

IMPACT OF COOPERATIVES ON SMALLHOLDER COFFEE PRODUCERS IN SOUTHWEST ETHIOPIA

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Impact van coöperatieven op kleinschalige koffieproducenten in het zuidwesten van Ethiopië

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List of Abbreviations

ATA	Agricultural Transformation Agency
ATT	Average Treatment of Treated
CBD	Coffee Berry Disease
CLR	Coffee Leaf Rust
CWD	Coffee Wilt Disease
ECX	Ethiopian Commodity Exchange
FAO	Food and Agriculture Organization
FCA	Federal Cooperative Agency
FDRE	Federal Democratic Republic of Ethiopia
FLO	Fair-trade Labeling Organization
GDP	Gross Domestic Product
Ha	Hectare
ICO	International Coffee Organization
ICA ^a	International Coffee Association
ICA ^b	International Cooperative Alliance
ICCO	International Cocoa Certifying Organization
IPW	Inverse Probability Weighting
Kg	Kilogram
NA	Network Analysis
NGO	Non-Governmental Organization
PASDEP	Plan for Accelerated and Sustainable Development to End Poverty
PSM	Propensity Score Matching
SCM	Supply Chain Management
USDA	United States Department for Agriculture

Summary

Improved supply chain coordination should provide benefits to smallscale producers who face market imperfections in the conventional mainstream chains due to their poor bargaining power. This arises from their limited access to market information, low levels of literacy and weak financial power amongst other factors. However, there are mixed reports on the success of coordination efforts through cooperatives and producer organisations as some studies demonstrated positive and significant impact while others revealed little effect.

The aim of this study is to investigate the impact of cooperative membership on smallholder coffee producers in the Jimma and Kaffa zones of Southwest Ethiopia. The Jimma zone is one of the 12 zones in the Oromia region with an altitude of around 1700 m.a.s.l., and average temperatures that range between 8 and 28°C. Kaffa is part of the Southern Region of Ethiopia with temperatures around 18 to 21°C and the altitude ranging from 500 m.a.s.l in the south to 3000 m.a.s.l in the north and central highlands. Due to the favorable altitude and weather condition, coffee is a dominant crop and contributes the lion share to the livelihood of farmers in the two zones. Farmers in both zones also produce cereals such as maize, fruits including avocado and mango, and root crops such as enset.

Chapter 2 describes the coffee value chains in the region and gives insight into the different actors involved and the functions they perform. Attempts are then made to address four major research gaps in the remaining chapters of this dissertation. The research hypotheses tested are: 1. Coffee cooperatives have a substantial impact in improving coffee production and marketing and these effects differ among member farmers; 2. Certification has a positive and significant impact in

reducing the probability and quantity of side-selling by cooperative farmers; 3. Coffee cooperatives have a positive and significant impact in empowering member women; and 4. Coffee cooperatives have a significant contribution in improving the food security of member farmers.

First, while the success of cooperatives depends on the characteristics of the group as well as the type of the product sold, most of the empirical work on cooperatives published so far has estimated mean treatment effects of membership in agricultural cooperatives without considering possible impact differences among members and the specific enterprises/crops the cooperatives are dealing with. Although mainly a positive and significant impact of cooperatives for high value crops such as coffee is expected, there is almost no quantitative evidence which explicitly demonstrates the overall and heterogeneous impact of coffee cooperatives. By using cross-sectional household data and propensity score matching techniques, we investigated the impact of coffee cooperatives on performance of member farmers in Southwest Ethiopia using volume of supply, yield, price received and margins obtained as performance indicators. The results were not statistically significant for any of the performance indicators. However, our heterogeneous impact analysis revealed that cooperatives have a significant performance impact for older and educated members with larger farms, and living in the Jimma area.

Second, the existing empirical literature on coffee certification mostly focuses on direct welfare impacts. However, certification is assumed to discourage free riding behavior (side-selling) of cooperative farmers as it secures premiums and market access to the producers. We therefore investigated the effect of certification and other socioeconomic variables on the probability and quantity of side-selling using a Cragg's double hurdle regression model. Certification was found to have a significant

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impact in reducing the quantity of side-selling but it had little effect on minimizing the probability of a member to side-sell. The results indicated that side-selling decreased with age, education, experience, availability of off-farm income, and trust in cooperative leadership while delays in payment and group size were found to induce side-sales by cooperative farmers.

Third, literature on the impact of horizontal coordination mostly focuses on direct economic performance effects of participation in collective action. Impact of cooperatives on social performance such as women empowerment is rarely addressed in cooperative literature. We therefore assessed the effect of coffee cooperative membership on women empowerment via the construct of three latent factors of empowerment: (a) participation in decision making and coffee sale, (b) self-awareness and knowledge and (c) access and control over finance. Propensity score matching tested the effect of cooperative membership on these dimensions of empowerment but rendered no significant result.

Fourth, food security is the second form of indirect impact of cooperative membership considered in this thesis. It has received less emphasis in literature, while cooperative membership for the marketing of a cash crop may impact significantly on production of food crops. Coffee farmers are threatened by a volatile coffee price, but they need to allocate their scarce resources between coffee and food crop production. Using cross-sectional household data and an inverse probability weighting estimation, we assessed the effect of coffee cooperative membership on food security using food crop production, input utilization (proxy for technological innovation), expenditure on food and income as measures of food security. The results revealed that cooperatives succeed to enhance food production

via increasing access to technological innovation, but the impact in improving income and food expenditure is weak.

Overall, it can be concluded that coffee cooperatives are multifunctional and there is a trade-off between the different functions of cooperatives in the area. That is, coffee cooperatives seem to be effective in technological transformation via delivering improved inputs for food crop production but weak in increasing the performance of coffee markets. Our study showed the relevance of going beyond comparing the average effects, as the impact of cooperative membership is influenced by members' characteristics. Furthermore, as most empirical literature focused on direct economic effects of participation in a product market, our study shows the importance of social impact such as women empowerment and the indirect spillover effects on food security in order to understand the overall performance.

Samenvatting

Kleinschalige boeren, die door de marktimperfecties in conventionele markten vaak weinig onderhandelingsmacht hebben, kunnen voordeel ondervinden bij een verbeterde coördinatie in de keten. De moeilijke onderhandelingspositie van de boeren komt onder andere door hun beperkte toegang tot marktinformatie, niet of weinig kunnen lezen en schrijven, en hun zwakkere financiële situatie. Toch komen uit studies die het succes voor boeren proberen te meten van de markt coördinatie bewerkstelligd door de coöperatieven en producentenorganisaties, gemengde resultaten. Sommige studies duiden op positieve en significante resultaten terwijl andere studies weinig effect kunnen aantonen.

Het doel van deze studie is het bestuderen van de impact van lidmaatschap van kleinschalige koffieproducenten van coöperatieven in de Jimma en Kaffa zone van Zuidwest Ethiopië. De Jimma zone is één van de 12 zones in de Oromia regio, gelegen op een hoogte van 1700 meter boven zeeniveau met een gemiddelde temperatuur tussen 8 en 28°C. De Kaffa zone ligt in de Zuidelijke Regio van Ethiopia, en heeft een gemiddelde temperatuur van 18 tot 21°C en is gelegen op een hoogte tussen 500 meter boven zeeniveau in het zuiden en 3000 meter boven zeeniveau in de noordelijke en centrale hooglanden. Door deze gunstige hoogte en klimatologische omstandigheden, is koffie een dominant gewas dat aanzienlijk bijdraagt tot het levensonderhoud van de boeren in de twee zones. Koffieproducenten in beide zones produceren eveneens granen (voornamelijk maïs), fruit (zoals avocado en mango) en wortelgewassen (zoals enset).

Hoofdstuk 2 beschrijft de koffie keten in de regio evenals de functies van de verschillende actoren hierin. In de daaropvolgende hoofdstukken in deze thesis

worden vier onderzoekshypotheses getest. Deze hypothesen zijn 1. Koffie coöperatieven hebben een substantiële impact op het verbeteren van de koffie productie en marketing (met een effect dat verschilt van producent tot producent); 2. Certificatie heeft een positief en significante impact op het verminderen van de kans en kwantiteit van *side-selling* van koffie door leden van de coöperatieve; 3. Koffie coöperatieven hebben een positieve en significante impact op de emancipatie van vrouwelijke leden; en 4. Koffie coöperatieven dragen significant bij tot het verbeteren van de voedselzekerheid van hun leden.

In hoofdstuk 3 wordt de impact van lidmaatschap van een koffie coöperatieve op productieprestaties bestudeerd. Terwijl het succes van een coöperatieve afhangt van de karakteristieken van de groep en het type product dat wordt verkocht, geven de meeste empirische studies een gemiddeld effect van lidmaatschap in de coöperatieven zonder in te gaan op de verschillen tussen deze leden en de specifieke gewassen of diensten die de coöperatieve behartigt. Ondanks de verwachting om een positief en significante impact van lidmaatschap van de coöperatieve te vinden voor commerciële gewassen zoals koffie, is nog weinig bewijs dat deze impact verschilt binnen en over de koffie coöperatieven. Door data van koffieproducenten te analyseren met een *Propensity score matching* model, bestuderen we de impact van lidmaatschap van koffie coöperatieven op de prestaties van hun leden in Zuidwest Ethiopië met volume van koffieproductie, opbrengst per hectare, prijs en de marges die de koffieproducent kreeg als prestatie indicatoren. De resultaten van het model kunnen niet aantonen dat leden van de coöperatieve beter presteren op deze indicatoren in vergelijking met niet-leden. Deze impact van lidmaatschap blijkt heterogeen en oudere en beter opgeleide leden die relatief grotere bedrijven hebben en leven in de Jimma regio presenteren beter.

In hoofdstuk 4 wordt gekeken of en hoeveel koffie leden van koffie coöperatieven verkopen aan handelaren ten nadele van de coöperatieve. De bestaande empirische literatuur over gecertificeerde koffie bestudeert voornamelijk de directe welvaart effecten. De verwachting is dat het certificeren van de coöperatieve het *free-rider* gedrag van hun leden zou verminderen, omdat het certificeren voordelen biedt aan de leden zoals de premies die worden betaald en de marktoegang die verzekerd is. In hoofdstuk 4 bestuderen we de effecten van certificatie en andere socio-economische karakteristieken op de kans en de kwantiteit van *side-selling* door het gebruik van *Cragg's double hurdle* regressie model. De resultaten tonen dat certificering een significante impact heeft op het verminderen van de kwantiteit van *side-selling*, maar het heeft een beperkt effect op de kans dat leden van de coöperatieve verkopen aan handelaars. De resultaten geven aan dat leeftijd, onderwijsniveau, ervaring, het hebben van een inkomen buiten de landbouw en vertrouwen in de leiders van coöperatieven de mogelijke verkoop van koffie door leden aan handelaars verminderen, terwijl vertraging in de betaling en de grootte van de groep boeren in de coöperatieve, de *side-selling* vergroten.

Hoofdstuk 5 bestudeert of vrouwelijke leden van een koffie coöperatieve zich meer geëmancipeerd voelen. De meeste literatuur die de impact van horizontale coördinatie in de keten bestudeert, beschouwen voornamelijk de directe effecten op economische prestatie. Studies over de impact van coöperatieven op sociale performantie zoals de emancipatie van vrouw, zijn zeldzaam. In dit hoofdstuk gaan we na of vrouwelijke leden van de koffie coöperatieve zich meer geëmancipeerd voelen door drie latente factoren van emancipatie in acht te nemen, namelijk (a) hun deelname aan het nemen van beslissingen en de verkoop van koffie, (b) hun

zelfbewustzijn en kennis, en (c) hun toegang en controle over financiën. *Propensity score matching* technieken worden gebruikt om het effect van lidmaatschap van een koffie coöperatieve op de drie factoren te testen. De resultaten uit het model zijn niet significant.

In hoofdstuk 6 wordt het effect van lidmaatschap van een coöperatieve op voedselzekerheid getest. We beschouwen voedselzekerheid als een tweede vorm van indirecte impact van lidmaatschap van een coöperatieve. Onze resultaten tonen aan dat het lidmaatschap van een koffie coöperatieve, ook een impact kunnen hebben op de productie van voedselgewassen. Koffieproducenten ondervinden de gevolgen van de volatiele koffieprijzen, en moeten anderzijds beslissen om hun beperkte middelen te investeren in koffie of eerder in de productie van voedselgewassen. Aan de hand van data van koffieproducenten en een *inverse probability weighting* model, wordt het effect van lidmaatschap van koffie coöperatieven getest op de voedselzekerheid van de gezinnen. Dit wordt gemeten aan de hand van hun gebruik van inputs (als een proxy voor technologische innovatie), inkomen en de uitgaven aan voeding. De resultaten bevestigen dat de coöperatieven de toegang tot technologische innovatie kunnen verbeteren, maar dat hun impact op inkomen en uitgaven aan voeding beperkt is.

