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Husbands and wives: power, peril and female participation in a Ugandan coffee cooperative

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Abstract

Purpose – Female smallholder farmers in low-income countries face barriers to accessing capital and commodity markets. While agricultural cooperatives provide services that contribute to the income and productivity of small-scale producers, evidence of cooperatives' social and economic empowerment of female smallholders remains limited. We apply Sen's capability approach to female entrepreneurs' socioeconomic empowerment to examine whether women's participation in a coffee and microfinance cooperative from rural western Uganda benefits their social and economic position within their household. First, we study the relationship between women's cooperative participation and their household coffee sales and savings. Second, we investigate the link between women's cooperative participation and their intra-household decision-making and whether the inclusion of the husband in his wife's cooperative strengthens or lowers women's decision-making power.

Design/methodology/approach – We carry out a case study of a hybrid coffee and microfinance cooperative that promotes social innovation through the integration and empowerment of female smallholders in rural Uganda. Using a cross-sectional survey of 411 married female cooperative members from 26 randomly selected self-help groups of Bukonzo Joint Cooperative and 196 female non-members from the identical area, employing propensity score matching, this paper investigates the benefits of women's participation in a coffee and microfinance cooperative in the Rwenzori Mountains of western Uganda. We present and discuss the results of our case study within an extensive literature on the role of institutions in collective action for women's empowerment.

JEL Classification — D13, D14, J16, J54, Q12

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Availability of data: The dataset and replication files will be available on our websites and by request from authors.

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Findings – Our findings provide new empirical evidence on female smallholders' participation in mixed cooperatives. Our results indicate that women's participation in microfinance-producer cooperatives appears to be a conditional blessing: even though membership is linked to increased women's intra-household decision-making and raised household savings and income from coffee sales, a wife with a husband in the same cooperative self-help group is associated with diminished women's household decision-making power.
Research limitations/implications – The focus of this study is on female coffee smallholders in an agricultural cooperative in rural western Uganda. In particular, we focus on a case study of one major coffee cooperative. Our cross-sectional survey does not allow us to infer causal interpretations. Also, the survey does not include variables that allow us to measure other dimensions of women's empowerment beyond decision-making over household expenditures and women's financial performance related to savings and income from coffee cultivation.
Practical implications – Our empirical results indicate that female smallholders' cooperative membership is associated with higher incomes and coffee sales. However, husband co-participation in their wives' cooperative group diminishes wives' decision-making, which suggests that including husbands and other family members in the same cooperative group may not be perceived as an attractive route to empowerment for female smallholders. For these reasons, an intervention that encourages the cooperation of both spouses and that is sensitive to context-specific gender inequalities, may be more successful at stimulating social change toward household gender equality than interventions that focus on women's autonomous spheres only.
Originality/value – While the literature thus far has focused on microfinance's potential for women's empowerment, evidence on agricultural cooperatives' affecting women's social and economic position is limited. First, our findings provide novel empirical evidence on the empowering effects of women's participation in a self-help group-based coffee cooperative in rural Uganda. Second, our data allows us to explore the role of husbands' participation in their wives' cooperative and SGH. We embed our hypotheses and empirical results in a rich discussion of female entrepreneurship, microfinance and cooperative literature.

Keywords Cooperatives, Microfinance, Intra-household decision-making, Husband participation, Female entrepreneurship, Smallholder agriculture, Social enterprise, Uganda, Coffee

Paper type Research paper

1. Introduction

Women's greater representation among the poor, dependence on agriculture and lower farm productivity in developing countries reflect female entrepreneurs' persistent barriers to access commodity and capital markets (Demirguc-Kunt *et al.*, 2015; FAO, 2011; Klugman *et al.*, 2014). Women's limited access to capital not only suggests gendered discrimination on the supply side of financial institutions but highlights gendered power imbalances within both society and households (Duflo, 2012; Hansen *et al.*, 2021). Gender inequities in capital markets tend to limit female entrepreneurs' participation in agricultural commodity markets, preventing them from obtaining reasonable prices for their farm produce and investing in their business (Hallward-Driemeier, 2013; Quisumbing and Pandolfelli, 2010).

Against this background, women's participation in microfinance has been heralded as an effective strategy, not only to alleviate poverty by improving female entrepreneurs' access to financial resources but also holds the potential to strengthen women's intra-household bargaining power (Hallward-Driemeier, 2013). Extensive literature has provided mixed results regarding microfinance-based self-help groups' (SHG) effectiveness in strengthening women's social and economic position within their households [1]. In light of this, women's participation in agricultural marketing cooperatives and the resultant social capital have been identified as important institutional means for improving female smallholders' social and economic empowerment that facilitate access to *both* capital and agricultural commodity markets in developing regions (Markelova *et al.*, 2009; Pandolfelli *et al.*, 2008; Quisumbing and Pandolfelli, 2010), including sub-Saharan Africa (Fischer and Qaim, 2012; Lecoutere, 2017; Majurin, 2012; Mwambi *et al.*, 2021; Serra and Davidson, 2021; Van Rijsbergen *et al.*, 2016), India (Datta and Gailey, 2012; Datta, 2015; Dohmwirth and Liu, 2020; Kumar *et al.*, 2021; Padmaja *et al.*, 2023) and China (Qiao *et al.*, 2015; Song *et al.*, 2014; Zhong *et al.*, 2023). This is particularly important as there are high concentrations of women in agriculture and food processing in Africa and Asia (Nukpezah and Blankson, 2017; Quisumbing *et al.*, 2015).

Agricultural marketing cooperatives are a common form of social enterprise aimed at reducing poverty among women (Fotheringham and Saunders, 2014), in particular in developing countries

(Alter, 2007). Recently, they have increasingly developed into hybrid organizations that combine both the marketing and processing of smallholders' farm produce with microfinance-based SHGs as part of an "integrated package" (Meinzen-Dick *et al.*, 2011). Several studies have contended that such "credit-plus" approaches are more likely to benefit women's control over income generated by their farms (Balasubramanian, 2013; Holvoet, 2005; Kabeer, 2001). Therefore, strengthening women's position in both capital and commodity markets has the potential to increase women's control over household resources. However, there is little consensus regarding agricultural cooperatives' potential to empower women socially and economically. Moreover, there has been a notable shift in the agendas of agricultural development programs toward increased emphasis on engaging men in building gender equality and improving program outcomes (Flood and Howson, 2015; Lambrecht *et al.*, 2016). Nevertheless, empirical evidence of women's participation in cooperatives affecting their financial performance and household decision-making power vis-à-vis their husbands remains scarce.

Studies that document the adverse impacts of microfinance on female clients routinely recommend that lending to women alone is not sufficient to challenge existing gender roles. In order to achieve women's economic empowerment requires engaging men, since men typically have power and influence over the lives of women, which calls for an "integrated package" of additional efforts on the side of microfinance institutions (Garikipati, 2008; Kabeer, 2001; Mayoux, 1999; Pierotti *et al.*, 2023). However, evidence on how *husbands' participation* in their wife's microfinance group may affect the relationship between husband and wife and women's empowerment more generally remains limited. This is surprising as it has been well documented that household well-being and women's decision-making power from access to microfinance hinge on cooperation between husband and wife in borrowing and spending decisions (Goetz and Gupta, 1996; Kabeer, 2001; Leach and Sitaram, 2002). Meier zu Selhausen (2016) has shown that female cooperative members' intensity of participation within cooperatives in western Uganda depends on their relative household decision-making power. Husbands are therefore both part of the problem and the solution. Recent studies found that women face a trade-off when including their husbands in collective action (Alemu *et al.*, 2018; Allen *et al.*, 2011; Bulte *et al.*, 2018). Male partners may perceive their wife's participation in microfinance and agricultural marketing as threatening, due to an intensified competition to assert control over household resources which may increase spousal conflict, thereby eroding potential benefits of women's access to microfinance. Moreover, the inclusion of the husband in microfinance and agricultural skills training may lead to the deterioration of household gender relations, which further reduces women's income generation and autonomy regarding borrowing and spending decisions.

In this paper, we examine whether female entrepreneurs' participation in a mixed coffee and microfinance cooperative from western Uganda benefits their social and economic position within their own households. Our analysis is based on a cross-sectional survey of 411 randomly selected married female members from 26 SHGs of a major coffee cooperative with an integrated microfinance scheme and 196 non-cooperative members from the same area. We employ kernel matching estimators to correct for potential endogeneity of female cooperative membership but do not claim causality. Our contribution is twofold. First, we provide empirical evidence on the benefits of female entrepreneurs' cooperative membership in rural Uganda on both their financial performance and household decision-making power. Second, we show that women's cooperative participation is not an unconditional blessing as women's household bargaining power diminishes when their husband is a member of the same group. To the best of our knowledge, this study is the first to empirically investigate whether husbands' and wives' joint participation in an agricultural cooperative can depress wives' household decision-making power. Our non-causal findings imply that even though cooperatives can empower female smallholders, these appear contingent on the non-involvement of the husband in the same cooperative. Cooperatives that actively support more

gender-equal cooperation of spouses within the household and coffee production may be more successful at stimulating gender equality within coffee family businesses.

The article proceeds as follows. Section 2 derives three hypotheses from the existing literature. Section 3 outlines background information on the local context and the cooperative case study. Section 4 describes the data and method. Section 5 presents the estimation results and robustness checks. Section 6 discusses our empirical findings within the literature and spells out policy implications. Section 7 concludes with avenues for future research.

2. Literature and hypotheses

This section reviews the literature on the role of (1) microfinance, (2) agricultural cooperatives and (3) husband inclusion in women's cooperatives for female entrepreneurship in developing countries. In particular, we draw on a long-standing debate of women's empowerment through group-based microfinance (Armendáriz and Roome, 2008; Ashraf, 2009; Holvoet, 2005; Kabeer, 2001; Swain and Wallentin, 2009) and agricultural marketing cooperatives (Datta and Gailey, 2012; Jones *et al.*, 2012; Meier zu Selhausen, 2016).

