	t-test	
		Treated	Control	%bias	|bias|	T	p>|t|
Age of household head	Unmatched	54.69	46.82	53.9		3.17***	0.002
	Matched	54.69	57.43	-6.9	65.1	-0.94	0.349
Education level of household head	Unmatched	0.61	0.68	-3.7		-0.21	0.833
	Matched	0.61	0.20	21.9	-491.8	1.46	0.147
Other household member with higher education	Unmatched	3.90	4.83	-24.4		-0.40	0.165
	Matched	3.90	4.59	-18.1	-25.9	0.92	0.361
Household size	Unmatched	3.63	3.80	-8.7		-0.51	0.608
	Matched	3.63	3.70	-3.8	56.2	-0.19	0.852
Household labour endowment	Unmatched	1.57	1.91	-29.5		-1.72*	0.087
	Matched	1.57	1.78	-18.4	37.5	0.85	0.399
Household's participation in non-farm business	Unmatched	0.172	0.172	-35.8		-1.93*	0.055
	Matched	0.059	0.059	0.0	100.0	0.00	1.000
Tropical livestock units	Unmatched	2.14	2.12	-0.6		0.04	0.969
	Matched	2.14	2.53	-15.0	-2268.3	-0.69	0.489
Land size	Unmatched	2.89	2.91	-1.1		-0.06	0.949
	Matched	2.89	2.99	-4.6	-319.5	-0.24	0.812

*Source: Authors' computation from IFPRI survey data (2017); *** significance level 1 per cent; ** 5 per cent; * 10 per cent*

Table D: Balance test for propensity score and covariates for man-headed households

Variables		Mean			% reduction	t-test	
		Treated	Control	%bias	|bias|	T	p>|t|
Age of household head	Unmatched	51.84	45.34	39.8		2.94***	0.004
	Matched	51.84	50.38	8.9	77.5	0.45	0.651
Education level of household head	Unmatched	1.55	1.32	9.4		0.67	0.505
	Matched	1.55	1.53	0.6	93.2	0.04	0.971
Other household member with higher education	Unmatched	5.37	4.98	11.0		0.77	0.442
	Matched	5.37	5.08	8.1	26.3	0.44	0.660
Household size	Unmatched	5.59	5.60	-0.4		0.03	0.974
	Matched	5.59	5.54	2.3	-422.7	0.12	0.903
Household labour endowment	Unmatched	2.25	0.08	-15.8		-1.19	0.235
	Matched	2.25	0.02	12.8	19.1	0.68	0.500
Household's participation in non-farm business	Unmatched	0.63	0.08	-5.0		-0.34	0.733
	Matched	0.63	0.02	18.6	-273.7	1.37	0.174
Tropical livestock units	Unmatched	3.24	3.91	-26.1		-1.70*	0.090
	Matched	3.24	3.07	6.6	74.7	0.43	0.671
Land size	Unmatched	3.92	4.01	-3.5		-0.25	0.806
	Matched	3.92	4.13	-8.5	-143.8	-0.42	0.674

*Source: Authors' computation from IFPRI survey data (2017); *** significance level 1 per cent; ** 5 per cent; * 10 per cent*

IOB
Institute of Development Policy
University of Antwerp