Over het algemeen kan worden besloten dat, in de koffie coöperatieven die multifunctioneel zijn, een wisselwerking is tussen de verschillende functies die de coöperatieven in de bestudeerde regio hebben. De koffie coöperatieven slagen er in om technologie over te dragen naar hun leden en dat dit de voedselproductie verbetert, maar de impact op de prestaties van hun leden in de koffiemarkt is beperkt. De studie toont aan dat het belangrijk is om verder te kijken dan de gemiddelde effecten omdat de impact van het lidmaatschap van de coöperatieve ook

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beïnvloed wordt door de karakteristieken van de leden. Daarenboven gaat deze studie verder dan de meeste andere studies die focussen op de directe economische effecten van participatie in de markt, door eveneens het belang van sociale impact zoals emancipatie en indirecte *spill-over* effecten op voedselzekerheid aan te tonen.

CHAPTER I

General Introduction

1.1 Producers in the coffee value chain

The International Coffee Agreement (ICA^a) regulated the international coffee market from 1962 to 1989 using quotas it attributed to members of the International Coffee Organization (ICO). The demise of ICA^a in 1989 and the Structural Adjustment Programs resulted in the dismantling of coffee boards and other quasi-governmental bodies in many of the coffee producer countries. With liberalization, it was expected that a competitive market with a large number of exporting and processing companies would develop. Yet, on the contrary, market power got concentrated in the hands of a few international traders and roasting companies (World Bank 2008; Backman, 2009; Markelova and Mwangi, 2010). Still, most coffee is produced by smallholders, who are at the bottom of the coffee chain and depend on local trading systems (Gelaw et al., 2016). Trade liberalization seems to have given local exporters the opportunity to increase their power in relation to other local traders and farmers (Backman, 2009; Markelova and Mwangi, 2010).

Smallholder coffee farmers are the ultimate price takers. Due to asymmetric price information and poor road conditions, their possibilities to get a better price in other markets are limited. Coffee farmers mainly sell to traders who operate in the area where they live. This results in oligopsonies and cartelization as mentioned by different authors (Gresser and Tickel, 2002 in Peru; Renard, 1996 in Mexico; Tallerontine, 1997 in Tanzania as cited in Milford, 2004; Gelaw et al., 2016). Consequently, producers retain only a small portion of what consumers pay when buying coffee. This is illustrated by the results of Gresser and Tickel (2002 cited in

Milford, 2004) who found that coffee farmers receive around 6 percent of the value of pack of coffee sold in a store.

In response to these adverse market conditions, small scale farmers joined producers' groups/organization or cooperatives as this may be the only option for them to engage and benefit from modernizing and new value chains (Coles and Mitchell, 2011; Markelova et al., 2009; Markelova and Mwangi, 2010; World bank, 2008; Verhofstadt and Maertens, 2015). Despite the expectation that cooperatives may benefit smallholder farmers by reducing transaction costs in input and output markets and improving bargaining power vis-à-vis buyers (Bernard and Taffesse, 2012; Markelova et al., 2009), mixed results are reported on the success of producers' cooperatives in improving the economic performance of their member households. For example, Fisher and Qaim (2012), Ito et al. (2012) and Vandeplass et al. (2013) found a positive and significant impact of cooperative membership on farm income and profits while Bernard et al. (2008) and Francisconi and Heerink (2011) pointed the limited influences that cooperatives have on the commercialization behavior of their members. Most studies search for an overall effect of cooperative membership on income, production, or price received. Yet, an impact a cooperative has on the individual members' livelihoods may differ a lot. Only a few studies (e.g. Bernard et al., 2008; Verhofstadt and Maertens, 2015; Fisher and Qaim, 2012; Ito et al., 2012; Abebaw and Haile, 2013) have demonstrated the heterogeneous impact of cooperative membership, yet none of them studied coffee cooperatives.

Cooperatives search to create value through horizontal collaboration, while certification systems and sustainability labeling create value through strengthening the position of smallholder farmers through vertical market integration. Coffee certification is a form of contract farming, through cooperatives, providing the

General Introduction

opportunity for farmers to sell their coffee to a certain niche market with better price guarantees and possible premiums paid by consumers. In turn, smallholder coffee farmers are required to meet certain standards that match the growing demands for healthier and more socially and environmentally-friendly coffee in larger consumer countries (Jena et al., 2012).

Certifying coffee as 'organic' or 'fair-trade' should provide the farmers price premiums which are to be used to encourage socioeconomic change and/or environmental sustainability in the areas of production. This voluntary product certification should make smallholder farmers in the South less susceptible to volatile 'free' world market prices and to enhance their market integration in order to increase their socioeconomic situation (Hoebink and Ruben, 2014). However, the impact of certification will only be as strong as the cooperative itself. Side-selling is a particularly critical problem cooperatives face. Farmers mostly side-sell part of their coffee to traders to get immediate cash payment for purchasing their household needs (since cooperatives do not pay on time) and also to pay back the loan that they have taken in advance from traders as cooperatives do not provide credit to their members. Hence studying the effect of certification in reducing the significant proportion of coffee sold by cooperative farmers in the conventional traders' market is vital in order to understand the leverage of certification in reducing the free-riding behavior of member farmers.

Other than the economic advantage (through collective action and access to certification systems), cooperatives are also assumed to have an important role in social development by empowering marginalized producers, especially women. Through spreading of new knowledge and values, cooperative membership may help to improve women's self-confidence and enhance their ability to make independent

choices (Ibrahim and Alkire, 2007; Alkire, 2009; Burchi and Vicari, 2014). Even if studies (e.g. Agarwal, 2007; Burchi and Vicari, 2014; Datta and Gailey, 2012; Meera and Gowda, 2013; Dohmworth, 2013-14; Meier zu Selhausen and Stam, 2013) were made on how cooperatives contribute to the empowerment of women in the different parts of the world, insights for Ethiopia are limited. Given the important contribution of women in the agricultural production and marketing, assessing how cooperatives empower women should provide insights in the indirect effects of cooperatives for reducing poverty.

Cooperatives are also hypothesized to enhance the food security situation of their member households via improved productivity and income. Even if some studies (e.g. Nugusse et al., 2013; Vuthy et al., 2014) analysed the food security effect of cooperative membership, coffee cooperatives deserve special attention. Coffee is one of the major cash crops in Africa. In some countries, it has been promoted as an income generating activity for poor farmers. Yet membership may have a direct effect on food security if the cash crop production would replace production of food crops. Otherwise better market access for coffee through cooperatives should have a direct impact on food security through increasing the farmers' purchasing power. This relationship did not yet receive the scientific attention it deserves.

This study focuses on the importance of cooperative membership amongst coffee farmers in Southwest Ethiopia with the aim of contributing to a better understanding of the impact of cooperative membership on the free riding behavior and performance of smallholder coffee producers. Four particular research gaps are addressed in relation to the impact of cooperatives, namely, (1) heterogeneity of impact across members; (2) side-selling by cooperative members; (3) effect on

women empowerment; and, (4) impact on food security. These four issues are chosen because they have received less attention in the large literature that exists on cooperatives. The first two empirical chapters deal with challenges in the member-cooperative relationship, while the last two chapters focus on cooperative performances on important secondary effects.

1.2 Analytical framework

Supply chain and network analysis have been considered as two diverging concepts of inter-organizational collaboration in the different strands of literature (Lazzarini et al., 2001). Supply chain analysis assumes a direct and sequential interdependence between actors at different layers/stages in a serial fashion (James, 2012). In a network analysis (NA), structural interdependence analysis gives more emphasis to horizontally organized transactions and collaborations with a reciprocal interaction of actors in a given layer or stage of the supply chain (Brito and Roseira, 2005).

The concept of net chain emerged as a lens and mechanism to integrate the two diverging concepts (SCM and NA) towards a more holistic understanding of structural interdependences in a supply chain. *“A net chain is a set of networks comprised of horizontal ties between firms/actors within a particular industry/group in such a way that these networks are again sequentially arranged based on vertical coordination between firms in different layers”* (Lazzarini et al., 2001; Brito and Roseira, 2005). Hence a net chain analysis accounts for structural interdependences by simultaneously studying vertical and horizontal ties in a given chain with distinct strategies and coordination mechanisms (Brito and Roseira, 2005).

As the main objective of this study is to assess the impact of smallholders' integration through their cooperatives, applying the net chain concept of net chain in

which producers are part of cooperatives that trade the coffee was found to be particularly appropriate since the structure of the cooperative chain is characterized by horizontal ties between farmers within a cooperative, which are again vertically coordinated to join the (certified) markets through the unions.

Cooperatives can facilitate and leverage market linkages for small scale producers, help them reduce transaction costs and improve their bargaining power so as to enable them benefit from existing value chains (World Bank 2007; Verhofstadt and Maertens, 2015) by directly supplying to the international market via their unions. In addition, certification of the coffee cooperatives – including fair-trade and organic certification - gradually gained recognition worldwide due to the potential impact of increasing poverty of smallholders in the South and addressing increasing demands for a more healthier, socially and environmentally friendly coffee by consumers in the North (Petit, 2007; Stellmacher and Grote, 2011). Certification is an attempt to build an alternative trade network between the disadvantaged producers in the South and social and environmental conscious consumers in the North. These consumers are willing to pay a price premium for products that meet certain precisely defined and assured standards (Renard, 2003; Murray et al., 2006). In this regard, certification licenses (fair-trade and organic) held by the unions and cooperatives increase market access and stability by providing long-term contracts between cooperatives/ unions and buyers in a certified niche market. This helps farmers to receive higher prices for their produce by stipulating a minimum price and a price premium (ICCO, 2012). Such benefits could contribute to reduce side-selling by cooperative farmers.

Through spreading of new knowledge and values, cooperatives which are organized on voluntary basis could be conducive to the empowerment of groups

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such as small scale farmers and, above all, women in rural areas via increasing their self-confidence and self-determination (Hill, 2005; Ibrahim and Alkire, 2007; Alkire, 2009; Burchi and Vicari, 2014). Furthermore, cooperatives could play a critical role in achieving food security amongst their coffee producing members by facilitating more and diverse food purchases and production of food via their income and input delivery effect (Chambo, 2009).

In the analytical framework presented in Figure 1.1, we therefore assumed that the net chain form of producers' ties affects the free-riding behavior (side-selling) and performance (direct performance on income, supply, price, margins from coffee, and indirect performance on women empowerment and food security) of member farmers via its components of vertical (possibly accessing certified markets via unions) and horizontal integration (cooperative membership) (Fig. 1.1).

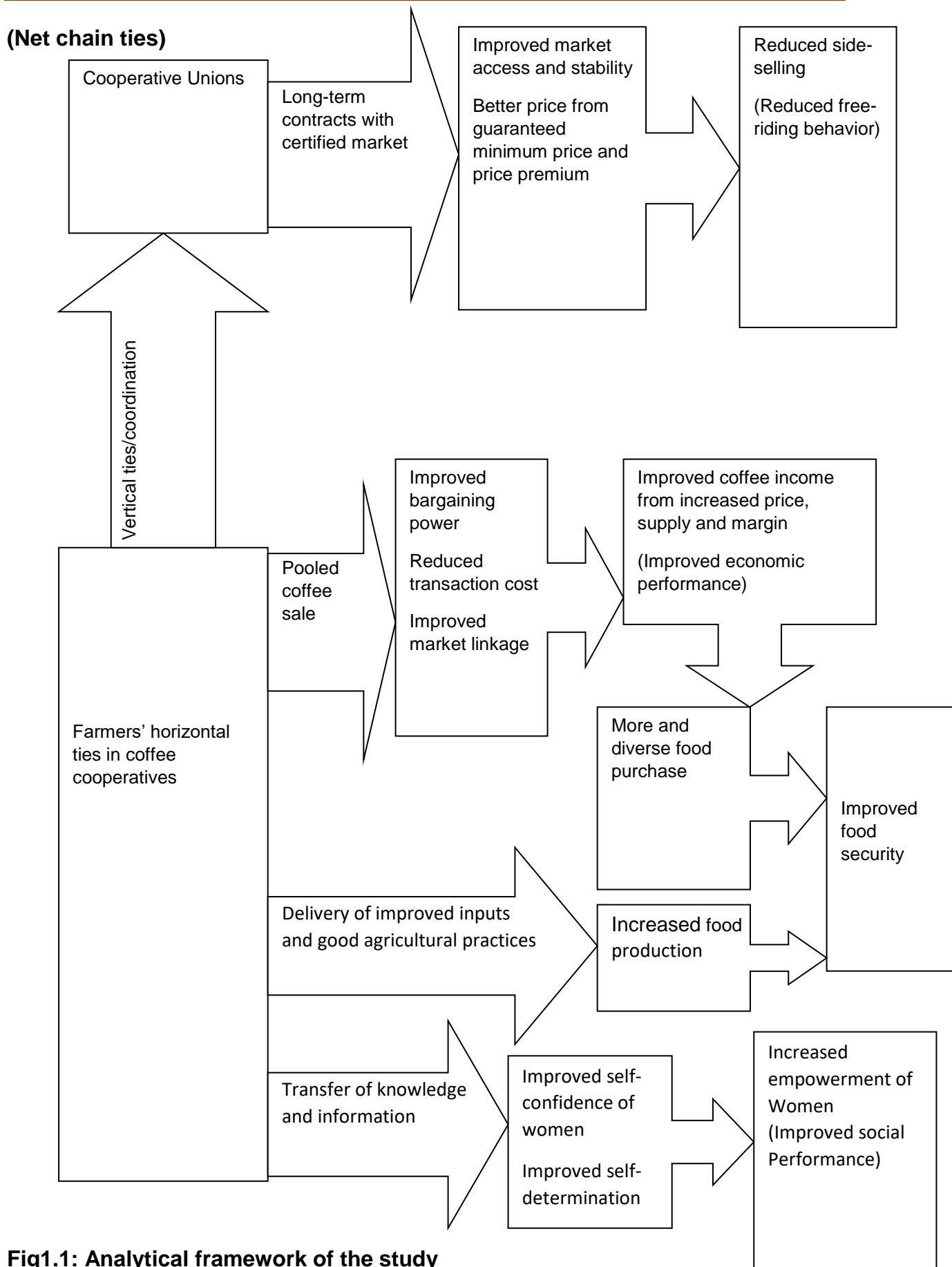


Fig1.1: Analytical framework of the study

1.3 Research aim, hypothesis and outline of the thesis

This thesis aims at a better understanding of the impact of cooperative membership on free riding behaviour, performance and food security of smallholder coffee producers in Southwest Ethiopia. Specifically, it aims at answering questions on how membership of coffee cooperatives is actually affecting the households directly (through the impact on income and livelihoods) and indirectly (through the impact on women empowerment and food security). To increase understanding of the different dimensions of the coffee chain in the region, we first provide a qualitative description of the overall coffee value chain in Southwest Ethiopia. To this effect, chapter 2 maps the coffee chain currently working in the region, identifying the different actors involved and describing their functions. We then focused on four main research hypotheses to be addressed in the remaining empirical chapters of this dissertation.