Many microfinance impact studies operationalize different concepts of women's empowerment (Kabeer, 2001). We theorize the impact of microfinance on women's empowerment using Sen's capability approach (Sen, 1999). The capability approach provides a theory of human development, in which quality of life is more than the amount of resources available. The essence of development are substantive freedoms – the capabilities – to choose a life one has reason to value (Sen, 1999, p. 74). Sen equates capabilities with freedoms that refer to the presence of valuable options—that is, opportunities that are effectively available to the individual. Sen (1999) emphasizes freedom to assess human well-being and social states because more freedom provides us with more opportunities to obtain what we value and have reasons to value and because freedom also has intrinsic value. As noted by Sen (1988, p. 290): "one reason why freedom may be important is that 'choosing' may itself be an important functioning [. . .]. Insofar as choosing is itself valuable, the existence and extent of choice have significance beyond that of providing only the means of choosing the particular alternative that happens to be chosen." An important concept in the capability approach is *agency* or empowerment. By agency, Sen refers to the ability to achieve the goals that a person values. Even though access to finance and the generation of resources with productive activities are important for increasing human well-being, access to resources *per se* does not automatically lead to social change (Calás *et al.*, 2009) but depends on ones' ability to take autonomous decisions for oneself in order to control and exploit those resources effectively: *agency*. Sen's capability approach has been used before to analyze entrepreneurship (Ali and Cottle, 2021; Gries and Naude, 2011; Wakkee *et al.*, 2018), but in this paper, we apply it in the context of rural female entrepreneurs with limited bargaining power, to gain the ability to make life choices for themselves (Kabeer, 1999).

Group-based microfinance provides access to credit and saving opportunities, which can raise investments and productivity. Agricultural cooperatives intend to improve smallholders' access to markets (at higher prices), farming inputs, processing skills and knowledge of production techniques, which increase the productivity of the farm. Combined investment, production and marketing through participation in mixed cooperatives, which offer access to both capital and commodity markets, are likely to increase the financial resources female smallholders can provide to their households. According to the resource theory of power (Blood and Wolfe, 1960), women's increased contribution to household resources strengthens their intra-household bargaining power.

Household decision-making is at the heart of some of the best-known attempts to conceptualize power (Kabeer, 1999). Participation of female entrepreneurs in a microfinance cooperative is likely to provide them with social capital that allows them to have a stronger

voice in intra-household decision-making. Especially in patriarchal societies, in which prevailing social norms subordinate women, group-based credit programs organized in microfinance cooperatives can improve the relative social and economic position of wives vis-à-vis husbands by making their lives more public and by fostering solidarity with other female members in the cooperative (Schuler *et al.*, 1996).

Microfinance programs that offer more than financial services may be particularly important for women's agency and household well-being because they are central local actors in inducing behavioral change. For instance, Saha *et al.* (2015) as well as Biscaye *et al.* (2014) find that the combination of microfinance SHG activities and a health program improved maternal as well as neonatal and children outcomes in Africa and Asia. In a similar vein, Kumar *et al.* (2018) propose a framework for behavioral pathways through which women's group participation may facilitate improvements in infant and child nutrition.

2.1 Microfinance and financial performance

Lack of access to capital markets is one of the principal reasons why citizens of low-income countries remain poor (Banerjee and Duflo, 2011; Hermes and Lensink, 2007). In particular, female entrepreneurs experience barriers to access credit (Marlow and Patton, 2005). In sub-Saharan Africa, about one in three adults had an account at a formal financial institution in 2017 (Demirguc-Kunt *et al.*, 2018), with women's financial inclusion being particularly skewed. In Uganda, 27% of female adults vs 39% of male adults held an account at a formal financial institution in 2017 (Demirguc-Kunt *et al.*, 2018) [2]. As a result, women are more likely to be financially constrained than men and therefore face greater risks and restrictions for any form of investment in income-generating activities. Consequently, women's entrepreneurial projects go unfunded, thereby hindering economic development. Microfinance offers practical solutions to this problem. Individuals form SHGs that pledge joint-liability for each other's loans by exploiting local information that exerts pressure on co-members in a manner consistent with the interest of the lender (Parker, 2009, p. 252). Access to finance through microfinance is likely to increase the productive investments by participating entrepreneurs and will lead to higher household incomes (McKernan, 2002). Some studies even found a significantly larger positive association with family welfare when women, rather than men, were participants in a microfinance scheme (Pitt and Khandker, 1998). This might be indicative of how access to credit in developing countries can unleash women's productive skills which, unlike men's, are otherwise held in check by cultural and religious restrictions. In line with previous studies (Calkins and Ngo, 2010; Fischer and Qaim, 2012; Ito *et al.*, 2012; Ito *et al.*, 2012; Ma and Abdulai, 2016; Van Rijsbergen *et al.*, 2016), we expect additional positive outcomes of membership in agricultural cooperatives on household income, through improved market access and agricultural practices. We thus hypothesize, controlling for selection, that:

H1. Women's participation in a SHG-based agricultural cooperative that provides access to farm marketing and microfinance is positively linked to their household financial performance.

2.2 Cooperative membership and women's empowerment

Jones *et al.* (2012, p. 13) find that in three East African countries "participating in collective forms of enterprise and linking to Fair Trade markets can enable female producers to access resources and markets, develop relationships, and overcome gender constraints." They also report that female cooperative participants increased their self-esteem and status within their households and communities. In East Africa, female membership in agricultural cooperatives has been positively associated with productivity gains, women's greater control over

agricultural production, improved agronomic knowledge as well as household food security and gender equity in Uganda (Chiputwa and Qaim, 2016; Ferguson and Kepe, 2011; Lecoutere, 2017; Serra and Davidson, 2021), Rwanda (Elder *et al.*, 2012) and Ethiopia (Serra and Davidson, 2021). Also, Burchi and Vicari (2014) document an improvement in gender relations between members of a Brazilian coconut cooperative and their partners, highlighting the capacity of cooperatives in fostering gender equality. Datta and Gailey (2012) regard female cooperatives as a form of social enterprise that empowers female entrepreneurs in three ways: economic security, development of entrepreneurial behavior and increased contributions to the family.

In addition, Sanyal (2009) has shown that group-based microfinance promotes women's social capital by facilitating their ability to participate in collective action. There is also evidence that access to microfinance in India and Bangladesh has improved women's income-earning capabilities that increased women's intra-household decision-making power and ability to overcome gender asymmetries (Hashemi *et al.*, 1996; Pitt *et al.*, 2006). Moreover, Ashraf *et al.* (2010) found that women who accessed commitment savings in the Philippines increased their intra-household decision-making relative to non-treated women.

Nonetheless, the literature has not reached a consensus on the impact of participation in microfinance schemes on women's empowerment. There is evidence that microfinance does not necessarily act as "magic bullet" or stimulate "virtuous spirals" for female empowerment (Kabeer, 2005; Mayoux, 1999). Often women do not control their loans themselves but hand over some or all of it to their husbands. In fact, for some women microfinance made them worse off in terms of income earnings (Banerjee *et al.*, 2015; Goetz and Gupta, 1996) or domestic violence (Rahman, 1999) and increased women's labor input under unfavorable conditions (Garikipati, 2008). This resonates with recent evaluations, which find that access to credit did not empower women, nor did business grants or trainings result in business growth and increased revenues when allocated to female small-scale entrepreneurs in India (Banerjee *et al.*, 2015), Sri Lanka (De Mel *et al.*, 2008), Peru (Karlan and Valdivia, 2011), Ethiopia (Belwal *et al.*, 2012) and Tanzania (Berge *et al.*, 2012).

Despite the prevailing pessimistic view on the effects of microfinance on female entrepreneurs' empowerment, the promise of mixed cooperatives, supplying both access to capital and commodity markets, leads us to formulate a more optimistic hypothesis:

H2. Women's participation in an SHG-based agricultural cooperative is positively associated with their intra-household decision-making power.

2.3 Inclusion of the husband in wife's self-help group

There are growing concerns by microfinance practitioners that women suffer from increased intra-household conflict as a result of their exclusive access to microfinance, eroding any benefit of an independent source of income (Murshid *et al.*, 2016; Salia *et al.*, 2018). Therefore, the inclusion of husbands into their wife's microfinance activities may be an obvious solution.

When husbands form part of their wife's microfinance they might gain a better understanding of the loan amounts and internalize the terms of lending which then reduces household conflict and induces more spousal cooperation, which encourages joint loan repayment (Armendáriz and Morduch, 2010, p. 228). For dairy cooperatives in southern India, Dohmwirth and Liu (2020) find that although membership in either women-only or mixed-gender diary cooperatives in southern India has a positive impact on women's intra-household decision-making power, women-only groups are not necessarily more effective for women's empowerment.

Moreover, joint male and female participation in agricultural cooperatives and training modules on gender equality could lower information asymmetries within the household, change husbands' beliefs about appropriate behavior and thus improve spouses'

communication and shared financial decision-making. On the one hand, this has been shown for both southern Mexico using anthropological evidence (Armendáriz and Roome, 2008) and through experimental research design in the Philippines (Ashraf, 2009). Also, Lambrecht *et al.* (2016) found that husband and wife joint participation in agricultural extension programs led to higher adoption rates of farming technologies among smallholder farmers in eastern Congo. On the other hand, Bulte *et al.* (2016) as well as Huis *et al.* (2019) find that inviting husbands' to their wives' gender and entrepreneurship training in Vietnam did not result in further impacts on wives' household decision-making power. Moreover, the analysis of silk-reeling self-employed women in South India by Leach and Sitaram (2002) as well as female membership in apple cooperatives in Ethiopia by Alemu *et al.* (2018) have shown that male exclusion from participating in their wives' microfinance group can result in husbands' denying support of their wife's business and exacerbate spousal conflict. As a result, no redistribution of power within the household was observed. The same conclusion has been reached by Rahman (1999) and Kabeer (2001) who document that men's (feeling of) exclusion from wives' microfinance increased friction between husbands and wives, as husbands often felt threatened in their roles as breadwinners. This tended to erode any benefits of an independent source of capital for wives. In South Asian patriarchal cultures, husband–wife partnering becomes a necessity for many female entrepreneurs to start their own business in the first place (Kabeer, 2000) or work outside the homestead (Carr *et al.*, 1997). Armendáriz and Roome (2008) summarize this in what they call the "women-disempowering effect": the exclusion of men from membership of the female's microfinance cooperative might create frictions and male backlash that diminish women's decision-making power within the household. This leads us to hypothesize:

H3. Wife's and husband's joint participation in an SHG-based agricultural cooperative is positively associated with women's intra-household decision-making power.

3. Research context

3.1 Gender and development in Uganda

Uganda, home to a population of 46 million in 2021, is an East African landlocked country bordering South Sudan in the north, Kenya in the east, Tanzania and Rwanda in the south and the Democratic Republic of the Congo in the west. GDP per capita growth has averaged 2.4% annually between 2008 and 2016 and the overall poverty rate has declined from 64% in 1992 to 42% in 2019 (World Bank, 2020). In 2019, 76% of Uganda's population lived in rural areas where 69% (74% for women) depended on agricultural production directly (World Bank, 2020). Women perform the bulk of agricultural work (Palacios-Lopez *et al.*, 2017).

Gender inequalities in Uganda are perpetuated by cultural beliefs rooted in the family setting, where hierarchies are largely accepted as predestined, placing men at the top of this hierarchy (Nuwagaba and Muhumuza, 2017). Resulting, socioeconomic inequality between women and men are well documented [3]. Some statistics are illustrative: the country has a high gender inequality index (0.523), as measured by maternal mortality, adolescent fertility rates and empowerment and economic activity, ranking 126 out of the 160 countries assessed (UNDP, 2017). In terms of educational attainment, primary school enrolment rates are almost equal between boys and girls (Baten *et al.*, 2021). However, the number of out-of-school children of primary school age remained twice as high for girls in 2013. Gender gaps become even more visible at secondary and tertiary enrolment levels with a female-to-male ratio of 0.89 and 0.27, respectively (UNDP, 2015).

Gender roles in rural Uganda are strongly marked. Men often expect women to be docile and subservient and women often perpetuate this oppressive culture. Examples of harmful practices that are justified as cultural and customary in Uganda and lower women's economic

opportunities in life include early marriage, widow inheritance, the practice of grabbing property from widows and orphans and domestic violence, which jointly affect 40–45% of marriages (Ellis *et al.*, 2006). Bride-wealth payment and polygamy is widely practised, particularly in rural areas (Anderson, 2007). Uganda had among the highest fertility rates in sub-Saharan Africa (4.7 births per woman) in 2020 (World Bank, 2020).

While most Ugandan women have informal access to land typically through marriage, women are rarely listed on formal land ownership titles and thus have limited say over its use (Doss *et al.*, 2014). In fact, women cannot inherit any land owned by their late fathers, brothers or husbands. When a man passes away, his property is inherited by his son or another chosen male family member (Ellis *et al.*, 2006), even though the land is worked mostly by the wife (Meier zu Selhausen, 2016). According to Kasirye (2011), four out of every five women in Uganda are employed in agriculture and 42% of women in the labor force are unpaid family workers—receiving no income despite contributing the largest proportion of the agricultural labor.

3.2 Coffee production and cooperatives in Uganda

Coffee is Uganda's most valuable export commodity, accounting for about 20% of export revenues in 2015 (Frankema and Meier zu Selhausen, 2024), followed by tea and tobacco. Both production and exports of coffee have doubled between 2005 and 2015 (Akoyi and Maertens, 2018). Following Ethiopia, Uganda is Africa's second largest coffee exporting country, producing about 40% of total African coffee in 2016/2017 (International Coffee Organization, 2018). Uganda's coffee sector almost entirely depends on approximately 500,000 smallholder households with farm sizes ranging from one to six acres (Uganda Coffee Development Authority, 2014). Direct employment within the coffee chain is estimated at 5 million people (Akoyi and Maertens, 2018), thus representing an important source of income in rural Uganda.

However, women's lack of access to both commodity and capital markets constitutes an important barrier for smallholders to increase their agricultural production and reap the full benefits from it. Against this background, Ugandans increasingly seek participation in agricultural cooperatives to market their produce and fetch higher market prices. Collective marketing of smallholders' produce realizes economies of scale and enhances farmers' power to negotiate better prices and tap into high-value markets, otherwise unreachable through intermediary buyers (Meier zu Selhausen, 2016).

The cooperative movement in Uganda was born in 1913 in response to British colonial and Indian interests that sought to monopolize marketing, processing and export of cotton and coffee. Yet, African cooperatives remained unsupported by the colonial government until 1946 when cooperatives were legalized (Develtere *et al.*, 2008). By the time Idi Amin came to power in 1971, 2,500 primary cooperatives existed, mainly engaged in cotton and coffee with about 750,000 dependent family members. Yet, Amin's regime combined with low international prices for primary commodities led to the collapse of most primary cooperatives in Uganda. When agricultural markets were liberalized and decentralized from state-controlled marketing boards during the 1990s, cooperatives were unprepared to compete in global export markets. This led to a further decline in the Ugandan cooperative movement, with cooperatives' export market share dropping to 1% in 2006. Simultaneously, multinational coffee firms expanded (Kyazze, 2010). Recently the cooperative movement has experienced a renaissance in a number of African countries, including Uganda (Develtere *et al.*, 2008).

In 2012, there were about 10,000 permanently registered cooperatives in Uganda of which 47% were agricultural cooperatives and 28% savings and credit cooperatives. Total membership subscriptions came to 1.23 million (MTIC, 2012) with female participation

estimated at 42% (Majurin, 2012). Moreover, women mainly participated in groups that focused on traditional handicrafts in the 1970s. More recently this has broadened to include agricultural production and microfinance (Pickering *et al.*, 1996).

3.3 The case study: Bukonzo Joint Cooperative

The cooperative under study, Bukonzo Joint Cooperative (henceforth BJC), operates in a remote area of western Uganda, in Bukonzo County (in Kasese District), with a population of 329,000 in 2014, on the northern slopes of the Rwenzori Mountains bordering the DRC. Bukonzo County is an exclusively agricultural area with poor transport infrastructure (ca. 35 min walking distance to the next main road, which is non-tarmac) and difficult market access (ca. 400 km distance to the capital city Kampala). The bulk of households in this region depend on the cultivation of subsistence crops and Arabica coffee. Women tend to invest more time in coffee production and processing than men (Meier zu Selhausen, 2016). Despite the unequal workload, men remain in control of coffee revenues, selling it to male coffee village traders. Because women's opportunities of reaping the benefits of their work are limited, women lack the capital and decision-making over household expenditures and thus are unable to invest in upgrading coffee cultivation (Mayoux, 2012). Moreover, many women are excluded from joining agricultural cooperatives or receiving credit from financial institutions due to land titles belonging to their husbands.

BJC was founded in 1999 in response to these fundamental challenges for female smallholders and to serve the poor and isolated farming communities in Bukonzo county. BJC is a mixed cooperative that combines microfinance services, coffee marketing and agricultural extension services. BJC operates on an adapted version of the village banking model, lending money to and accepting savings from low-income clients organized in SHGs. This means that members either jointly form or are allocated to a SHG of the cooperative which provides access to microfinance and coffee marketing services to every member. It purchases its members' coffee at fair prices and sells it overseas buyers. Earned income are recycled to members as share capital and used for social activities. The structure of SHGs intends to facilitate interaction between members, mutual trust and social capital. By 2012, BJC had grown to c. 2,220 local smallholder members distributed across 74 SHGs. SHGs are predominantly female (76%), each consisting of 31 members on average. SHGs are further divided into solidarity groups, comprising 3–5 members, who are jointly liable for repaying members' loans. Members meet on a weekly basis to make savings, take out loans, share common problems and receive technical training in coffee production and gender justice. These characteristics make that BJC also qualifies as a social enterprise (Datta and Gailey, 2012; Fotheringham and Saunders, 2014). There are no restrictions on both husband and wife being members of the cooperative or one of its SHGs. In this case, spouses are not jointly liable for repayment but access credit individually.

About 9 in 10 members saved with BJC and one in two obtained a loan during the past year (i.e. June 2011–July 2012) from the cooperative with an average amount of 160,000 USh (c. US$65). About half of those members re-invested these loans into their coffee businesses and about a third into paying their children's school fees [4]. BJC also provides capacity building for SHG members to change gender relations on the household and community level and best practices of cultivation and post-harvest processing of coffee. Additionally, since 2005 BJC pools and markets members' coffee for international export, which has been Fair Trade licensed in 2012.

4. Data, measures and methods

4.1 Household survey

The data for this study was collected in June and July 2012. Using a specifically designed questionnaire, we conducted structured household-level interviews of female smallholders

(1) being members of Bukonzo Joint and (2) a comparison group of non-members in six sub-counties of Bukonzo County in western Uganda [5]. A two-stage stratified random clustered sampling strategy was used. In the first stage, from all of the 74 SHGs, consisting of a total of 2,200 members of which 1,691 are female, we randomly selected 26 SHGs from a list provided by Bukonzo Joint Cooperative. Sampled SHGs were remotely located across the mountainous slopes of the Rwenzori Mountains, generally comparable in their rural agro-ecological environment. SHGs located between 1,200 and 2,000 meters above sea-level with a bi-modal rainfall pattern, suitable for the cultivation of Arabica coffee within 20 km proximity of the cooperative. In the second stage, we made a stratified random selection of female cooperative members (who were married and co-resided with their husbands) and married women who were not members of BJC but resided in the same village. At the SHG level, 16 married female members (c. two-thirds of SHGs' female members) [6] were then randomly drawn for interviews (playing a lottery). Interviews were conducted by trained enumerators of Mountains of the Moon University (Fort Portal) speaking the local language (Lukonzo). The interview situation was strictly private, without any relatives, other group members or BJC field officers present. The total cooperative sample consists of 421 female members from 26 SHGs. For sample power calculations see Supplementary Material Table A2.

The comparison group comprises 210 married women co-residing with their husbands and not being members of BJC. Households were randomly visited in close proximity (i.e. c. 100–600 meters) of each SHGs' meeting place to reflect a comparable geographic and socioeconomic group. About 13 women were interviewed living in proximity to the 26 randomly selected SHGs of BJC. Overall, our sample includes 631 married female respondents. The final sample includes 607 married female respondents, consisting of 411 cooperative members across 26 SHGs and 196 non-members, for whom we have complete survey information. Our sampling strategy does not allow us to estimate causal effects but to observe correlations.

4.2 Descriptive statistics

Table 1 presents descriptive statistics on those selected households. Husbands are on average five years older than their female partners. The average non-BJC household consisted of 6.2 members compared to 7.1 for households of which three women live in polygamous unions. Respondent households who joined BJC owned about 1.9 acres of land (husband and wife accumulated), whereas non-BJC households possessed 1.5 acres. However, husbands of both BJC members and non-members own on average about 4 times as much land as their wives. Moreover, Table 1 shows that respondents who joined BJC are on average 4 years older than non-members, have on average 1.5 more children and therefore larger households. Women's average years of education is about 4 years. Still, BJC members' average years of schooling is 1 year less compared to non-members.