First, while the effectiveness of cooperatives differs across members, most papers do not go beyond estimating the overall mean treatment effects of cooperative membership. Only few studies have assessed the heterogeneous effect of cooperative membership among the different socioeconomic groups within cooperative. In chapter 3, we assess the heterogeneous performance impact of coffee cooperatives across member households. We assume a heterogeneous impact on performance and hence formulated the following hypothesis.

Research hypothesis of chapter 3: Coffee cooperatives have a substantial impact in improving coffee production and marketing and these effects differ across the member farmers.

Second, despite the expectations that collective action in cooperatives could fetch better prices and generate income from sales of agricultural produces, many cooperative members seem to side-sell a substantial amount of their coffee to traders

in the conventional/ mainstream chain. Most commonly mentioned reasons are that traders offer a better price, and they pay immediately which has a positive income effect. Cooperatives may however reinforce their price and income effects by being certified to access fair-trade and/or organic markets. On top of fetching higher prices on the market, certified cooperatives may benefit from more training and access to information. As a form of contract farming, certification is assumed to have a leverage effect in reducing side-selling by member farmers. Because, similar to contract farming, certification involves agricultural production being carried out on the basis of an agreement between the buyer and farm producers where buyers sometimes specify the quality required and the price with the farmer agreeing to deliver at a future date. Certified markets assure a minimum guaranteed price. When market prices are below a certain threshold in the international coffee market, farmers receive a top-up of the price. Moreover premia and training are provided to the organization (Jena, et al., 2012). As far as we know, no studies were made in the past that investigated the impact of certification on the free-riding behavior of member farmers. Most studies on certification focused on its welfare and environmental impact. In chapter 4, we assessed the impact of certification and other (farm, physical and institutional) variables on the likelihood as well as quantity of side-selling and we put the following research hypothesis.

Research hypothesis of Chapter 4: Certification and other farm, physical and institutional characteristics have a significant impact on the probability and quantity of side-selling by cooperative farmers.

Third, most literature on the impact of cooperatives give emphasis to the contribution of cooperatives in improving the economic performance of member farmers through better prices, reduced transaction costs, higher income and

improved market access and participation. The secondary social impact of cooperatives such as empowering women is most often ignored and rarely addressed for cash crop production such as coffee. In chapter 5, we investigate the impact of coffee cooperatives on empowering member women.

Research hypothesis of Chapter 5: Coffee cooperatives have a positive and significant impact in empowering member women.

Fourth, despite the relevance of assessing the food security concerns of coffee farmers who are confronted with volatile coffee prices and allocation of the available scarce resource to food crops and coffee production, previous studies did not pay much attention to the food security effect of coffee cooperative membership. Cooperatives for cash crops may contribute to food security through an income effect, but also through smoothing consumption if it succeeds in providing a financial buffer to the households. In chapter six, we assessed the impact of coffee cooperative in enhancing the food security situation of their member households and assumed the following hypothesis.

Research hypothesis of Chapter 6: Coffee cooperative membership has a positive and significant impact on food security of farm households.

1.4 Conceptualizing of cooperatives

Cooperatives are a legal form of producer organisation which are defined as “*membership- based organizations or federations of organizations with elected leaders accountable to their constituents*” (World Bank, 2007). A cooperative is a type of business model defined as “*an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise*” (ICA^b, 2015). Cooperatives, as joint activities amongst its members, are based on the

values of self-help, self-responsibility, democracy, equality, equity and solidarity (ICA^b, 2015). The extent and impact of cooperatives on community and business development worldwide should not be underestimated. A report of the International Cooperative Alliance in 2015 estimated that nearly 30,000 cooperatives in the United States employed 2 million Americans. Around the world, cooperative enterprises are estimated to employ 250 million people and generate 2.2 trillion USD in return while delivering the services and infrastructure that the society needs to acquire (ICA^b, 2015).

The earliest record of a cooperative comes from Fenwick, Scotland in 1761, when the Fenwick Weavers' Society was established by the local cottage weavers (Emana, 2009). However, cooperatives began to gain popularity in the 19th century especially in Britain and France at the moment that the livelihoods of many workers were in danger due to the bad working conditions during the industrial revolution (Lemma, 2008). The main objective of cooperatives at that time was to access basic goods at a lower price by pooling their scarce resources and working together. The cooperative movement in Sub-Saharan Africa dates from colonial times (Holmen, 1990; Poole and de Frece, 2010; Chambo, 2009). In East Africa, member initiated cooperatives in the colonial era were established in an attempt to break the monopolies of Asian traders and middlemen. During this period, cooperatives in most African countries were established to market cash crops such as coffee, cotton, cash nuts and cocoa for exporting to the colonizing countries. In the post-Colonial period, governments initiated food marketing cooperatives (Chambo, 2009). Nonetheless, little emphasis was given to the voluntary and democratic aspects of cooperation (Mujawamariya et al., 2013).

The three typical forms in which agricultural cooperatives in most developing countries are organized include top-down controlled by government; those started with philanthropic support (NGOs and development aid organization) and the grass root cooperatives that emerge from collective action by local farmers (Mujawamariya et al., 2013). Within these forms, several types of cooperatives are distinguished including agricultural/ farmers' cooperatives, financial cooperatives and food cooperatives as the most common in rural areas. Yet, also shared services cooperatives, labour cooperatives, housing cooperatives, mutual insurance cooperatives, e-commerce cooperatives, recycling cooperatives and others exist (ICA^b, 2015). Cooperatives are either commodity-specific organisations, advocacy organisations representing producers' interests or multipurpose organisations (World Bank, 2007). The cooperative may support members to increase production of goods and services (lower price for inputs, processing and joint marketing, see below) and/or increase consumption (providing goods and services at lower prices, lower interest rates, saving possibilities and facilitate services) (ICA^b, 2015).

Agricultural cooperatives have been important vehicles of agricultural development in the past few decades albeit with variable success (World Bank, 2007). Chambo (2009) viewed the developmental role of agricultural cooperatives from four perspectives. First, agricultural cooperatives supply required agricultural inputs which can enhance production and productivity. Second, they provide a secured market for commodities produced by resource poor smallscale farmers. Third, by reducing transaction costs and improving bargaining power, agricultural cooperatives allow member farmers to capture the benefits of value addition. Fourth, agricultural cooperatives organize the processing of agricultural produce and as such allow their members to benefit from the value that is added by sorting, introducing

grades and standards and this in turn encourages poor farmers to access a higher value market.

Traditionally, cooperatives were community-based organizations, primarily involved in channeling resources to a community or to organize community activities (Hayami, 2009), which is still at the heart of many cooperatives in developing countries. Moreover, recurrent communications within communities decreased transaction costs that were associated with information gathering and contract enforcement by building trust, and by supporting informal information exchange (Bowles and Gintis, 2002). Thus, cooperatives with a strong attachment to the community were benefiting from such local social capital (Bijman et al., 2016). Nonetheless, the advent of liberalization policies and competitions urged cooperatives to compromise their motive of community development as this is not easily aligned with the current commercial orientation required for market access and value chain coordination (Chambo, 2009). Moreover, producer organizations in general (and as such also cooperatives) are prone to problems due to the conflict between efficiency and equity, heterogeneous membership, need for managerial capacity for high-value chains, potential participating in high-level negotiations, and sometimes unfavourable external conditions (World Bank, 2007). Producers' organizations are forced to become more careful in allowing members and accepting products as market access often entails conformity with strict quality and volume requirements which all producers in the community may not be able to achieve (Bijman et al., 2016).

Despite the prevalence of a large body of literature (Loevinsohn et al., 1994; Bebbington, 1996; Staal et al., 1997; D'haese et al., 2005; Wollni and Zeller, 2007)

demonstrating that producer organizations in general and cooperatives in particular can facilitate smallholder market access and integration in modern value chain, the inclusiveness of these organizations still remains relevant for further discussion (World Bank, 2007). Inclusiveness can be explained from the perspective of entry requirements (whether all producers can become members without a certain economic pre-condition), equal access of members to cooperatives' services irrespective of their membership status, participatory decision making, and inclusion of the marginalized especially women and youth who contribute much to agricultural production (Bernard and Speelman, 2009). Inclusion of large groups of farmers may be relevant if cooperatives are viewed as extensions of the state and are used as tools for rural development programmes of the government and non-government organizations. However, if cooperatives are conceptualized as members' owned commercial business, low performing farmers would be excluded as that would reduce costs and risks (Bijman et al, 2016), and this would facilitate the alignment of efficiency and equity (see challenges mentioned above (World Bank, 2007)). Bernard and Speelman (2009) give evidence from grain marketing cooperatives in Ethiopia that ruled out poor farmers who are thought to be less competent to meet the requirements of the growing market.

In most African countries including Ethiopia, cooperatives are hybrids of state control and member-owned commercial organisations. In some countries, policy and legislative processes on cooperatives are still hindering 'grassroot' cooperative development as they are not yet participatory. The state continues to be the main promoter of cooperatives (Chambo, 2007). In such cases, the influences related with financial support and strategy design may produce an adverse impact on the efforts of the organizations to respond to the ever faster changing and globalizing external

market environment and it makes it difficult to transform the organization into a new frame of competitiveness where members are motivated to expand the size of equity capital and return on investment. This again refers to the difficulty to reconcile efficiency and equity. That is, cooperatives need to impact on all members equally while their members often comprise a heterogeneous group with different attitudes and socioeconomic status. In addition, they need to establish strict performance based rules which prohibit non-compliers (World Bank, 2007). Nevertheless, members are found to free ride (Ruben and Lerman, 2005; Mujawamariya et al., 2013). So, such factors of policy and members' characteristics are still militating against the commercial orientation of agricultural cooperatives and its impact on the income levels of their members in Africa in general and Ethiopia in particular.

1.5 History of Ethiopian Cooperatives

Formal cooperative development in Ethiopia started in the Imperial Period between 1950 and 1974 (Kodama, 2007). The imperial regime at the time envisaged an important role for cooperatives in transforming smallholder agriculture and set the stage by providing the first legal framework (the farmer workers Cooperative Decree No. 44 later replaced by the cooperative Societies proclamation No. 241/1966). The legal framework was relatively comprehensive and it served as a basis for the legal framework issued in 1998. The framework introduced the start of several producer, multipurpose and consumer cooperatives. However, many of the cooperative were not successful and they operated in an inefficient manner as their scope and experience was limited (Lemma, 2008).

When the socialist regime (Derg) came to power (after 1974), the new cooperative movement was launched and many cooperatives were established. The objective of the establishment of these cooperatives as claimed by the regime was

“to bring an end to capitalist exploitation and to prevent the re-emergence of capitalism in the agriculture” (Kodama, 2007). The operations of these cooperatives had to be in line with the socialist principle of collective production and marketing and membership was also mandatory. So the overall intention of cooperatives and cooperative system was to assist the realization of the regime’s policy of collective ownership of properties (Kodama, 2007). During this period, there was a significant increase in the number of primary cooperatives. Other than the 149 cooperatives founded during the imperial period, another 10,500 primary cooperatives were established resulting in a membership of 4.8 million families (Lemma, 2008). Under the socialist regime, cooperatives faced numerous problems, such as forced membership incapable leadership, non-transparent governance, internal corruption and politically established prices for farm products (Rahmato, 2002; Veerakumaran, 2007). Towards the end of the Socialist regime, state-owned cooperatives had collapsed in many parts of the country (Lemma, 2008) in a disordered manner (e.g unsettled bank loans and other obligations, no distribution of assets between members). This is still a source of suspicion and distrust for cooperatives until today.

When the current regime came to power in 1991 introducing its policy towards a free market economy, farmers were given a choice to work for cooperatives or individually. A majority of the farmers decided to work individually and cooperative land was reallocated to individual holdings (Kodama, 2007). Some years later, the regime supported the activities of the cooperatives by proclamation no. 147/1998. The proclamation introduced a new cooperative system by defining cooperatives as “organizations formed by individuals on voluntary basis” and it states that “they participate in a free economy system” (Emana, 2009). Unlike the previous regime, this proclamation allows a layered organizational structure of cooperatives and it

defined the ratio of dividends between cooperatives and members (70% of profit as dividend to members and the rest 30% to be retained by the cooperative) (Emana, 2009).

The proclamation of 1998 established cooperative unions. These unions were initially created to link the cooperatives to the “exporters” and they would play an important role at times when international coffee prices would be low. Coffee cooperative unions were given the mandate to organize the export of coffee activities on behalf of the primary cooperatives and to protect farmers and their cooperatives against unethical misconduct in the marketing system (Kodama, 2007).

So the overall history of cooperative establishment in Ethiopia is related with the strong involvement of governments which in fact is contrary with the concept of cooperatives and civil society in the western (Emana, 2009). Despite the tempestuous history of cooperatives under Ethiopia’s socialist regime (1974-1991), the current government of the Federal Democratic Republic of Ethiopia (FDRE) has expressed renewed interest in collective action to improve smallholders’ market involvement (FDRE; Proclamations 85/1994 and 147/1998; Abate et al., 2014). This renewed interest in cooperatives was also inscribed in the Sustainable Development and Poverty Reduction Program (FDRE, 2002; Abate et al., 2014) as well as the Plan for Accelerated and Sustained Development to End Poverty (FDRE 2005; Abate et al., 2014), in which cooperatives are a central actor in the country’s rural development strategy. Agricultural cooperatives are also recognized as privileged institutions by the recently established Agricultural Transformation Agency (ATA) (Abate et al., 2014). As a result, cooperatives are widespread throughout the country with the principle of voluntary membership and a substantial number of public improvement programs and private initiatives are directed through them in an attempt

to reduce the exorbitant transaction and coordination costs that individual projects and farmers face (Pingali et al., 2005).

1.6 Background and research setting

This study focuses on coffee cooperatives in the Jimma and Kaffa zones of Southwest Ethiopia. These two zones are selected based on their large coffee production and concentration of cooperatives as compared with the other zones of the region. Jimma is one of the 12 zones in the Oromia region. It has about 2.5 million inhabitants, most (88%) of whom are Oromo, and mainly speak Oromiffa and Amharic. Muslim is the dominant religion in the region, followed by Orthodox Christianity and Protestantism. At an altitude of around 1700 m.a.s.l., and with average temperatures that range between 8 and 28°C, coffee (Arabica) thrives in the zone and is the most important cash crop. Cereals, such as maize, and fruits, such as avocado and mango, are also widely produced in the zone (Personal communication, Jimma Zone Bureau of Agriculture, 2013).

Kaffa is part of the Southern Region of Ethiopia and has a population of about 1 million people. A majority of the people speaks Kaffa and the major religion is Orthodox Christianity (80%). Temperatures are around 18 to 21°C and the altitude ranges from 500 m.a.s.l in the south to 3000 m.a.s.l in the north and central highlands. Due to the favorable altitude and weather condition, coffee is an important cash crop in the zone and it provides income for many farmers in the region. Agricultural production such as cereals and root crops, livestock rearing and collection of non-timber forest products are other important livelihood sources in the zone (Personal communication, Kaffa Zone Bureau of Agriculture 2013).

Coffee cooperatives in the region are multi-purpose. Other than marketing coffee, they also process coffee in the washing stations and are involved in the sale

of other crops. They also provide inputs (e.g. improved coffee seedlings, improved seed and fertilizers for other crops) and consumables, such as sugar and oil. Member farmers receive at least one training session a year and a dividend (between 2 and 4 birr/kg of coffee sold) from their cooperative. Membership requires payment of registration fees (5 to 20 birr) and the purchase of shares (minimum of one share which has a value ranging from 30 to 200 birr depending on the membership rule of the cooperatives). Cooperatives are organized by Kebeles or Peasant Associations (PAs), with each cooperative named after its location. Our preliminary study estimated that there are 63 (8 certified and 55 uncertified) cooperatives in Jimma supplying coffee to the export market and 27 (18 certified and 9 uncertified) in Kaffa (Personnel communication, zonal cooperative agencies 2013).

The study is mainly based on primary data collected in various periods of 2013 from 256 coffee farm households (Cooperative members and non-members) living in 12 cooperative (both certified and uncertified) villages (6 from Jimma and 6 from Kaffa). Cooperatives/Cooperative villages were selected using stratified random sampling from six purposively selected coffee producing weredas (3 from Jimma and 3 from Kaffa) using certification status as criteria for stratification. According to the administrative structure, a wereda is a district consisting of different cooperative villages/Peasant Associations while group of weredas aggregate to form a zone. After stratifying households in the cooperative village into members and non-members, a random selection was made to have a sample of household respondents from each stratum using a sampling frame. Information from farmers' group discussions, key informant interview and discussions with the management team of the 12 cooperatives from which the samples were taken have also been used to

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supplement the household data. Table 1.1 summarizes the number of cooperatives and sample households considered for the study.

Table 1.1: Summary of number of cooperatives and sample farm households for the study

	No. of cooperatives	Members	Non-members	Total
Jimma	6	66	62	128
Kaffa	6	66	62	128
Total	12	132	124	256

The selection of equal number of cooperatives from both zones despite the prevalence of more cooperatives in the Jimma zone is attributed to the need for accommodating more certified cooperatives in our sample as certification is stronger in the Kaffa zone compared to the Jimma zone.

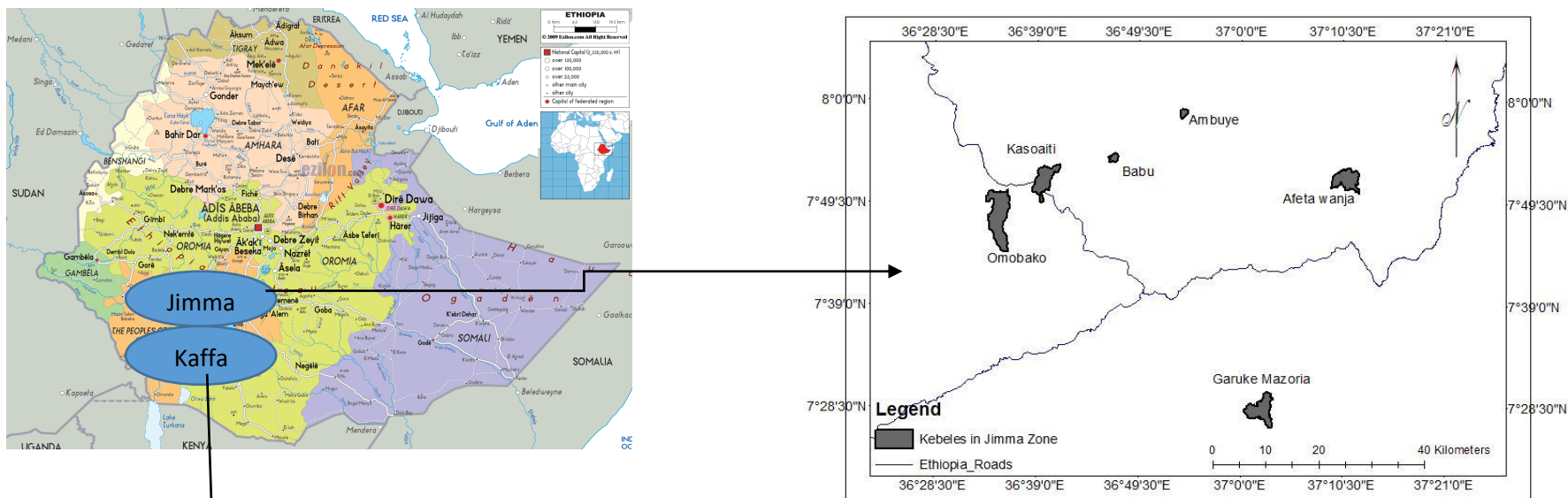
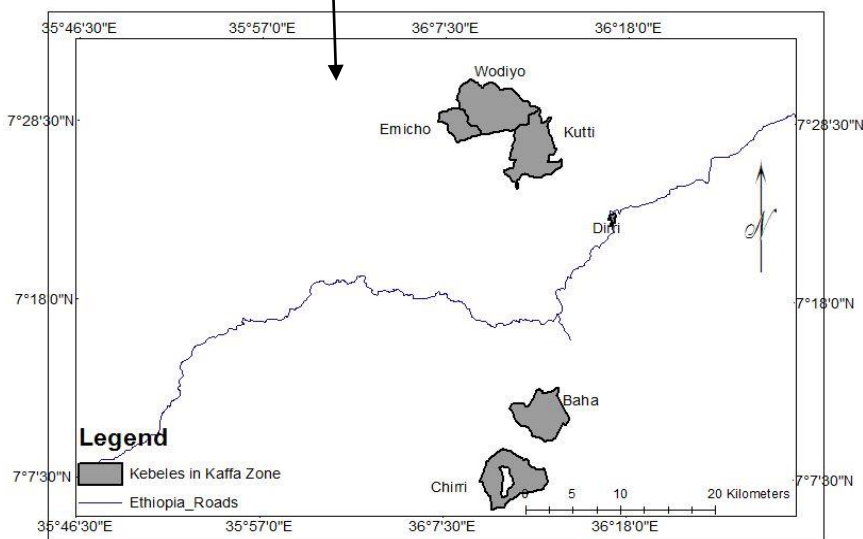


Fig 1.2: Map of Ethiopia showing the study sites (Ethiopian Mapping Agency, 2015)



CHAPTER II

Characterisation of Coffee Value Chain in Southwest Ethiopia

2.1 Introduction

As indicated in Chapter 1, this thesis integrates elements from Supply Chain and Network Analysis frameworks to improve our understanding of how cooperatives may affect the integration of small firms or farmers into the coffee market. Better market access very often implies the reduction of transaction costs through developing inter-firm linkages (Jones, 2011) at both the horizontal and vertical levels. It is assumed that market integration could attain collective efficiency through shared knowledge, co-innovation, inputs and technologies, and improve responsiveness to the existing market demand in order to achieve revenue and become competent in the market (Canina et al., 2005).

There has been extensive research conducted on how marginalised farmers with poor resources can be integrated into a high value market, using a value chain approach (Reji, 2013). In addition to the classical view of enterprise development, value chain development emphasises the development of the entire chain system by improving market functions for a set of enterprises for a specific product (Kula et al., 2006). That is, it deals with facilitating market linkages between actors along the chain and creating an enabling environment in which the enterprises work towards achieving competitiveness. Critical success factors include product quality, price, costs, volume, and speed of delivery (Kula et al., 2006).

Various methods (e.g. subsector analysis, global commodity chain analysis, and Porter's value chain) are found in literature conceptualising value chains. They have in common a reliance on the knowledge of chain structure in terms of

information, product, and money flow (Spies, 2011). Therefore, the first step in value chain analysis is to map the value chain, in order to better understand the product, information and money flow between the different segments of the chain, as well as understand how the inter-linkage between the different segments function (Hellin, 2006; Munyua et al., 2013). Therefore, as an entry point for the analysis of the coffee value chain in Southwest Ethiopia, this chapter maps the structure of the coffee value chains, explains the roles of the actors and describes factors shaping the relationships between the actors (Figure 2.1).

2.2 Map and description of chain actors and their functions

Figure 2.1 and the paragraphs below provide an overview of the actors and product flows along the coffee value chain.