Those households that participate in BJC generated on average 748,000 Ugandan Shillings (USh) (c. US$305) from coffee per year in comparison to 550,000 USh (c. US$224) for non-participants [7]. Coffee represents the most important source of income for cooperative members, as 70% stated that coffee represents the main source of income, followed by the sale of field crops (17%) and small businesses (13%). Figures are similar for non-members who reported that coffee was their main source of income (63%), followed by the sale of field crops (18%) and small business (9%). In other words, the great majority of respondents are self-employed. Moreover, BJC members had saved twice as much money at the time of the survey, potentially attributed to the fact that the cooperative offers a savings account to its members to save up lump sums.

Health-related expenditures feature prominently: 44% of female respondents reported to have had malaria and more than once attended the hospital themselves or taking their child

Variables	Total		Non-member		Cooperative member	
	Mean	SD	Mean	SD	Mean	SD
Age wife (years)	34.67	11.49	30.24	10.00	36.78	11.56
Age husband (years)	40.68	13.26	35.94	12.08	42.94	13.22
Education wife (years)	4.41	3.29	5.22	3.08	4.03	3.31
Education husband (years)	6.39	3.53	6.84	3.33	6.18	3.60
Polygamous household (dummy)	0.33	0.47	0.28	0.45	0.35	0.48
Household size	7.10	4.35	6.21	2.37	7.52	4.98
Number of children	5.52	3.18	4.39	3.04	6.06	3.11
Malaria prevalence (per month)	0.44	0.50	0.39	0.50	0.47	0.50
Land area (acres)	1.79	1.88	1.48	1.78	1.94	1.91
Land wife (acres)	0.34	0.83	0.28	0.59	0.37	0.92
Land husband (acres)	1.45	1.55	1.20	1.68	1.57	1.46
Income (in USh)						
Coffee sales (in USh, annual)	684,150	822,463	549,536	610,329	748,346	899,922
Total savings (in USh)	136,032	291,495	90,569	199,039	157,713	324,480
Income wife (in USh, last 7 days)	19,267	32,567	17,427	30,796	20,146	33,380
Income husband (in USh, last 7 days)	37,748	69,579	46,979	92,766	33,346	54,796
Wife's decision-making						
Say in health expenditures (dummy)	0.59	0.49	0.47	0.50	0.65	0.48
Say in education expenditures (dummy)	0.60	0.49	0.47	0.50	0.67	0.47
Say in food expenditures (dummy)	0.69	0.46	0.60	0.49	0.73	0.45
Cooperative variables						
Coop membership wife (years)					5.76	4.03
Coop member husband (dummy)					0.35	0.48
Husband member in wife's SHG (dummy)					0.22	0.41
Wife coop member first (dummy)					0.11	0.32
Coop member relatives (dummy)					0.36	0.48
SHG size					35.55	18.22
SHG > 80% female (dummy)					0.65	0.48
Distance to main road (walking minutes)					34.50	30.10
No. of observations	607		196		411	

Note(s): The U.S. Dollar amount is calculated at the exchange rate of $1 = USh 2,450 of the month the survey was completed (July 2012)
Source(s): Authors' own work

Table 1. Individual characteristics of female cooperative members and non-members

during the last month. Both households share identical housing conditions and both groups live in mountainous and remote areas, more than half an hour foot walk from the next main road (which is not an all-weather road).

4.3 Method for analyzing women's financial performance and decision-making power

We measure female entrepreneurs' financial performance with the dependent variable income from coffee sales (per household). Within the African context, crop sales are typically used by entrepreneurs to evaluate their own financial performance (Khayesi *et al.*, 2014). Besides expanding incomes, we examine whether female cooperative membership also benefited women's intra-household decision-making power.

We see this in the light of Sen's capability theory, in the sense that the ability to achieve the goals that a person values is increased. In this line, previous studies in the field of microfinance have focused on women's intra-household decision-making power as a central indicator of women's empowerment (see Duvendack *et al.* (2014) for an overview). Following

Holvoet (2005), Huis *et al.* (2019), Nilakantan *et al.* (2013), we measure women's participation in household decision-making focusing on women's influence over major household expenditures in (1) health, (2) children's education and (3) food. The variable is constructed to take into account joint decision-making (wife and husband) [8], fully autonomous decision-making by the wife and husband's entire decision-making. The distribution of women's relative decision-making power across the three dimensions is presented in Table 2. It appears that husbands hold significantly more decision-making power with respect to health and education expenses, whereas women participate on an equal footing in decisions pertaining to food expenditures [9]. Large-scale investments, such as health (about 20% of monthly household incomes of sampled households) and offspring's school fee payments, represent costly life-cycle expenditures for parents (Collins *et al.*, 2009). This suggests that costlier investment decisions are taken by the husband while expenditures related to food or the homestead are taken jointly. Expenditure decisions of cooperative members however involve significantly more joint decision-making among spouses compared to non-members. The share of "wife only" decision-making does not differ substantially between treatment and control groups. This may indicate that the cooperative enables a shift from "husband only" decisions to "joint decision making," but not to "wife only" decisions.

For our analysis, we create indicator variables equal to one if the decision is made by the "wife only" or if it is a joint decision-making (i.e. wife and husband) and zero otherwise (i.e. husband). While women's control over household spending is commonly used in the literature as a measure of women's intra-household decision-making power (see Ganle *et al.*, 2015; Holvoet, 2005; Huis *et al.*, 2019; Nilakantan *et al.*, 2013; Vaessen *et al.*, 2012, 2014), we acknowledge that these measures are not free of criticism. First, empowerment is multidimensional and is expressed at multiple levels (Alkire *et al.*, 2013; Ewerling *et al.*, 2017), which have led to the use of indices (that include various components of women's agency and socioeconomic status and characteristics) as group-level indicators of equality [10]. In this sense, then, our results can only speak to one dimension of women's empowerment. Second, while our variables measure the degree to which women participate in household decision-making, they may also indicate responsibility, i.e. women's ability to decide on health or food expenditures is likely to make her responsible for family health and cooking, respectively. This is what Basu and Koolwal (2005) refer to as a "marker of domestic

Variables	All	Cooperative member Treated	Non-member Control
Say in health expenditures			
Female only	0.10	0.09	0.10
Male only	0.41	0.35	0.53
Both	0.50	0.55	0.37
Say in education expenditures			
Female only	0.11	0.12	0.10
Male only	0.40	0.33	0.53
Both	0.49	0.55	0.38
Say in food expenditures			
Female only	0.15	0.14	0.17
Male only	0.31	0.27	0.40
Both	0.54	0.59	0.43
No. of observations	607	411	196

Note(s): All variables are binary variables (0 or 1) as described in Table 1
Source(s): Authors' own work

Table 2. Distribution of women's relative household decision-making power

duty." Wives' decision-making on family expenditures may therefore also reflect some degree of "duty" rather than agency *per se*. Third, following the previous reasoning, empowerment as a means of serving women's self-interest cannot be disentangled from its instrumental properties when using our aggregated indicators, i.e. having a say over their own body and health expenditure is different from having a say over family health investment.

4.4 Empirical approach

Our empirical strategy is two-fold. First, we estimate the relationship between women's cooperative membership and (1) household income from coffee and savings (Hypothesis 1) as well as (2) women's empowerment (Hypothesis 2), using the PS-matched kernel method (Heckman *et al.*, 1997, 1998). As a second method, we use Probit regressions to investigate how the participation of the husband in his wife's SHG may influence the wife's household decision-making power (Hypothesis 3).

4.5 Propensity score matching

Self-selection into group membership is a common problem in observational data. Therefore, assessing the impact of cooperative membership on the different outcome variables requires balancing the distributions of observed characteristics (or covariates) between the treatment and control groups. The self-selection bias, in our context, arises because women's decision to participate in BJC depends on the same attributes that determine the outcome variables (household income and women's empowerment). Women who are SHG members are likely to be systematically different from non-members. Table 1 shows that women who are SHG members are on average older and come from better-off households in terms of income and farm size compared to those who are non-members. In order to eliminate this bias we rely on propensity score analysis.

The basic idea behind statistical matching (Rubin, 1974) is to identify a pool of potential comparison observations that closely resemble the treated units. While the set of conditioning factors necessary to identify valid comparison units is typically required to be of high dimension, Rosenbaum and Rubin (1983) showed that instead of conditioning the matching on the whole set of individual characteristics, it suffices to concentrate on a single-index variable, i.e. the propensity score, defined as the conditional probability of assignment to a particular treatment, i.e. program participation, given a vector of observed covariates:

$$p(X) \equiv \Pr(D = 1|X) = E(D|X), \tag{1}$$

where $D = 0, 1$ is the indicator variable of exposure to treatment and X is a vector of observable variables (pre-treatment characteristics). The work of Rosenbaum and Rubin (1983) stated that if exposure to treatment is random within cells defined by X, it is also random within cells defined by the values of the single-index variable $p(X)$. Hence, given a population of units i, if the propensity score $p(Xi)$ is known, the Average effect of Treatment on the Treated (ATT) can be estimated as follows:

$$\begin{aligned}\tau &\equiv E\{Y_{1i} - Y_{0i}|D_i = 1\} \\ &= E[E\{Y_{1i} - Y_{0i}|D_i = 1, p(X_i)\}] \\ &= E[E\{Y_{1i}|D_i = 1, p(X_i)\} - E\{Y_{0i}|D_i = 0, p(X_i)\}|D_i = 1]\end{aligned}$$

where the outer expectation is over the distribution of $(p(Xi)|Di = 1)$ and Y_{1i} and Y_{0i} are the potential outcomes in the two counterfactual situations of treatment and no treatment. The above estimation relies on the following hypotheses: (1) Balancing of pretreatment variables given the propensity score and (2) Unconfoundedness given the propensity score [11].

To achieve a close balancing, we use the optimal bandwidth of 0.06 for the Kernel matching. Further, we impose common support by dropping treatment observations with a propensity score higher than the maximum or less than the minimum propensity score of the controls. We thus drop 15 observations from the complete sample that lied outside the common support and six observations from the non-polygamous households.