Input Traders

Although there are a few traders who sell coffee inputs in the area, most inputs are provided by government institutions e.g. agricultural and research offices, cooperatives and unions, model farmers, and some NGOs (Personal communication, Zonal Bureau of Agriculture, 2013 and Farmers Group Discussion, 2013). Most common coffee inputs are seeds and seedlings, nursery inputs, farm implements (e.g. stumping saws), mesh wires for drying, machines for wet and dry processing, roasting machines, packaging inputs, and others. Seedlings of the selected coffee varieties are raised for 6-12 months in shaded nurseries before planting. They are then planted in pre-prepared holes. The young plants start producing the first seeds 2.5 to 3 years after planting (Geremew et al., 2016). The Jimma Agricultural Research Centre, which holds a national mandate for coffee research, is the main source of seedlings of improved coffee varieties for both zones (Kuffa et al., 2011). Agricultural offices, cooperatives, and NGOs purchase the seedlings from this

Coffee value chain

research centre, after which they sell or distribute it to farmers at a relatively fair price which covers the production costs (Personal observation and communication, Jimma Agricultural Research Centre, Zonal Bureau of Agriculture and Cooperatives, 2013). However, the choice of input is limited. Coffee production in the region is largely organic, yet pesticides are applied to protect plants from pests and diseases. Manual slashing is used to protect weeds and inorganic fertilisers (e.g. compost and manure) are used to maintain/improve soil fertility. Chemical fertilisers are mainly applied to cereal food crops e.g. maize and teff (Personal communication, Bureau of Agriculture, 2013)

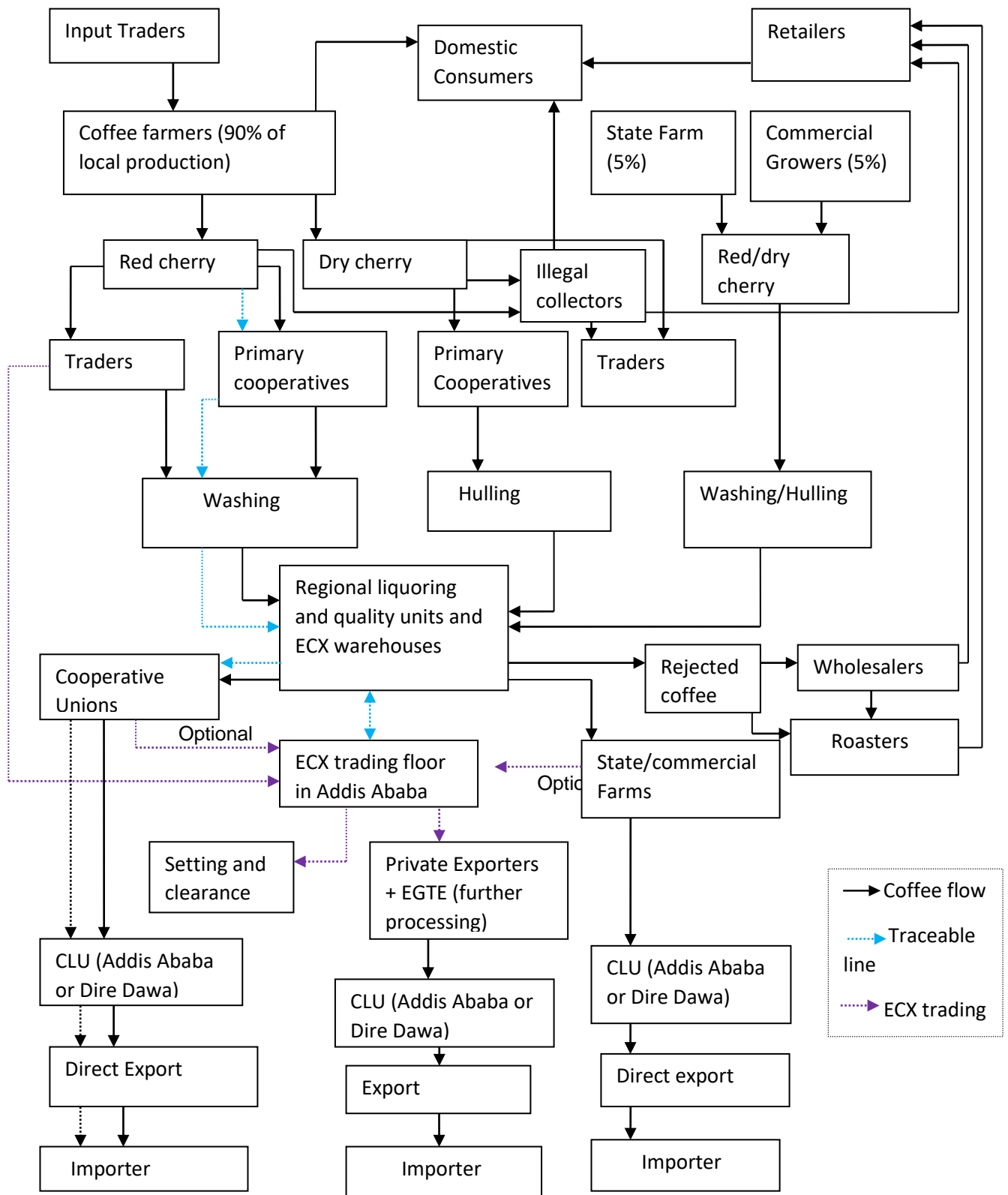


Figure 2.1: Coffee value chain in Southwest Ethiopia

EGTE= Ethiopian grain trade Enterprise CLU= Coffee liquoring unit

Small-scale coffee growers/farmers

Small-scale coffee growers are the main actors in coffee production, accounting for more than 90 percent of the total volume of coffee production in the country (Gebreselassie and Ludi, 2008). Three different coffee production systems are used by small-scale farmers, viz. forest, semi-forest, and garden coffee systems. In the forest coffee system, coffee is simply picked from the natural population of spontaneously regenerating coffee trees in the mountain rainforests of Ethiopia, and there is no endeavour to improve coffee productivity. Semi-forest production refers to a forest coffee system which has been transformed to a semi-managed forest coffee system, through the lessening of plant composition, diversity, and density (Woldemariam, 2015). In this production system, farmers remove other plants in the forest to avoid competition with the coffee. After clearing, farmers relocate the coffee seedlings from densely to sparsely populated areas. Such plantations are close to natural coffee vegetation systems, but competition with other species is minimised. Finally, the garden coffee production system (accounting for almost half of the coffee production in the country) is heavily managed with weeding (2-3 times per year), fertilising with farmyard manure and crop residues, and hoeing. However, the application of chemical fertiliser is generally very low (Woldemariam, 2015). According to information obtained from the Zonal Bureau of Agriculture, garden and semi-forest coffee production systems are common in the Jimma area, while forest and semi-forest coffee production systems dominate in the Kaffa area.

Farmers lose a significant proportion of potential coffee harvest due to persistent diseases and pest problems. Major coffee diseases in the area are coffee berry disease (CBD) and coffee wilt disease (CWD). Coffee leaf rust (CLR) is also common, but has not yet posed significant economic challenges to coffee production,

due to the prevalence of high genetic diversity and tolerant genes (although some varieties resistant to CBD have been found). For CWD however, uprooting and burning the affected plant is the only solution as no resistant varieties have been found yet. Although insects and pests are not particularly problematic in this area, cultivation practices like shading and pruning are used for control. In more intensively managed garden coffee systems, however, insects and pests pose a greater problem due to the narrow genetic pool of the coffee stock, reduced shade, and habitat complexity. This may necessitate the use of chemical pesticides (Woldemariam, 2015).

In addition to coffee, farmers grow cereals (e.g. maize and teff) and rear livestock. These small-scale coffee growers sell fresh cherries or dry coffee directly to coffee traders or their agents, their primary cooperatives in primary or nearby village markets, and to illegal collectors (who, although they are banned by government from coffee transactions, remain active). Farmers often also sell small amounts to local customers and consume a small proportion of coffee that they produce themselves.

Large-scale coffee plantations

State-owned Coffee Plantation Enterprises were previously the only large-scale coffee producers, prior to being transferred to private investors. In this production system, coffee plants are well managed and the recommended agronomic practices (e.g. improved seedlings, spacing, proper mulching, weeding, shade regulation and pruning) are applied. Coffee trees are planted in a row in the shade and there is limited chemical application for fertilisation and disease control. Shade trees in bigger plantations are sourced mainly from old forest stands (e.g. Bebek and Teppi coffee plantations), while smaller plantations usually plant their own shade trees. Coffee produced from plantation production systems account for ten percent of the country's

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coffee export volume (Gray, 2013). In addition to coffee, these plantations produce honey, fruits (e.g. mango, banana, pineapple and avocado) and cereals (e.g. maize). Large-scale coffee plantation owners sell coffee to local consumers, to exporters through ECX (see below), as well as export directly. These plantations were owned originally by the government, but plantations have recently been privatised (key informant interviews, Coffee Plantation and Development Enterprise, 2013).

The Limu coffee plantation is one of the large-scale coffee plantations in Southwest Ethiopia. It covers 11,182 hectares, of which 7,782 hectares are allocated to coffee production. The plantation has an estimated capacity of five to seven thousand tons of green coffee beans. It employs 4000 permanent and 6000 seasonal workers for production and processing activities (information obtained from the plantation officials). There are also a number of privately-owned coffee plantations in the Kaffa zone, e.g. Lem Kaffa and LH Coffee and Spices. The amounts of dry and wet processed coffee supplied by these plantations for 2013 were 367.63 and 552.6 tons respectively (information obtained from Kaffa Zone Marketing Department).

Southwest Ethiopia also hosts the Bebeke and Tepi coffee plantations. Bebeke is a 9337 hectare coffee plantation located 28km southwest of Mizan Teferi city. The Tepi coffee plantation stretches over 6290km and produces 6000 tons of coffee a year. Coffee in both plantations is grown under shade with ample rainfall and rich soil. Coffee is inter-cropped with spices e.g. black pepper. These plantations also produce honey, including a specific coffee blossom honey variety (Personal communication, Coffee Development Enterprise, 2013).

Primary Cooperatives

Primary cooperatives deliver coffee to their unions. Primary cooperatives constitute a membership of individual farmers, and a membership of these primary cooperatives

form a cooperative union. Primary cooperatives were established by law in the 1960s to increase the bargaining power of farmers through collective actions. Farmers are required to pay a registration fee (usually around 5 to 20 birr) and purchase a minimum of one share (the value of which ranges between 50 and 200 birr) to attain membership in these cooperatives. The chairman and executive management committee (approximately six to eight people, elected by member farmers,) manage the cooperatives. According to information obtained from the zonal cooperative agencies and respective cooperative unions, there are 63 and 27 primary cooperatives working in the Jimma and Kaffa area respectively. Certification of coffee, e.g. fair trade, often occurs through these primary cooperatives (Personnel communication, Oromia Coffee Farmers' Cooperative Union, 2013).

After buying coffee from farmers, cooperatives process the coffee by drying (dry-coffee) or through washing stations (wet coffee). The coffee is further processed by the unions, following grading and quality control activities in the auction market. During this process, sundried coffees are further sorted by hand or by sorter machines, and washed coffees are hulled, sorted and blended to make up the bulk for export (Personel communication, Oromia and Kaffa Cooperative Union, 2013).

The common structural hierarchies of cooperatives and cooperative-supporting institutions approved by the proclamation are demonstrated in Figure 2.2.

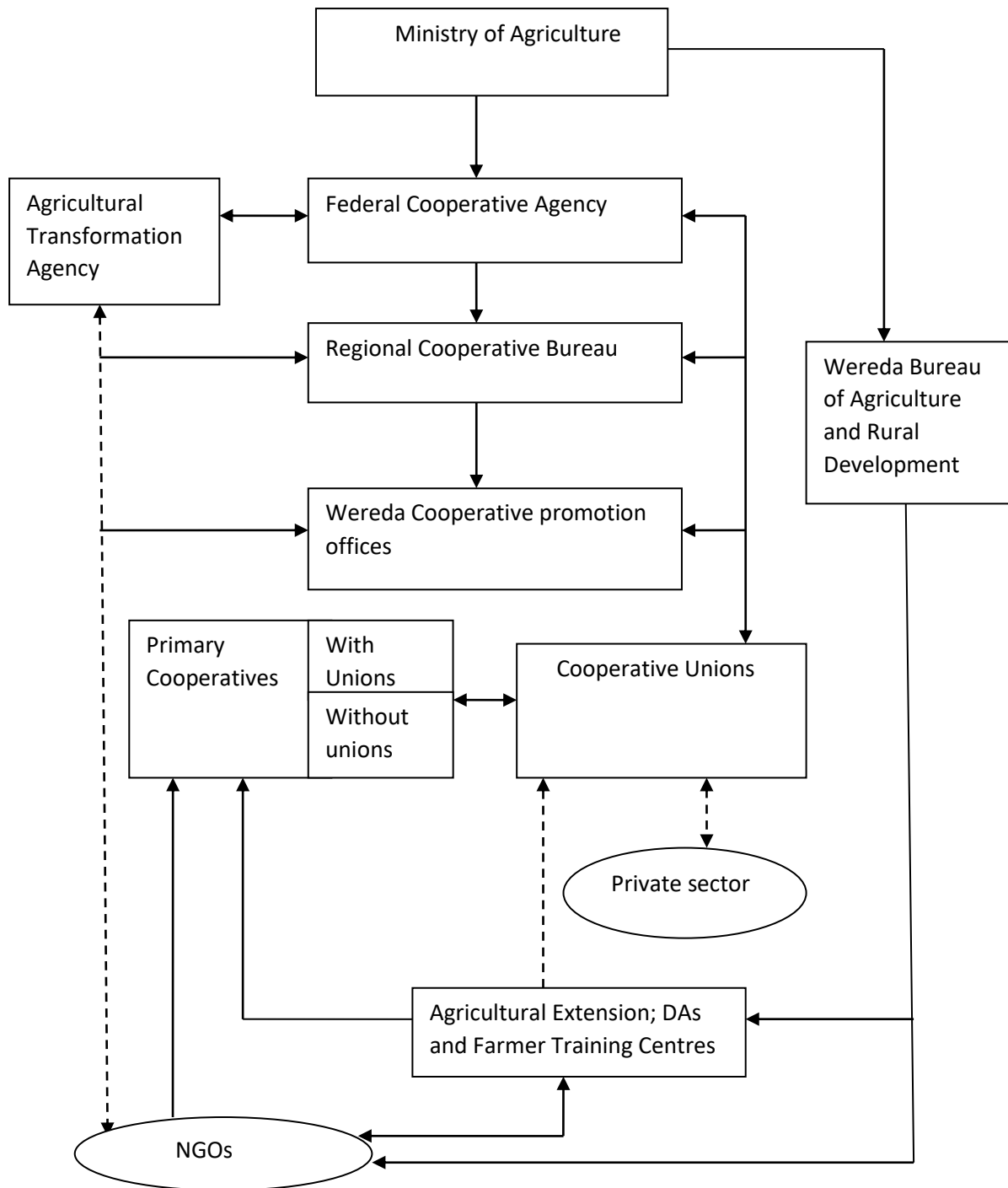


Figure 2.2: Actors and relationships in the promotion of agricultural cooperatives in Ethiopia (Adapted from Tefera et al., 2016)

The Federal Cooperative Agency (FCA) is the highest government structure facilitating the organisation of cooperatives. The FCA oversees the appropriate execution of regulations for cooperatives, formulates cooperative policies and legal

procedures consistent with international resolutions, and ensures coherence between cooperative policy and the broader policy environment (Emana, 2009). The FCA is structured down to regional and district levels. FCA district offices are responsible for organising, registering and supporting primary cooperatives. Regional offices have a monitoring and regulatory function, i.e. they register unions and federations, and provide capacity-building and technical backup to cooperatives. The Agricultural Transformation Agency (ATA), established in 2010 to promote the country's agricultural transformation, also plays a leading role in providing policy advice to the Federal Cooperative Agency. It also accepts and undertakes assignments related to rural transformation, assigned by the Ministry of Agriculture (Tefera et al., 2016).

Apart from government, many NGOs actively support unions and primary cooperatives. The Cooperatives for Change (C4C) programme of the Dutch NGOs Agriterria and SNV, for example, supports cooperative unions in improving business performance and organisational capacity. Through better performing cooperatives, smallholders will be integrated into value chains and remunerative markets. Other NGOs, such as Oxfam, Self-Help Africa, ACIDI-VOCA, and Techno-Serve actively support the Ethiopian cooperative movement (Tefera et al., 2016).

Cooperative unions

The Oromia Coffee Farmers Cooperatives Union and Kaffa Forest Coffee Cooperative Union are formed by a collection of primary cooperatives in the respective areas. These unions are accountable to their board of directors (comprising of farmers and leaders of primary cooperatives). To become a member, primary cooperatives are required to pay a registration fee and purchase shares in the unions. Membership is voluntary and cooperatives can function independently if they are unable or unwilling to work under the umbrella of the unions. These unions

can bypass the ECX and export both uncertified and certified coffees to importing countries, or sell to exporters in the central market. In addition to selling, cooperative unions facilitate access to credit, certification, training, and input provision for their member cooperatives. Some cooperative unions provide machinery renting services to cooperative members at lower rental price to introduce modern farming techniques. They also provide transportation and storage services to the producers of their member cooperatives (Emana, 2009).

Horizontal coordination in the form of cooperative unions is viewed as a crucial step towards improving access to reliable and up to date information on prices. However, linkage between cooperatives in the form of knowledge and information sharing is almost non-existent (Emana, 2009). Networking between unions, which could help to share the needs of their constituency, is also generally said to be limited (Emana, 2009).

Traders/Wholesalers

These actors purchase coffee mostly through their agents in village markets, and sometimes directly from farmers in the primary or nearby town markets. They are licensed large-scale coffee traders who purchase and resell coffee after processing. According to the Jimma Zone Bureau of Agriculture (2013), these wholesalers should show a minimum capital of 100,000 birr in order to be a registered/licensed trader in their locality. Although they do not all supply coffee every year, the current number of registered wholesalers in the Jimma and Kaffa zones is estimated at 419 and 65 respectively (Personal communication, Jimma and Kaffa Zonal Bureau of Agricultural Marketing, 2013). These actors generally purchase dry coffee and cherries which they then process using dry and wet processing methods. Only 16 of the 419 wholesalers in the Jimma zone own both dry and wet processing plants, while the

others rent equipment from these wholesalers. Thereafter, the wholesalers sell the coffee to exporters through ECX, if the coffee is of acceptable export standard. Recent changes to the grading system permits only coffees with grades of 1 to 5 for export, while those graded above 5 are to be sold in the domestic market (ECX coffee contracts, 2015). This differs from previous grading systems, where coffee graded between one and nine were considered appropriate for export.

Agents of traders/wholesaler

Traders and wholesalers typically employ agents. Some of these agents worked previously as collectors/assemblers in the chain and became legal agents of traders/wholesalers when collectors/assemblers were legally banned from working independently along the coffee chain. Agents are farmers themselves who have knowledge of market connections and who are involved in the purchase of coffee from other farmers in their villages or primary markets on behalf of traders/wholesalers and who receive a commission based on their agreement. Traders/wholesalers usually set a price in advance for their agents and communicate with them telephonically when there is a need for adjustment.

Illegal collectors

Illegal collectors are usually people who were collectors/assemblers before they were legally banned, or people who intentionally or unintentionally missed the opportunity to become legalised agents to traders. These actors purchase dry coffee from farmers and illegally sell it to traders and consumers. They also smuggle coffee to neighbouring countries like Sudan and Kenya. Based on the 2006 estimate of the Agricultural Marketing Promotion Department in the Ministry of Agriculture, Worako (2008) indicates that 15 percent of the total coffee produced in Southwestern and Western zones of the country is illegally smuggled (without quality inspection) to

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Sudan, as it is the nearest neighbouring country to the western coffee-producing regions. Despite efforts to minimise illegal trading by convicting those involved, it remains a challenging and critical issue, especially in the Jimma zone.

Exporters

Exporters buy coffee from the traders/wholesalers in the ECX market. They further process the coffee using their own processing facilities in order to meet the required export standards. Thereafter, they export better-graded coffee to importing countries and sell low quality coffee to local traders. There are 58 exporters involved in the coffee export market (Personal communication, Ministry of Trade, 2013). The volume of coffee exports fluctuates according to differences in the annual volumes of coffee produced and competition with the international market in terms of quantity and quality. Table 1 lists the export volume of Ethiopian coffee to the top 15 destination countries. As indicated in Table 1, most coffee is exported to Germany and Saudi Arabia.

Table 2.1: Volume of export of Ethiopian coffee by country of destination

Country	2009/10		2010/11		2011/12		Total for three years	
	(tons)	(%)	(tons)	(%)	(tons)	(%)	(tons)	(%)
Germany	57,237	35.20	66,290	36.10	53,305	33.80	176,833	35.10
Saudi Arabia	28,958	17.80	24,101	13.10	27,364	17.30	80,423	16.00
USA	14,168	8.70	20,311	11.10	9,662	6.10	44,142	8.80
Belgium	12,254	7.50	15,351	8.40	10,398	6.60	38,003	7.50
France	7,967	4.90	11,150	6.10	11,299	7.20	30,417	6.00
Italy	9,239	5.70	11,586	6.30	8,426	5.30	29,251	5.80
Sudan	9,816	6.00	4,972	2.70	9,593	6.10	24,381	4.80
Japan	5,836	3.60	8,433	4.60	7,172	4.50	21,441	4.20
Sweden	3,782	2.30	8,559	4.70	4,919	3.10	17,260	3.40
UK	2,119	1.30	4,619	2.50	3,981	2.50	10,720	2.10
South Korea	2,079	1.30	2,648	1.40	3,444	2.20	8,170	1.60
Australia	2,291	1.40	2,406	1.30	2,789	1.8	7,486	1.50
Russia	2,380	1.50	1,752	0.95	2,333	1.5	6,464	1.30

Switzerland	3,762	2.30	913	0.50	307	0.2	4,983	1.00
Jordan	614	0.40	433	0.20	2,890	1.8	3,966	0.80
Total	162,502		183,524		157,882		503,908	

Source: Ethiopian Coffee Exporters Association, 2012, a Report on Ethiopian Coffee Perspective from 2009/10-2011/12 Season and the Long Term Vision of the Sector by Assefa and Arega

The Ethiopian Commodity Exchange (ECX)

The ECX was established in 2008 as an auction market. It is now acknowledged as being the major service provider in the Ethiopian coffee value chain, generally, and that of the Southwest, particularly. This auction market is centrally managed in the Ethiopian capital, Addis Ababa, and has many branch offices in different parts of the country, including Jimma, Kaffa, and other parts of Southwest region. This auction and its branch offices were established to bring order, transparency, and efficiency to the market. There are registered buyers and traders who have seats in the exchange process, which serve as a license to participate in the transactions in the ECX market and are acquired through purchase. Despite the initial (2008) price of 50,000 birr for a seat in ECX, the cost has since increased to hundreds of thousand birr, and the purchase of seats is made through a bid. All actors, except coffee unions and big state plantations with special licenses to bypass the ECX, are expected to sell and buy in this market. ECX grades coffee qualities, provides warehouse services, conducts training, and provides price information in various ways (price information screens, mobile services, websites, and the mass media) (Personal communication, Zonal Bureau of ECX, 2013).

Coffee Liquoring Unit (CLU)

The Coffee Liquoring Unit (CLU) performs the final coffee quality assessments to determine whether the export standards are met. The quality of both washed and unwashed coffee beans is graded by CLU. Coffee quality is rated after raw and physical inspection and cup tasting. The raw/physical inspection and cup tasting account for 40 and 60 percent respectively of the final quality grade. Only coffee that meets the minimum requirements of a moisture content of less than 11.5 percent and a bean size of above screen size 14 for 85 percent of the bean sample, is graded. For unwashed coffee, raw quality is assessed based on defect count of the beans and odour. For washed coffee, it is based on shape, colour, and odour (Minten et al., 2014).

Other secondary actors/service providers

Secondary actors and service providers do not directly handle or own the product. Rather, they are service providers, or 'enablers', who perform various activities. These activities include providing training and advisory services on the production, processing, and marketing activities; monitoring and following up of quality; certifying coffee; regulating and facilitating the buying and selling process; providing and facilitating credit; controlling illegal transfer of coffee; establishing and organising producers and sellers and institutions; and transporting products to the central market, etc. Actors included in this category are Oromia cooperative banks, cooperative agencies, commercial banks, agricultural offices, transport agencies, research centres, universities, certifying agencies, administrative authorities at various levels, and NGOs like Techno-Serve Ethiopia (which work on capacity-building of cooperatives in the country by granting a loan for planting a processing

machine, providing technical advice, and sometimes linking the cooperatives with buyers).

2.3 Extent of value addition, quality assurance and institutional support in the coffee value chain of Southwest Ethiopia

2.3.1 Extent of value addition

Value addition activities on coffee are performed by actors in each of the identified stages of the value chain, with the aim of achieving a greater income through the provision of quality coffee that can satisfy the needs and preferences of consumers. These activities begin at farm level where farmers perform preliminary value addition activities like sorting, cleaning, and drying cherries at the optimum moisture level, or selling red cherries after sorting and cleaning (Musebe, 2007).

Both dry and wet processing is done by traders and cooperatives (Musebe, 2007). In dry processing (to produce unwashed coffee), dry cherries are hulled and, thereafter, coffee beans are cleaned and sorted. In wet processing (to produce washed coffee), red cherries are immediately de-pulped after harvest (4-6 hours after picking), fermented, washed and the resulting parchments dried in the sun. Almost all cooperatives in the surveyed areas of the Jimma zone perform wet processing. Reasons for avoiding the dry processing at the cooperatives include the absence of processing machines and the laborious nature of the processing work which may not be reflected or rewarded by the market price (Personnel communication, cooperative officials, 2013).

Dry coffee is more common in the Kaffa zone than the cherries/ wet processed coffee in both the independent and cooperative chains. This can be attributed to a lack of knowledge and experience of wet coffee processing. Very few cooperatives and unions in the zone have a processing plant. The cooperatives supply dry coffee to unions without any further processing. The unions then process the coffee using

machines rented from traders. At the time of this survey, only six cooperatives (Kuti, Wodiyo, Michiti, Diri, Chiri and Mankira) had a washing station for wet processing, built with the support of the NGO Techno-Serve (Personal communication, Kaffa Coffee Cooperatives and Union, 2012).

Finally, export processing activities are undertaken by the exporters and unions using their own facilities following the grading and exchanging activities in the auction market. During the processing, sundried coffees are sorted by hand or sorter machines, while washed coffees are hulled, sorted and blended to make up the bulk for export (Personal communication, Exporters, 2013).

2.3.2 Quality assurance

Although there is no universally accepted definition for coffee quality (Murdoch et al., 2000; Valkila and Nygren, 2010), many studies (see Susila, 2005; Daniels, 2009; Moniruland Jang, 2012) agree that it is determined mainly by the taste and preferences of consumers. Those attributes of coffee quality which are preferred by consumers can be affected by the type of varieties grown, agronomic practices used, processing methods employed and other environmental conditions (Leroy et al., 2006). The harvesting period was also found to have an effect on quality. Beans harvested in early and middle harvest periods scored better in preliminary cup quality, preliminary total quality, total specialty cup quality, overall cup preference and body scores, compared with late harvested beans (Tolosa et al., 2016).

Fungal and mycotoxin contamination also affects coffee quality in Ethiopia. Coffee samples taken from six major coffee growing districts of the Jimma zone showed a rising fungal incidence of 87 percent and Orchrtoxin A (OTA) species (*A. westerdijkiae*, *Aspergillus ochraceus*, and *Aspergillus steynii*) were also identified for the first time in Ethiopia (Geremew et al., 2016). These fungal and toxin incidences

were found to differ substantially between the different coffee processing types, coffee sample types, and storage characteristics (Geremew et al., 2016).