4.6 Assessing matching quality

Standard balancing tests were performed to check the quality of the matching, i.e. *t*-tests and standardized differences between the treated and untreated groups. We consider the sample to be balanced on observables when the standardized difference is less than 20%, as suggested by Rosenbaum and Rubin (1985). Table A1 in Appendix reports the results of the balancing tests. It shows that after matching, all significant differences are eliminated (see also Figure A1).

4.7 Sensitivity analysis

The matching procedure described above helps to control for observable differences between treatment and control groups; however, unobserved heterogeneity remains a problem. Indeed as pointed out by Rosenbaum (2002), if there are unobserved variables that simultaneously affect assignment into treatment and the outcome variable, a hidden bias might arise to which matching estimators are not robust. While we cannot estimate the magnitude of selection bias, we can test the sensitivity of our estimated treatment effects to the existence of such hidden bias. We test this by conducting the bounding approach proposed by Rosenbaum (2002). Although the Rosenbaum bounds approach does not test the unconfoundedness assumption itself, it measures the extent to which an unobserved factor must influence the odds of being allocated to the treatment group before the estimated treatment effect becomes statistically unreliable (Becker and Caliendo, 2007).

4.8 Regression analysis

For the regression analysis, we use a reduced sample consisting only of cooperative members. We use a dichotomous variable of household decision-making power in which we merge the categories of joint decision-making (wife and husband) and fully autonomous decision-making by the wife (value 1) and contrast it with no influence at all by the wife (value 0). The estimated equation is as follows:

$$Y_i^* = \alpha_i + X_i\,\beta_i + \varepsilon_i, \tag{2}$$

$$Y = \begin{cases} 1 & Y^* > 0 \\ 0 & \text{otherwise} \end{cases}$$

where Y_i is the outcome of interest and X_i is a vector of individual characteristics and household variables that affect women's decision-making power. The vector of individual variables includes wife's and husband's age and years of education. We also include variables that control for the family's demographic composition, such as the number of children born, household size and polygamous households. As part of cooperative-related variables, we include the time in years the wife has been a member of the cooperative and four dummy variables that capture: (1) whether the husband is a member of BJC, (2) if any relative is a member of BJC, (3) if the husband is a member of the same SHG as his wife and (4) whether the wife was the first to join the SHG [12]. In addition, we use two variables to control for wife's and husband's own income other than coffee sales and we use the land area as a proxy for household wealth. Finally, we cluster the standard errors at the SHG level and control for SHG characteristics, i.e. the share of women in the SHG, SHG size and distance to the main road from the SHG.

5. Results

5.1 Propensity score matching

Table 3 reports the ATT for financial and agency outcomes as well as average outcomes for treatment and control groups based on kernel-matching [13]. Our results indicate a positive statistically significant relationship between women's cooperative membership and their level of empowerment. Membership is also positively linked to household income from coffee and women's savings (Hypothesis 1) as well as to women's decision-making concerning health and education expenditures within the household (Hypothesis 2). In particular, women's say in health and education expenditures of BJC members is 9–10% points higher than for women in the control group. This is not surprising, given that women in the cooperative are also members of a SHG where issues related to household gender equity are actively discussed and previous studies have found that women's participation in SHGs is associated with women's empowerment (Datta, 2015; Deininger and Liu, 2013; Mukherjee, 2015). Our empirical findings therefore confirm Hypotheses 1 and 2.

However, most recent research has questioned earlier enthusiasm for microfinance improving women's agency and relative socioeconomic status within the household (Banerjee *et al.*, 2015). In order to better understand this difference in results, in the next subsection, we unpack the determinants of women's decision-making among BJC members (Hypothesis 3). Building on previous anthropological and sociological research on the links of women's agency, kinship structures and family relationships, we posit that in relatively small patriarchal societies, such as this remote area in the Rwenzori Mountains of Uganda, the presence of family members in the working environment of the women may explain, to a certain extent, the statistically insignificant relationship between women's participation in institutions of collective action and women's agency found in previous studies.

5.2 Sensitivity analysis

Table 5 in the Supplementary Material presents the *p*-values for the upper and lower bounds on the Wilcoxon signed-rank test and the McNemar's test for continuous and binary outcomes, respectively. We present the results for both Nearest Neighbor and Genetic Matching.

Under the null hypothesis of no treatment effect for different values of unobserved selection bias, Γ, we observe insignificant results at 1.7 for savings and women's say on

Table 3.
Impact of cooperative membership on households' financial performance and women's decision-making power

	All			Non-polygamous		
Variables	Cooperative member Treated	Non-member Control	Difference	Cooperative member Treated	Non-member Control	Difference
Coffee sales (USh)	737,525	560,999	176,526***	707,062	570,735	136,326*
Savings (USh)	154,066	92,912	61,154***	149,977	96,289	53,688*
Health exp. (dummy)	0.64	0.54	0.10**	0.68	0.49	0.20***
Education exp. (dummy)	0.67	0.58	0.09*	0.68	0.53	0.16**
Food exp. (dummy)	0.72	0.66	0.07	0.75	0.62	0.12**
No. of observations common support	396	196		260	141	

Note(s): Kernel matching. Health, education and food exp. are binary variables (see Table A2, Supplementary Material). Significance at *$p<0.10$, **$p<0.05$, ***$p<0.01$
Source(s): Authors' own work

education expenditures and 1.4 for health expenditures. In other words, individuals who appear to be similar in terms of observed covariates will have to differ in their odds of receiving the treatment by a factor of 1.7 (1.4 for health) before our results become insignificant. This is a rather strong relationship.

On the other hand, the results for coffee sales are sensitive to hidden bias at 1.3. That is even if the odds of one person being a member of the coffee cooperative are only 1.3 times higher because of unobserved covariates, despite being identical on the matched covariates, our inference changes. From these findings, one must interpret the results carefully. That being said, as pointed out by Becker and Caliendo (2007) these are worst-case scenarios. A critical value of 1.3 does not mean that unobserved heterogeneity exists and there is no effect of treatment on the outcome variable. Rather, it only suggests that the confidence interval for the treatment effect estimate would include zero if an unobserved variable caused the odds ratio of treatment assignment to differ across the comparison groups by 1.3.

5.3 Intra-household decision-making power

Next, using Probit regressions we investigate Hypothesis 3: the role of the husband's co-membership in both (1) the cooperative and (2) in his wife's SHG for wife's household decision-making power. For this, we restrict our sample to the 411 female cooperative members. The estimates reported in Table 4 indicate that neither increased duration of cooperative participation, nor husband's co-membership are statistically significantly related to wives' decision-making power over household expenditures.

However, we find that the husband's participation on the level of his wife's SHG is negatively associated with all three measures of wife's intra-household decision-making power (Columns 1–3). In other words, men's cooperative co-membership is not adversely correlated with women's empowerment *per se*, which rejects Hypothesis 3. This negative association only emerges once the husband enters the domain of the wife's SHG. This is not a marginal phenomenon since 22% of husbands are co-members of the same SHG as their wives (see Table 1). The question then is: who joins the SHG first? We expect that when the wife entered the SHG first, this is an indication of women's empowerment in itself and will positively affect the benefits derived from being an SHG member (or in the contrasting situation that wives follow their husbands submissively and thus do not benefit from membership). This mechanism seems to be confirmed by the statistically significant positive association between the wife joining the SHG first and her decision-making power in expenditures related to education and food (Columns 2 and 3).

Besides the negative association of husband's participation on their wife's household decision-making power, Table 4 also shows a negative association between the presence of other family relatives in the cooperative on women's decision-making power. Also, the participation of family relatives in the cooperative reduces women's decision-making in all three expenditure dimensions (Columns 1–3). Whether this negative association is entirely driven by the presence of other family members in the cooperative or in the same SHG cannot be disentangled, as analyzed for the presence of the husband, with the data at hand. However, both results together raise important concerns about the inclusion of family members into cooperatives and SHGs regarding female entrepreneurs' empowerment.

Moreover, Table 4 indicates that women appear to expand on their ability to make both independent and joint household decisions when their incomes increase (Columns 1 and 2). Contrary, wives seem to lose power when their husband's income increases. Finally, SHG characteristics, including membership size, gender composition and remoteness of SHGs' meeting locations (i.e. walking distance to the nearest main road) appear not to be statistically significantly associated with women's relative decision-making power (not shown in Table 4).

Variables	Health exp.	Education exp.	Food exp.
Coop membership wife (years)	0.0067	0.0087	−0.0026
	(0.0071)	(0.0069)	(0.0053)
Coop member husband (dummy)	0.112	0.0829	−0.019
	(0.0721)	(0.0580)	(0.0505)
Coop member relatives (dummy)	−0.198***	−0.101**	−0.109**
	(0.0553)	(0.0474)	(0.0462)
Husband member in wife's SHG (dummy)	−0.196***	−0.275***	−0.160*
	(0.0620)	(0.0771)	(0.0820)
Wife SHG member first (dummy)	0.100	0.209***	0.126*
	(0.0671)	(0.0581)	(0.0719)
Age wife (years)	0.0031	0.0049	0.0002
	(0.0052)	(0.0047)	(0.0049)
Age husband (years)	0.0030	0.001	0.0052*
	(0.0043)	(0.0039)	(0.0031)
Education wife (years)	0.0012	0.0147**	0.0028
	(0.0073)	(0.0063)	(0.0064)
Education husband (years)	−0.0023	−0.0074	0.0003
	(0.0072)	(0.0059)	(0.0061)
Polygamous household (dummy)	−0.147***	−0.0905**	−0.0983**
	(0.0437)	(0.0378)	(0.0427)
Household size	0.0131	0.0188**	0.0055
	(0.0103)	(0.00782)	(0.0036)
No. of children	0.0055	0.0212**	0.0061
	(0.0131)	(0.0101)	(0.00596)
Land area household (acres)	−0.0069	0.0023	0.0027
	(0.0126)	(0.0155)	(0.0130)
Income wife (log)	0.0395**	0.0324***	0.0230
	(0.0155)	(0.0105)	(0.0146)
Income husband (log)	−0.0216*	−0.0086	−0.0162
	(0.0111)	(0.0130)	(0.0127)
SHG characteristics	Yes	Yes	Yes
No. of observations	411	411	411

Note(s): Robust standard errors in parentheses clustered at SHG-level. Significance at *$p<0.10$, **$p<0.05$, ***$p<0.01$
SHG characteristics include: membership size, gender composition and SHG's walking distance to the nearest main road
The sample includes only cooperative members. Health, education and food exp. are dummy variables (see Table A2, Supplementary Material)
Source(s): Authors' own work

Table 4.
Female cooperative members' household decision-making power, Probit regression-marginal effects

5.4 Identification concerns

Group selection bias is a common problem in observational data. In our case, the selection effect operates both in terms of which women join the cooperative and which husbands do so. While in the first part of the analysis, we address women's self-selection into the cooperative by means of PSM, the second part of the study investigates the role of husbands' co-membership (Hypothesis 3), which is still prone to selection bias and so, establishing a causal relationship between women's bargaining power and husband membership in the same SHG is hard to verify. It may be argued, however, that women with higher bargaining power are able to prevent their husbands from joining their SHG, while less influential women are not. If this was the case, our results from our Probit model would be showing correlations.

We argue, however, that in a patriarchal society such as rural Uganda, where social norms and community factors are major determinants of women's agency, this is unlikely to happen.

Gender roles in Uganda are strongly marked, with men expecting their women to be docile and subservient and women perpetuating these oppressive gender norms (see Section 3.1). More generally, while the "model of domestic virtue" [14] imposed on women by the Ugandan society has certainly evolved over time, nowadays, many married women still need to seek permission from their husbands to conduct business or work outside the home. This is particularly true in rural areas where women frequently have to share income from their businesses with their husbands (Ellis *et al.*, 2006). When women, especially rural women, try to break the norm and venture into distant markets, the repercussions often include gender-based violence, family tensions and sometimes family disintegration (Among, 2017).

Under these circumstances, it is difficult to imagine that women, particularly in rural areas, may have a say in whether their husbands can or cannot join a given SHG. Indeed, there are social norms that are easier to change compared to others, i.e. women's say in income regarding household expenditure vs tolerance to domestic violence.

5.5 Robustness checks

5.5.1 Different specifications. When examining the determinants of woman's empowerment among BJC members, we have relied on univariate Probit models. It can be argued, however, that these decision-making indicators are correlated among each other and therefore our results may be biased. In order to verify the validity of the results, we also estimate Equation (2) using bivariate and trivariate Probit models, i.e. we allow for errors correlation among equations. Columns 4–6 of Table 5 show the results of the trivariate Probit model and Columns 1–3 show the results of the bivariate specification. The estimates presented in Table 5 reinforce the main conclusion of the paper, i.e. the presence of family members (including the husband) in the same network may be negatively associated with women's empowerment (Hypothesis 3).

5.5.2 Non-polygamous households. In all specifications above, we used the complete household sample. As pointed out in Section 4.2, 33% of sampled households are polygamous. In Uganda, on average one in four married women born between 1970 and 1990 lived in polygamous partnerships (Fenske, 2015). It can be argued, that having both types of households in the original sample may be driving our results. In order to verify the validity of the results, we drop polygamous households from our sample and re-estimate all equations. Panel B in Table 3 shows the estimates of the average treatment effect without polygamous households. Table 6 presents the same estimates for the Probit models. As expected the estimates have different coefficients, but their signs and significance levels remain similar to the previous estimates in all specifications and thus the main conclusion of the paper remains unchanged.

	Bivariate Probit			Trivariate Probit		
	Health and Education	Health	Education	Health	Education	Food
Coop member	0.109*	0.105*	0.089	0.100	0.092	−0.024
husband	(0.059)	(0.061)	(0.057)	(0.067)	(0.064)	(0.061)
Husband member in	−0.248***	−0.196**	0.272***	−0.194**	−0.269***	−0.153*
wife's SHG	(0.076)	(0.089)	(0.082)	(0.087)	(0.085)	(0.081)
Coop member	−0.170***	−0.197***	−0.108**	−0.184***	−0.105**	−0.104**
relatives	(0.043)	(0.046)	(0.045)	(0.043)	(0.043)	(0.042)

Note(s): Coop members only. Bootstrapped standard errors. 1,200 repetitions. Significance at *$p<0.10$, **$p<0.05$, ***$p<0.01$

Source(s): Authors' own work

Table 5. Simultaneous equation probit model-marginal effects selected variables

Table 6.
Simultaneous equation Probit model-marginal effects selected variables

	Univariate Probit			Trivariate Probit			Bivariate Probit		
	Health	Education	Food	Health	Education	Food	Health and Education	Health	Education
Coop member husband	0.172**	0.070	0.057	0.175	0.077	0.058	0.136	0.170	0.077
	(0.086)	(0.061)	(0.061)	(0.082)	(0.074)	(0.076)	(0.072)	(0.071)	(0.071)
Husband member in wife's SHG	−0.215**	−0.221**	−0.137	−0.226**	−0.217**	−0.155	−0.231**	−0.218**	−0.215**
	−0.098	(0.092)	(0.116)	(0.101)	(0.096)	(0.095)	(0.092)	(0.102)	(0.097)
Coop member relatives	−0.165***	−0.116**	−0.089	−0.142***	−0.115**	−0.083	−0.155***	−0.158***	−0.123**
	(0.062)	(0.052)	(0.055)	(0.051)	(0.051)	(0.052)	(0.052)	(0.054)	(0.053)

Note(s): Coop members only. Bootstrapped standard errors. 1,200 repetitions. Significance at *$p<0.10$, **$p<0.05$, ***$p<0.01$
Source(s): Authors' own work

6. Discussion and policy implications

This paper contributes to the literature on the variegated effects of agricultural and microfinance cooperatives on female entrepreneurs' social and economic empowerment, applying Sen's capability approach. Sen's capabilities approach is a "meta-theory" on development that we further articulated into a theory of empowerment of female entrepreneurs via participation in institutions for collective action, operationalized as the effect of participation in agricultural cooperatives on intra-household decision-making power. We explored the potential of female smallholders' cooperative membership and duration of participation on their financial performance as well as on their household decision-making. The latter aspect reveals how cooperatives shape female smallholders social and economic opportunities beyond formal financial inclusion. We acknowledge that our cross-sectional survey does not allow us to infer causal interpretations.

First, we found a positive link between women's cooperative membership and the financial performance (savings and coffee income) of their households. This suggests that female smallholders reaped the benefits of both access to commodity and capital markets which is in line with previous research (Fischer and Qaim, 2012; Van Rijsbergen *et al.*, 2016), confirming our Hypothesis 1 that women's cooperative participation is positively associated with their financial performance. These results yield the following policy implications: First, savings constitute an asset that provides financial security in response to adverse shocks. Although BJC does not provide a compulsory savings scheme, our results document that cooperative members saved more than the control group. Second, higher incomes, through coffee sales in this case, as well as the ability to obtain small loans have been probed in the literature to act as a means of poverty alleviation by increasing overall household income and asset accumulation (Habib and Jubb, 2015; Simanowitz, 2003), which in turn, directly or indirectly, can benefit household nutrition, healthcare or education (Biscaye *et al.*, 2014; Kumar *et al.*, 2018).

Second, we documented that women's cooperative participation was positively associated with their intra-household decision-making power, confirming Hypothesis 2 that female cooperative membership is positively associated with their intra-household bargaining power. Since gains in women's income may not necessarily translate into increased control over those resources, our finding that female cooperative members also strengthened their household decision-making raises important policy implications. Indeed, previous studies have shown that women are more likely to invest in and use a higher share of their income on their children's education, nutrition and healthcare (Pitt and Khandker, 1998; Sarker, 2011). Thus, improved decision-making power over household resources may not only benefit the well-being of female smallholders but also of their offspring. So cooperative participation not only increases female entrepreneurs' own capabilities in multiple ways but holds the potential to also improve their children's capabilities. This being said, we highlight the fact that the ability to decide on family expenditures may very well reflect "duty" rather than autonomy (Basu and Koolwal, 2005).

Third, we provide first empirical evidence that husbands' inclusion into wives' cooperatives can come at the cost of women's household decision-making power. Interestingly, this negative relationship between husbands' co-membership and female decision-making only emerges when the husband is a member of the same SHG as his wife—not when he is a member of a different SHG of the same cooperative. This rejects Hypothesis 3 that a spouse's joint participation in the same SHG is positively linked to women's intra-household decision-making power and challenges the perception that women gain greater decision-making in husband-inclusive cooperatives. Husband's co-membership may reduce his wife's relative advantage in making financial decisions independently because co-membership may give husbands a direct way of monitoring and controlling their wife's borrowing and business activities. This appears to be a common phenomenon, as often

husbands dominate the participation and governance (as chairmen or coordinators) of farmer groups in Kenya (Hambly Odame, 2002) and Zambia (Harrison, 1997; Mulungu and Mudege, 2020). Moreover, the husband's presence in the SHG may contribute to competition for receiving coffee payments and loans from the microfinance component (as they are usually paid back by the household together), which could reduce the wife's ability to take decisions by herself, in contrast to sole members. So, what initially seems to be a capability-enhancing institution of collective action, namely, a coffee and microfinance cooperative, can turn out to be capability decreasing, when husbands are also present in the same SHG.

In a similar vein, in an experiment in southern Mexico, Allen *et al.* (2011) documented that when female participants of women-only microfinance SHGs were given the choice to invite their husbands the vast majority were reluctant to do so. More than 95% chose to keep their husband out of their SHG, despite lucrative cash incentives in some cases. This signals that female members valued their private space, independent income generation and autonomy over borrowing and spending decisions. Their findings were reinforced by higher take-up rates of female friends over their husbands. Those women who had fought over loans with their husbands in the past and had the least household decision-making power were most likely to invite their husbands. Our adverse empirical findings concerning husband inclusion in SHG thus underpin the rationale behind women's reluctance to involve their husbands. This is in line with Milanov *et al.* (2015), who document that Kenyan microfinance SHGs composed predominantly of women had a greater positive impact on female entrepreneurs' venture performance. In a similar vein, Mwambi *et al.* (2021) find that a husband's co-membership in their wife's dairy producer cooperative carries additional benefits for women's empowerment.