Different actors in the chain, including producers, traders, exporters, and marketing institutions, have their own methods for ensuring the required coffee quality. Currently, quality control/assurance of coffee from Southwest Ethiopia is performed in three different stages: (1) at the district/wereda level by an expert from Bureau of Agriculture, (2) at the ECX level (Jimma and Kaffa branch offices), and (3) at a national level immediately before export.

At the district level, a preliminary quality inspection of coffee sourced from traders and cooperatives is done by the wereda/district Bureau of Agriculture by checking the moisture content and other major quality defects such as broken or unclean packs. At the ECX level, quality is verified according to raw and cup quality tests. Representative coffee samples are taken from the coffee trucks, coded, and then checked for preliminary quality parameters such as moisture level and bean size. Once the sample meets the criteria, it is graded. The grading system is determined by the following grading factors: beans retained, moisture content (the moisture content of coffee must not be more than 11 percent by weight), primary defect distribution (full black, full sour, fungus attacked, foreign matter, insect damaged), odour, cup cleanliness (number of cup defects out of five cups after the organoleptic examination of brewed coffee), acidity, body flavours (coffee brew taste in the mouth for determining the natural taste and the specific coffee characteristic) and secondary defect distribution (partial black, partial sour, floater, immature, withered, shell, slightly insect damaged, under-dried, over-dried, faded, coated, light, starved) (ECX coffee contracts, 2010). As previously indicated, only coffees graded between 1 and 5 are permitted for export. After further processing to meet export

standards, all coffees from the mainstream and certified chains are inspected at the national level for their quality (using raw and cup tests) before export by a state-controlled Coffee Quality and Inspection Enterprise in Addis Ababa (Personal communication, Coffee Quality and Inspection Enterprise, 2013).

3.3. Institutional support

As the supply of quality coffee is largely influenced by activities starting from production up to marketing, institutional support that can positively contribute to an increased supply of quality coffee. This includes system-wide activities classified under four major-sub programs, described below.

A. Extension support system

At the time when the coffee sector was organised at the ministry and authority levels, all sub-disciplines (agronomy, protection, quality control, marketing, planning and administration) were functional and equipped with the required manpower and budget. As a result, the sector, and the farmers working therein, was supported by strong extension services that provided training, demonstrations, technical support, strong monitoring and evaluation by experts, supply of farm tools and improved technologies.

The sector has since been re-organised under the extension department of the Ministry of Agriculture, with no specific budget allocation. Instead, the budget was allocated directly to the extension department within the Bureau of Agriculture. As a result, the extension advice and training on coffee practices provided to farmers were not considered adequate as compared with the existing demand. However, attempts are currently being made to organise the coffee sector at the authority level (Coffee and Tea Authority) so that it can be funded directly by the government and thus operate independently. Currently, development agents, who are meant to undertake

coffee extension activities, are burdened with tasks other than what they are trained for. Some development agents and experts also have inadequate knowledge and experience in coffee management and processing and a coffee technology package document which could address the technical knowledge gap is absent.

Although all farmers working in the coffee chains experience reduced access to the extension services, farmers in the independent chain are even more exposed to a lack of support. This is because farmers in the cooperative chain will still receive training and some other input delivery services, at least once a year, through their cooperative (Personal communication, Zonal Bureau of Agriculture, 2013)

B. Coffee research

Research should suggest solutions to improve coffee production and quality. The Jimma Agricultural Research Centre was established under the Ethiopian Institute of Agricultural Research with the aim of generating technologies that can improve the yield and quality of coffee. Since its inception, the Centre has generated 37 improved coffee varieties appropriate to the different coffee growing agro-ecological areas of the country (Kufa, 2011). In addition to yield and disease factors, which were considered previously to be the most important parameters in variety selection, quality aspects are now garnering increased attention (Bechere, 2007). Furthermore, different coffee agronomic practices, e.g. stumping, pruning, and spacing, have been developed. However, even though the improved varieties released by the Research Centre are used by all farmers in the mainstream and certified chains, some of the agronomic technologies are still left shelved without reaching the users. The upscaling of those good practices has not yet been undertaken at the required level (Personal communication, Jimma Agricultural Research Centre, 2013).

C. Market support system

During the previous socialist Derg regime (1974-1991), cooperatives and the coffee marketing board were the two main coffee market institutions operating in the country. During that time, only the marketing board had a mandate to sell coffee to the international market and cooperatives were only allowed to act locally. The Marketing Board was dismantled with the collapse of Derg in 1991 (Personal communication, Zonal Cooperative Agency, 2013).

Cooperatives and the Marketing Board were restructured by the current regime. There are currently 217 coffee cooperatives working under the umbrella of Oromia Coffee Farmers' Cooperative Union, of which 63 (eight certified and 55 uncertified) are in the Jimma area. The Kaffa Forest Coffee Cooperative Union (in Kaffa zone) counts 27 (18 certified and nine uncertified) cooperatives. These cooperatives perform different marketing functions e.g. purchasing, storing, processing, packing, transporting and selling.

As previously indicated, unions deal with international buyers on behalf of the cooperatives and they try to identify new and sustainable export market opportunities. They are responsible for quality control, and intend to broaden farmers' choices of outlets and, as such, contribute to a higher bargaining power of producers. Coffees from all cooperatives should pass through ECX for grading purposes only. However, ECX does not interfere in the sale of coffee from the cooperatives and unions.

D. Financial support system

Actors in the coffee value chain, especially farmers, have expressed dissatisfaction at the weak financial support system in the region. Farmers may ask traders to finance their production and household needs in return for a promised sale of coffee at harvest time. Such interlocking contracts are common in coffee markets

(Mujawamariya et al., 2013). Cooperatives are financially weak, especially when they fail to sell enough coffee. Some cooperatives in the Jimma area are in debt and are not trusted by banks, and hence do not qualify for bank loans. Instead, as indicated by cooperative officials of the two zones, the union borrows money from the bank and transfers it to member cooperatives. However, the amount of money available for loans is often not sufficient and does not reach the cooperatives on time to purchase the coffee. Although some micro-finance institutions and cooperative banks deliver credit to smallholders and cooperatives, the sums and services they provide may not meet the demand.

2.4 Coffee certification and supply in the coffee value chain of Southwest Ethiopia

Fair-trade certification was introduced in Ethiopia in 2002 by Oxfam (Backman, 2009). Certain criteria and standards which are related to the organisational structure, traceability, management and marketing are pre-requisites for attaining fair-trade certification in Ethiopia (FLO-CERT, 2014).

The goal of fair-trade certification is to improve the well-being of small-scale coffee producers by setting a minimum guaranteed price of 1.40USD/lb that can serve as safety net in the case of a price slump in the international market, and by providing a price premium of 0.2USD/lb over the conventional market (FLO, 2014). Rather than being a direct payment to producers, these premiums are intended for the financing of social projects e.g. schools, roads, health centres, water wells, and others by the cooperatives (Jena et al., 2012). Nonetheless, secure market access and minimum guaranteed price offered by certification can be seen as direct benefits to certified farmers, given the volatile nature of coffee price in the international market.

Organic certification differs from fair-trade in that it emphasises environmental stewardship, while fair-trade emphasises labour and trade standards. The IFOAM (International Federation of Organic Agriculture Movement), formed in 1972, sets standards and criteria for certification of organic products. This organisation accredits different certifying agents on the basis of the internationally agreed upon rules for accreditation so as to enable them to certify producers' organisation on its behalf (Mekuria et al., 2004).

Organic coffee certification in Ethiopia is determined according to norms and standards set by the National Organic Program of USDA (United States Department of Agriculture). This certification was introduced in Ethiopia by a USDA accredited German company BSC*OKO-GARANTIE GMBH in 1999 (Mekuria et al., 2004). The USDA rules of organic production demands farming without pesticides, inorganic fertilisers and other chemicals for three years, and the use of organic/biological means to control pests and prevent depletion of soil nutrients.

In order to be organically certified, the producer organisation/cooperative should submit an application to the USDA-accredited organisation with a detailed description of the operation to be certified, a history of substances applied to the land during the previous three years, names of the organic products grown, and a written organic system plan describing the practices and substances to be used. The accredited certifying agents review the application and send their inspectors to conduct an on-site inspection of the applicant operation. The certifying agent then reviews the inspector's report and the application and issues an organic certification if the applicant complies with USDA-NOP organic regulations. Renewal of this certification is expected to be made every year through the submission of an updated application (together with an organic system plan) and renewal fees to the certifying

agent. Mostly scheduled, yet sometimes unannounced, inspections are made by the certifying agent inspectors to verify whether the practices are performed according to the requirements of the USDA organic regulations. The reports produced from the inspection are used to decide on the renewal of the certification.

Unlike fair-trade coffee, it is difficult to determine the premium that farmers will receive after certification, as this is dependent on the quality and origin of the coffee at a given moment and market (FAO, 2009). The premium for double certification (fair-trade-organic) was estimated to be around 0.05 to 0.2 USD/lb by the officials of the Oromia Coffee Farmers' Cooperative Union.

The Oromia Coffee Farmers' Cooperative Union and Kaffa Forest Coffee Cooperative Union export a significant amount of certified coffee from Ethiopia. According to Jena et al. (2012), the total coffee production by Oromia Coffee Farmers' Cooperative Union was estimated to be 235,000 tons, of which 27,619 tons (which accounted for 10 percent of the total production), were fair-trade coffees from its 28 fair-trade certified member cooperatives. Certified coffee exported by Kaffa Forest Coffee Union in 2012 amounted to 38.1 ton, according to calculations made from the Ethiopian Customs and Revenue Authority database.

The Oromia, Kaffa, Sidama, and Yirgacheffe Coffee Farmers' Cooperative Unions are the major traders of organic certified coffee in volume in Ethiopia, and the amount supplied is estimated to be 0.1 percent of the nation's total coffee production, despite the acceptance of 90 percent of the country's coffee production as *de-facto* organic (Mekuria et al., 2004). Volumes of supply of certified (fair-trade and organic) and uncertified coffee by cooperatives and wholesalers to the central market from the study zones are presented in tables 2.2 and 2.3.

Coffee value chain

Table 2.2: Volume of coffee supply by wholesalers and cooperatives of Jimma zone (in tons)

Year	Total		Wholesalers→Exporters				Certified coop→Oromia Union				Uncertified coop→Oromia Union			
	Dry Processed	Wet Processed	Dry Processed	%	Wet Processed	%	Dry processed	%	Wet Processed	%	Dry processed	%	Wet Processed	%
2007/08	22,018	7,915	21,988	99.80	7,171	90.6	NS	NS	174	2.20	30	0.10	569	7.20
2008/09	14,158	7,446	14,116	99.70	6,636	89.1	42	0.3	183	2.50	NS	NS	627	8.40
2009/10	25,602	12,947	25,342	99.00	11,069	85.5	132	0.5	361	2.80	128	0.50	1,517	11.70
2010/11	21,875	7,408	21,682	99.10	5,928	80.0	73	0.4	208	2.80	110	0.50	1,272	17.20
2011/12	27,895	19,224	27,465	98.40	15,239	79.3	127	0.5	613	3.20	304	1.10	3,371	17.50
2013	16,870	8,911	16,870	100.0	7,544	85.0	N/A	N/A	192	2.30	N/A	-	1,175	13.20

Source: Jimma zone Bureau of Agriculture and cooperative agency, 2013, Number of wholesalers= 200- 400, Number of certified cooperatives =8, Number of uncertified cooperatives=55, NS=No sale of the specific coffee during that year, N/A= No available data despite probably the sale is there

Table 2.3: Volume of coffee supply by wholesalers and cooperatives of Kaffa zone (in tons)

Year	Total		Wholesalers→Exporters				Certified coop→Kaffa union				Uncertified coop→Kaffa Union			
	Dry Processed	Wet Processed	Dry Processed	%	Wet Processed	%	Dry processed	%	Wet Processed	%	Dry processed	%	Wet Processed	%
2007/08	2,416	266	2,337	97.0	226	100	76	3.00	NS	NS	2.48	0.10	NS	NS
2008/09	1,515	350	1,393	92.0	350	100	106	7.00	NS	NS	17	1	NS	NS
2009/10	2,575	420	2,430	94.0	420	100	131	5.00	NS	NS	15	0.60	NS	NS
2010/11	2,261	409	2,235	99.0	389	95	2,497	1.00	20	5.00	1	-	NS	NS
2011/12	3,101	1,122	2,912	94.0	1093	98	148	5.00	28	2.50	41	1	NS	NS
2013	2,562	609	2243	88.0	574	94	212	8.00	36	6	106	4	NS	NS

Source: Kaffa zone Bureau of Agriculture, 2013, Number of wholesalers=65, Number of certified cooperatives =18, Number of uncertified cooperatives=9, NS=No sale of the specific coffee during that year

Wholesalers in the mainstream independent chain continue to handle the largest proportions of the total supply of both types of coffee from the two zones, compared with the coffee traded through the cooperatives. More than 85 percent of the dry and wet processed coffee in the two zones is supplied through wholesalers. The proportions of dry and wet processed certified coffee supplied to the respective unions from the two zones are small and did not exceed 10 percent for years considered, despite its role in satisfying a niche market demand.