With the husband being present in the same SHG, wives may feel intimidated to voice their interests or discuss their problems from home in group meetings (Pandolfelli *et al.*, 2008). The SHG ceases to represent a place of intimacy and openness and as a result, women do not experience mutual and peer support from each other (Al-Dajani and Marlow, 2010) which could take away the social capital mechanism of female empowerment. In our regression analysis, once a husband's SHG co-membership is controlled for, a weak significant positive association between cooperative membership length and household decision-making regarding health expenses emerges. Even though cooperative membership is positively associated with female smallholders' financial performance, its influence on empowerment are more ambiguous. This suggests that in contexts of deep-seated gender inequities, women-only SHGs may, at least initially, be more effective in fostering women's social empowerment within their own households. Even though cooperatives can empower female smallholders, our findings imply that these are contingent on the non-involvement of the husband in the same SHG.

To achieve more egalitarian decision-making, engaging men only to some specific interventions, such as joint gender and coffee cultivation training and joint land titling, while also keeping an exclusively women's space in the SHG, in which women can discuss daily challenges and problems, might be a promising way to promote change in gender relations and strengthen women's economic empowerment. This way female members can control more fully the economic gains that they attain through the cooperative.

The negative joint male and female membership relationship is corroborated by our finding that the participation of other family members is negatively associated with women's decision-making. Indeed, a handful of anthropological and sociological studies have explored the link between women's agency, kinship structures and family relationships (Bloom *et al.*, 2001; Dube, 1997; Narayan, 2005). In particular, they examined how natal and marital kin are linked to women's rights to children, property and self-determination. Also, Ngenzebuke *et al.* (2018) show, among other factors, that kinship characteristics prove to be more important than (standard) individual and household characteristics for women's empowerment.

This study builds on this previous literature on family context and women's agency by examining how the presence of family members, other than the husband, in the same cooperative influences women's empowerment. Our findings suggest that despite the cooperative's positive association with women's financial and decision-making power, in patriarchal societies, the presence of family members in the same cooperative can negatively influence female members' empowerment. This informs and specifies theorizing about female entrepreneur empowerment via participation in institutions for collective action as inspired by Sen's capability approach and operationalized as the effect of participation in agricultural cooperatives on intra-household decision-making power. This result, together with the negative link between husbands' participation in their wives' SHGs and wives' decision-making, reinforces our conclusion that the inclusion of husbands and other family members in the same cooperative SHG is not perceived as an attractive option for female smallholders.

7. Conclusion and future research

Through the integration and empowerment of women, cooperatives can act as effective models of social enterprise for development in rural areas. In this paper, we investigated the linkage between female entrepreneurs' participation in a SHG-based agricultural cooperative and their social and economic empowerment. While, previous studies suggested harmful effects regarding the exclusion of husbands from their wife's microfinance cooperative as a strategy to promote economic empowerment for female clients, less is known about agricultural cooperatives. Using detailed survey data from a major coffee and microfinance cooperative in western Uganda, we (1) analyzed the economic and social empowerment potential of women's participation in a mixed cooperative in western Uganda and (2) explored in depth the role of husband's inclusion in wife's cooperative activities.

This study provides new empirical results on female smallholders' and their husbands' participation in a mixed cooperative in Western Uganda. Our results highlight that women's participation in microfinance-producer cooperatives is not an unconditional blessing: even though membership is associated with women's strengthened intra-household decision-making and raised household savings and income from coffee sales, the joint participation of the wife and her husband in the same SHG is associated with diminished women's household bargaining power. Our results are strengthened by the fact that this relationship is only observed when husbands join their wives' SHG—not any other SHG of the cooperative and persists when controlling for spousal order of membership. For these reasons, an intervention that encourages household cooperation of both spouses and that is sensitive to context-specific gender inequalities, may be more successful at promoting social change toward household gender equality than interventions that focus on women's autonomous spheres only.

This paper has highlighted that future research should take into account cooperative's non-financial effects more explicitly as a way of increasing the socioeconomic benefits of women's participation in collective action. Through the integration and empowerment of women, cooperatives can act as effective models of social entrepreneurship for development in rural areas. First, the social embeddedness in which cooperatives operate and its female members' household gender relations deserve greater attention to (1) promote female cooperative members' socioeconomic empowerment and (2) investigate ways to engage husbands in women's cooperatives to achieve this goal. Second, future research may also explore whether strengthening more egalitarian gender relations among members benefits the cooperative own business performance, such as the quality and quantity of coffee production. Third, the cross-sectional research design and single case study focus limit its generalizability and causal inference. Scholars are encouraged to collect more longitudinal and comparative data from multiple cooperatives testing how different treatments promoting gender relations and husbands' involvement can promote women's empowerment.

Notes

1. See Armendáriz and Morduch (2010), Banerjee *et al.* (2015) and Garikipati *et al.* (2017) for surveys of this extensive literature.
2. This excludes the growing share of mobile money account (adult) holders of 51% in Uganda in 2017 (21% in sub-Saharan Africa). Most Ugandans (46%) relied on loans from relatives and friends, 22% from savings clubs and 14% from financial institutions. Furthermore, only 13% of Ugandan adults kept their savings at formal financial institutions. Instead, about 37% of adult Ugandans saved using a savings club or a person outside the family.
3. See Sell and Minot (2018) for a study exploring the determinants of women's empowerment among Ugandan smallholders.
4. Informal lending is also common. About half of the members stated that they had asked a relative or friend over the past three months for a loan. Only two members stated they used mobile money services.
5. Sub-counties include: Kyarumba, Kyondo, Kisinga, Lake Katwe, Maliba and Mahango.
6. On average SHGs consisted of 31 members of which 76% were female.
7. Due to primarily male ownership of land and women's labor contribution, the returns from coffee sales are hardly ever separated into wife's and husband's shares. This makes it impossible for us to use women's coffee sales as a distinct dependent variable.
8. Although this concept rests on the assumption that women participate as equals in joint decisions, the perception of joint decision-making may not entirely reflect an equal say in spousal discussion and final decision (Acosta *et al.*, 2019). Nevertheless, joint decision-making still indicates women's perceived scope of bargaining power.
9. We only have data on intra-household decision-making power between husbands and wives, not on extended family members, which might also be relevant for the bargaining process in the African context (Khavul *et al.*, 2009).
10. An often-used index is the Women's Empowerment in Agriculture Index (WEAI) (Alkire *et al.*, 2013). However, we do not have the full set of variables included in WEAI. However, control over the use of income makes up the most important component (20%), which is fully captured in our measure of decision-making over household expenditures.
11. See Becker and Ichino (2002) and Caliendo and Kopeinig (2008) for a detailed discussion.
12. Value of 1 if the husband is a member of BJC, if any other relative is a member of BJC, if the husband is a member of the same SHG as his wife and if wife was the first to join the SHG.
13. Estimations without "land area" and/or other income yield similar results. The Supplementary Material provides different specifications and results using Nearest Neighbor and Genetic Matching.
14. The domestic virtue model is a set of expectations regarding women's role in society, mostly as caretakers, while husbands have authority over their wives, see (Kyomuhendo and McIntosh, 2006).

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Appendix 1

Variable	Unmatched sample			Matched sample		
	Treated	Control	$p > t$	Treated	Control	$p > t$
Wife age	38.415	32.047	0.000	37.502	37.395	0.892
Husband age	44.842	38.064	0.000	43.861	43.902	0.964
Education wife (years)	3.761	5.006	0.000	3.867	4.040	0.510
Education husband (years)	6.102	6.731	0.063	6.195	6.077	0.675
Household size	7.687	6.591	0.000	7.526	7.632	0.593
Other income	0.943	0.866	0.003	0.941	0.937	0.843
Land area (acres)	2.031	1.592	0.014	1.962	1.881	0.639
Polygamous household (dummy)	0.367	0.304	0.159	0.365	0.354	0.756
Rubin's standardized difference		76.6			12.5	
Mean absolute bias		34.7			2.8	
Median absolute bias		32.4			2.9	
Pseudo R^2		0.097			0.003	

Table A1.
Matched and unmatched samples, kernel matching

Note(s): Pseudo R^2 of Probit model for the selection of treated households. Estimations without "land area" and/or other income yield similar results
Source(s): Authors' own work

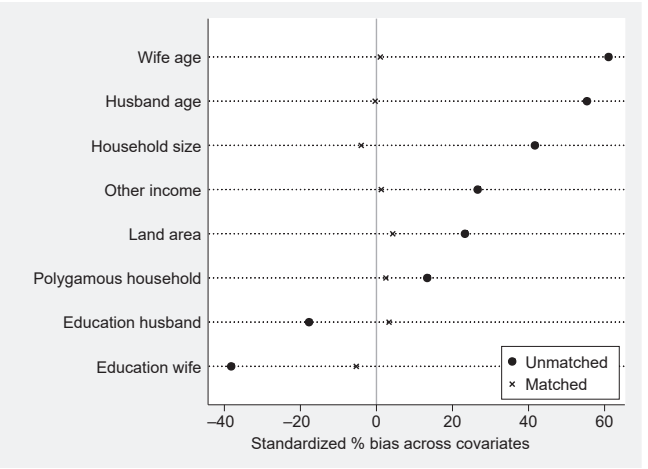

Figure A1. Standardized % bias, kernel matching

Supplementary Material

Data

Sample power calculations

The method for calculating a precise and statistically required sample size is called power calculations. The statistical power is the probability of detecting an impact if there is one (Gertler *et al.*, 2010). This work applies the standard power of 0.8, indicating that one finds an impact within 80% of cases where one occurred. Table A2 illustrates the associated power calculations required for different minimum detectable effects. Standardized effect sizes can be small ($\delta = 0.2$), medium ($\delta = 0.4$) or large ($\delta = 0.5$).

Minimum detectable effect	Number of clusters	Units per cluster	Treatment sample with clusters	Comparison sample without clusters
Small ($\delta = 0.2$)	Not feasible	Not feasible	Not feasible	787
Medium ($\delta = 0.4$)	24	16	384	198
Large ($\delta = 0.5$)	16	16	256	128

Source(s): Authors' own work

Table A2. Sample power calculations

From Table A2 one can conclude that for a small effect size the number of SHGs required exceeds the total number of operational SHGs and therefore is not feasible, while both medium and large effect sizes can be calculated. There is no indication to presume a large effect; consequently, we stick to the more conservative medium effect. For a power of 0.8 to detect a medium effect of 0.4, an increase in women's household decision-making power due to the BJC program, a total sample of at least 24 SHGs with a total of 384 respondents would be sufficient for the treatment group. Since the comparison group is not clustered into (self-help) groups, 198 respondents are necessary. The min. total sample would thus come to 592 (i.e. 384 SHG members + 198 non-members) married female respondents.

Then, a random selection of the treatment sample followed a two-step process: First, stratified random sampling for which 74 (SHGs) were divided into four groups where SHGs shared the characteristic group maturity. Groups were clustered into blocks according to the year they started operation and randomized within each block: 2000–2002, 2003–2005, 2006–2008 and 2009–2011. Second,

within each of the four strata, a subset of six SHGs were randomly assigned to treatment using a spreadsheet. Two random extra groups were included anticipating non-response.

Definition of variables

Variable	Definition
Age wife	Wife's age in years
Age husband	Husband's age in years
Education wife	Wife's education in years
Education husband	Husband's education in years
Polygamous household	Dummy variable for polygamous marriage (polygamous = 1)
Household size	No. of persons in the household
Number of children	No. of children in the household
Malaria (prevalence)	Dummy variable equal to 1 if respondent reported to have had malaria
Income	
Coffee sales	Household annual income from coffee sales
Savings	Wife's savings at the day of the interview
Income wife	Wife's other income during the last 7 days
Income husband	Husband's other income during the last 7 days
Wife's decision-making	
Say in health expenditures	Dummy variable equal to 1 if health expenditures decisions are made jointly (wife and husband) or by the wife only
Say in education expenditures	Dummy variable equal to 1 if education expenditures decisions are made jointly (wife and husband) or by the wife only
Say in food expenditures	Dummy variable equal to 1 if food expenditures decisions are made jointly (wife and husband) or by the wife only
Cooperative variables	
Years of coop membership wife	Wife's coop membership in years
Coop member husband	Dummy variable indicating if the husband is a member of the BJC (member = 1)
Husband member in wife's SHG	Dummy variable equal to 1 if both husband and wife are members of the same SHG (yes = 1)
Wife coop member first	Dummy variable indicating if the wife became a member of BJC before the husband (yes = 1)
Coop member relatives	Dummy variable indicating if a relative is a member of the BJC (member = 1)
SHG size	No of members of the SHG
SHG > 80	Dummy variable indicating if the share of women in the SHG is greater than 80% (yes = 1)
Distance to main road	Walking distance, in minutes, from the SHG meeting location to the main road

Table A3.
Variables definition

Source(s): Authors' own work

Sensitivity analysis

ATT estimates using genetic matching and nearest neighbours

	Genetic matching	Nearest Neighbours
Coffee sales (Ush)	195,523**	192,220**
Savings (Ush)	76,010***	83,495***
Health exp.	0.11**	0.13**
Education exp.	0.15***	0.08
Food exp.	0.05	0.13**
No. of observations	411	408

Note(s): Significance at *p<0.10, **p<0.05, ***p<0.01. Matching with a caliper of 0.25
Source(s): Authors' own work

Table A4. Impact of cooperative membership on household outcomes

Matching balance

	Unmatched sample			Matched sample		
Variable	Treated	Control	$p > t$	Treated	Control	$p > t$
Nearest neighbours						
Wife age	36.783	30.245	0.000	36.662	36.424	0.399
Husband age	42.939	35.944	0.000	42.814	42.054	0.139
Education wife	4.027	5.219	0.000	4.032	3.941	0.624
Education husband	6.180	6.832	0.063	6.191	6.093	0.678
Household size	7.518	6.214	0.000	7.259	7.469	0.176
Other income	0.898	0.903	0.839	0.897	0.854	0.062
Genetic matching						
Wife age	36.783	30.245	0.000	36.783	35.584	0.000
Husband age	42.939	35.944	0.000	42.939	41.842	0.000
Education wife	4.027	5.219	0.000	4.027	4.036	0.811
Education husband	6.180	6.836	0.063	6.180	6.065	0.070
Household size	7.518	6.214	0.000	7.518	7.146	0.080
Other income	0.898	0.903	0.839	0.897	0.897	1.000

Source(s): Authors' own work

Table A5. Matched and unmatched samples, complete sample

Rosenbaum sensitivity test

	Coffee sales		Savings		Health		Education		Food	
GM Gamma	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05
1.10	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	*0.14*
1.20	0.00	0.06	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.30
1.30	0.00	*0.19*	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.49
1.40	0.00	0.40	0.00	0.00	0.00	*0.20*	0.00	0.01	0.00	0.67
1.50	0.00	0.63	0.00	0.02	0.00	0.35	0.00	0.04	0.00	0.81
1.60	0.00	0.81	0.00	0.06	0.00	0.53	0.00	0.09	0.00	0.90
1.70	0.00	0.92	0.00	*0.16*	0.00	0.68	0.00	*0.17*	0.00	0.95
1.80	0.00	0.97	0.00	0.30	0.00	0.80	0.00	0.28	0.00	0.97
1.90	0.00	1.00	0.00	0.46	0.00	0.88	0.00	0.40	0.00	0.99
2.00	0.00	1.00	0.00	0.62	0.00	0.93	0.00	0.53	0.00	1.00
NN Gamma	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.10	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.20	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
1.30	0.00	*0.17*	0.00	0.00	0.00	0.00	0.00	*0.06*	0.00	0.01
1.40	0.00	0.37	0.00	0.00	0.00	0.02	0.00	0.15	0.00	0.02
1.50	0.00	0.61	0.00	0.00	0.00	*0.06*	0.00	0.27	0.00	*0.07*
1.60	0.00	0.80	0.00	0.00	0.00	0.14	0.00	0.42	0.00	0.16
1.70	0.00	0.92	0.00	0.02	0.00	0.25	0.00	0.58	0.00	0.28
1.80	0.00	0.97	0.00	0.05	0.00	0.40	0.00	0.71	0.00	0.42
1.90	0.00	1.00	0.00	*0.11*	0.00	0.55	0.00	0.81	0.00	0.57
2.00	0.00	1.00	0.00	0.22	0.00	0.68	0.00	0.89	0.00	0.70

Note(s): NN: Nearest Neighbour, GM: Genetic Matching
Source(s): Authors' own work

Table A6.
p-values Rosenbaum sensitivity test-complete sample

Different specifications

Kernel matching without "other income" variable

		All			Non-polygamous	
Variables	Treated	Control	Difference	Treated	Control	Difference
Coffee sales	736,556	559,445	177,111***	707,061	553,757	153,303*
Savings	154,477	92,011	62,465***	149,977	95,655	54,322*
Health exp.	0.64	0.54	0.10**	0.68	0.49	0.20***
Education exp.	0.66	0.58	0.08*	0.68	0.52	0.16**
Food exp.	0.72	0.65	0.07	0.75	0.62	0.13**
No. of observations	395	196		260	141	

Note(s): Significant at *$p<0.10$, **$p<0.05$, ***$p<0.01$
Source(s): Authors' own work

Table A7.
Impact of cooperative membership on household outcomes

Estimations without "other income" variable. Complete sample

Variables	Health exp.	Education exp.	Food exp.
Coop membership duration wife	0.00887	0.0101	−0.00127
	(0.00683)	(0.00706)	(0.00544)
Coop member husband	0.113	0.0851	−0.019
	(0.0727)	(0.0604)	(0.0517)
Coop member relatives	−0.200***	−0.103**	−0.109**
	(0.0542)	(0.0475)	(0.0462)
Husband member in wife's SHG	−0.201***	−0.272***	−0.163*
	(0.0630)	(0.0825)	(0.0833)
Wife first	0.0972	0.199***	0.127*
	(0.0680)	(0.0647)	(0.0729)
Age wife	0.00202	0.00475	−0.000907
	(0.00516)	(0.00446)	(0.00511)
Age husband	0.0036	0.00108	0.00588*
	(0.00414)	(0.00369)	(0.00307)
Education wife	0.00171	0.0158**	0.00305
	(0.00753)	(0.00666)	(0.00635)
Education husband	−0.00298	−0.0075	−0.000299
	(0.00733)	(0.00575)	(0.00616)
Polygamous household	−0.148***	−0.0916**	−0.0989**
	(0.0458)	(0.0393)	(0.0447)
Household size	0.0148	0.0204**	0.00563
	(0.0105)	(0.00807)	(0.00439)
No. of children	0.0064	0.0207**	0.00742
	(0.0127)	(0.00993)	(0.00625)
Land area	−0.00539	0.00384	0.00384
	(0.0126)	(0.0162)	(0.0134)
SHG characteristics	Yes	Yes	Yes
No. of observations	*411*	*411*	*411*

Note(s): Robust standard errors in parentheses clustered at SHG level. Significance level at *$p<0.10$, **$p<0.05$, ***$p<0.01$

Source(s): Authors' own work

Table A8. Women empowerment-Probit regression-marginal effects

Estimations without "other income" variable. Non-polygamous households

Variables	Health exp.	Education exp.	Food exp.
Coop membership duration wife	0.00723	0.0152	0.000186
	(0.00786)	(0.00949)	(0.00628)
Coop member husband	0.173**	0.0751	0.0576
	(0.0866)	(0.0622)	(0.0622)
Coop member relatives	−0.179***	−0.122**	−0.0919
	(0.0659)	(0.0533)	(0.0560)
Husband member in wife's SHG	−0.234**	−0.237**	−0.158
	(0.0957)	(0.0941)	(0.117)
Wife first	0.130*	0.222***	0.0995
	(0.0778)	(0.0779)	(0.0851)
Age wife	0.00861	0.0103	0.00643
	(0.00638)	(0.00657)	(0.00736)
Age husband	−0.00469	−0.00612	−0.00548
	(0.00487)	(0.00517)	(0.00532)
Education wife	−0.00576	0.00499	0.00133
	(0.00812)	(0.00897)	(0.00852)
Education husband	−0.000206	−0.00469	0.00149
	(0.0101)	(0.00775)	(0.00842)
Household size	0.0131	0.0210*	−0.0135
	(0.0127)	(0.0125)	(0.0103)
No. of children	0.0087	0.0133	0.0307***
	(0.0128)	(0.0104)	(0.00947)
Land area	−0.00557	−0.00341	0.0087
	(0.0150)	(0.0173)	(0.0167)
SHG characteristics	Yes	Yes	Yes
No. of observations	266	266	266

Table A9.
Women empowerment-Probit regression-marginal effects

Note(s): Robust standard errors in parentheses clustered at SHG level. Significance level at *$p<0.10$, **$p<0.05$, ***$p<0.01$

Source(s): Authors' own work

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