Apart from certified coffees, Ethiopia also supplies trademarked coffee to the international market. These are Sidama, Yirgacheffe and Harar coffee. Sidama and Yirgacheffe are in the Southern region while Harar is in Oromia region. Between 2004 and 2009, these three trademarked coffees constituted 43 percent of the total coffee export with Sidama alone contributing 30 percent to the total (Arslan and Reicher, 2010). After the trademarking, the export price of these trademarked coffees was also found to increase by 10 percent despite the uncertainty regarding the transmission of the increment to the farm-gate price (Arslan and Reicher, 2010).

2.5 Conclusion

The well-being of all actors in the chain, especially the producers, is vital for the sustainability of the coffee sector in Ethiopia. Although some positive progress has been made, the coffee chain suffers from various challenges. The first challenge is the low coffee yield reported by farmers. Average yield of coffee at the smallholder level is rather poor. Given the volatile nature of the international market price and the relative low yields, the income from coffee sales may not be sufficient to cover production costs, and thus smallholder farmers may not improve their standard of living. The low yields are partly attributed to the reliance on old and unproductive coffee varieties in the face of widespread diseases (e.g. coffee berry disease, leaf

rust). Apart from the production, some of the processing challenges faced at the farm level include the lack of processing facilities, high investment costs for raised drying beds and washing stations, limited technical knowledge, and long distances to the few processing facilities. Further processing activities, including roasting to enhance the value added by the local coffee industry, are also limited. Even if there is a continued effort by research and development to generate improved techniques of coffee production and processing, the outcome is not satisfactory. Although there is better dissemination of improved coffee varieties to a significant proportion of the farming community, improved agronomic practices are still shelved and research output on coffee processing technologies are said to be poor.

The coffee chain also suffers from poor execution of market liberalisation and weak institutional framework in the sector, which in turn results in an imperfect market largely dominated by intermediaries with quasi-monopsonist power. Cooperatives which are expected to protect smallholders from the exploitation of imperfect markets by serving as conduits for supplying essential support services and accessing the best markets for their produce, are not effective in meeting these expectations, due to their limited resources and top-down organisational structure.

Despite the challenges mentioned, the Ethiopian coffee sector has opportunities for a brighter future. That is, the country can sustainably produce and supply fine specialty coffee as it has coffee growing on suitable altitude and fertile soils, with ample rainfall and optimal temperatures, and at relatively low labour costs. The introduction of the ECX has also promoted value addition/quality by introducing various quality standard measurements and regional warehouses that organise quality control at a more local level. Traceability through brand differentiation based on coffee origin is to be mentioned in this regard. Interest and support from both

government and non-government organisations for transforming agriculture through research and development should drive innovation in the coffee sector in the near future.

In addition, the current increased focus on the role of cooperatives to improve the livelihood of smallholders is very relevant, as they help increase income by increasing bargaining power and reducing transaction costs in input and output markets. Nonetheless, such focus should also be accompanied by the creation of a suitable environment for the free operation of the cooperatives and provision of financial services in the form of loans.

Finally, special attention could be paid to stimulating local consumption. Ethiopians are the largest coffee consumers in Africa and the 'coffee ceremony' is deep-rooted in the Ethiopian culture.

CHAPTER III

¹Do coffee cooperatives benefit farmers? An exploration of heterogeneous impact of coffee cooperative membership in Southwest Ethiopia

Abstract

Smallholder farmers' participation in agricultural cooperatives is often promoted as a promising strategy for overcoming market imperfections and as a means of increasing farmers' productivity and income. In recognition of this potential, Ethiopia has recently shown renewed interest in promoting cooperatives. However, there is lack of empirical evidence of the impact that cooperatives have on farmers' performances in Ethiopia. Using a matching technique, we evaluated the impact of coffee cooperatives on the performance of their member households in terms of income and coffee production. We used data from coffee farmers in Southwest Ethiopia. The overall results suggest that members of cooperatives are not faring much better than non-members. The treatment effects we measured were not statistically significant from zero. However, the aggregate figures mask differences between cooperatives and individual cooperative members. Average treatment effects on members differ between cooperatives. Generally, those who seem to benefit more from membership include older members, more educated members, and those with larger coffee plantations. Our analysis sheds light on the heterogeneity in the impact that cooperatives can have, i.e. this impact varies among members, a finding that has important policy implications.

Key words: Coffee, Cooperatives, Propensity score matching, Heterogeneity

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3.1 Introduction

It is widely recognised that, by participating more in markets, smallholder farmers can increase their productivity levels and incomes, thereby improving their food security and experiencing less poverty. A thriving agricultural sector contributes to overall economic growth (World Bank, 2007). At the same time, however, changing economic, environmental and socio-political conditions around the world pose serious challenges to agricultural production and, particularly, to small-scale production. Today, as in the past, African smallholder producers face challenges in accessing rewarding markets. Market liberalisation (mainly in markets for traditional export products like coffee) and globalisation have presented new opportunities and challenges to farmers (World Bank, 2007) who have to deal with quasi-monopsonistic powers of the intermediaries with whom they have to negotiate spot markets deals or contracts (Markelova and Mwangi, 2010). If unprotected or insufficiently supported, smallholder farmers can be disadvantaged and lack the bargaining power to secure fair-trade conditions (Mujawamariya, 2013).

Horizontal coordination among farmers, in the form of cooperatives or producer groups, is often promoted as a means of overcoming market imperfections and constraints (World Bank, 2007; Verhofstadt and Maertens, 2015). These collective organisations can help exploit the economies of size that farmers are unable to achieve individually, improve their bargaining power, and provide access to inputs. They also facilitate market linkages for small-scale producers which can enable them to engage with and benefit from the existing value chains (World Bank, 2007; Verhofstadt and Maertens, 2015). Recently, donors and governments have been supportive of producer cooperatives (Collion and Rondot, 2001; Berdegué,

2001; World Bank, 2003; 2007; Bernard et al., 2008), even though studies reveal that, in Ethiopia and elsewhere, they achieve different levels of success.

Fisher and Qaim (2012), and Ito et al. (2012) show the positive and significant impact of banana and watermelon cooperative membership on farm income and profits in Kenya and China respectively. Similarly, Vandeplas et al. (2013) demonstrate a substantial income effect of membership in agricultural cooperatives in India. By contrast, Bernard et al. (2008) and Francisconi and Heerink (2011) show that agricultural cooperatives have a limited influence on the commercialisation behaviour (increased volume of market supply via enhanced cooperative price) of their members in Ethiopia. Barham and Chitemi (2009) examined the extent to which certain characteristics and asset endowments of smallholder farmer groups facilitate collective actions that can improve group marketing performance in Tanzania. Their findings suggest that more mature groups with stronger internal institutions, functioning group activities, and a good natural capital base are more likely to improve their members' market situations. Markelova and Mwangi (2010) indicate the need to consider different types of markets and products, the characteristics of user groups, institutional arrangements, and external environment to determine the effectiveness and sustainability of collective marketing for smallholders in Africa. Cazuffi and Moradi (2012) found a net positive effect of group size on performance of agricultural cooperatives in Ghana, probably resulting from economies of size.

However, the average impact of cooperative membership on members' performance seems to conceal considerable heterogeneity between members. The World Bank (2007) expresses concerns about this trend, which was confirmed by Bernard et al. (2008) who found a positive and significant impact of cooperative membership on the degree of commercialisation for large farms, but a sometimes

negative impact for some very small farms in Ethiopia. Similarly, Verhofstadt and Maertens (2015) show that cooperative membership in Rwanda is more beneficial for larger farms and members in remote areas. Fisher and Qaim (2012) show that the effects of membership in terms of commercialisation, technology adoption and farm income of banana cooperatives in Kenya are more noticeable for the smallest farms. Ito et al. (2012) conclude that the income effect of cooperative membership for watermelon farmers in China is twice as large for small farms as for larger farms. Abebaw and Haile (2013) assessed the impact of cooperative membership on the likelihood of fertiliser adoption among farmers in Ethiopia and found that there is a significant positive effect for less educated farmers, and an inverse U-shaped effect of distance to the market. However, none of these studies examined coffee cooperatives, despite the relevance of coffee for income-generation and the mostly smallholder nature of its production.

Studying variance in treatment effects across cooperatives and members is useful in that it can help policy makers and researchers to anticipate problems that could endanger the sustainability of cooperatives, and it can also play an important role in improving programme targeting. If only top-performing farmers join a cooperative, the net benefit of membership could decrease if economies of size are not increased significantly. The difference that cooperatives make for these top-performers would be small compared with when they operate individually. Similarly, the transaction costs involved in cooperating could be larger than the benefits in economies of size. On the other hand, encouraging top-performers to join a cooperative with less successful or less qualified farmers as members could increase the net impact, especially for those members who faced difficulties before joining the cooperative (Xie et al., 2012; Djebbari and Smith, 2008; Verhofstadt and Maertens,

2015). In short, supporting cooperatives may contribute to uplifting some members out of poverty, but the average effect could be larger for poorer-performing farmers.

In this paper, we explore both the overall and the heterogeneous impact of membership of coffee cooperatives in Ethiopia. Our general assumption is that coffee farmers in Southwest Ethiopia benefit from cooperative membership (in terms of increasing income) by improving the supply, the price they attain, and the margins obtained, and that this impact will differ across members of different socioeconomic groups.

The remainder of this paper is organised as follows. Section 3.2 describes the method of data collection and analytical tools employed. Sections 3.3 and 3.4 present the descriptive and econometric results respectively. Section 3.5 deals with the discussion. Section 3.6 concludes and provides recommendations for future research.

3.2 Methodology

3.2.1 Method of data collection and sampling techniques

The data collection for this study was conducted in January 2013 in the Jimma and Kaffa zones. A three-stage sampling technique was used to select sample households for the study. In the first stage, three weredas (districts) from each zone were purposively selected on the basis of coffee production and the concentration of cooperatives. In the second stage, accessible cooperatives were purposively selected in each wereda. In our context, inaccessible cooperatives are those which require 3-4 hour walks on foot to reach due to the absence of any type of road for vehicles. Those accessible cooperatives were then stratified based on certification status (certified and uncertified). A random selection of two cooperative kebeles was made using the list of cooperatives from the respective wereda cooperative agencies. Therefore, a total of 12 cooperative kebeles (six each from Jimma and Kaffa) were

considered for this study. More certified cooperatives were considered from the Kaffa zone as certification is stronger in this zone. In the third stage, households were stratified on the basis of their membership status. A random selection of 132 member and 124 non-member coffee-producing households (the control group) were made across 12 cooperative Kebeles.

Respondents were interviewed by 12 enumerators. These enumerators are diploma-holders working as development agents in the area. They speak the local language and are knowledgeable about the farmers and the study sites. They were trained in conducting the questionnaires, in terms of both its contents and as to how best to approach the informants. A structured questionnaire with questions relating to household characteristics, farm characteristics, the volumes of coffee produced and supplied, prices received and costs incurred, and cooperative membership was used.

The household data were supplemented with information obtained from key informant interviews, focus group discussions with selected farmers and surveys across the 12 cooperatives (both certified and uncertified) to which the farming sample belonged.

3.2.2 Method of data analysis

A particular challenge in assessing the effect of cooperative membership on performance is the need for a counterfactual, i.e. a control group of farmers who are not members of a cooperative (Heckman et al., 1997). We used the well-known Propensity Score Matching (PSM) technique (Rosenbaum and Rubin, 1985; Heckman et al., 1997; Becker and Ichino, 2002; Dehejia and Wahba, 2002) to test our general hypothesis that coffee cooperatives have a substantial impact on improving the income of their members through increasing supply, price received and margins obtained (H1). This technique matches farmers in both treated and control

samples based on their observable characteristics. The impact is measured by the difference in performance between pairs of treated and control farmers, which allows for partial control of non-random selection of cooperative members (Imbens, 2004; Caliendo and Kopeining, 2008). Members are matched with non-members in order to search for differences in performance or the Average Treatment effect on the Treated (ATT) in terms of supply volume, income levels, price received and margins obtained.

It should be noted that the PSM mimics the effects of a counterfactual and attempts to control for any bias caused by non-random selection. However, it does not take into account any possible spill-over effects of cooperative membership. In addition, members may side-sell some or all of their coffee outside the cooperatives (cf. Mujawamariya et al., 2014; chapter 4), and this cannot be captured by PSM.

We first estimated the probability of cooperative membership as a function of observable pre-treatment covariates, using a logit model that included different sets of confounding variables explaining the non-random distribution of cooperative membership among the population. Next, we generated the predicted values of the logit model propensity scores for all treatment and control units. Mathematically, this is stated as:

$$PS = \text{Prob}(Z=1|X) \quad (\text{eq.1})$$

Where the PS is the propensity score obtained through a logit regression of observable covariates on cooperative membership, Z is the probability of sample farmers being members of cooperatives and the variables considered in vector X (*age, years of schooling, number of family members in the productive age range, land planted with coffee, off-farm income, risk of price volatility on coffee income, location*). These variables were inspired by previous research (see next section).

We used the propensity scores to restrict the samples and to ensure common support or overlap. The common support assumption requires a balancing of the covariate distribution between treated and untreated observations, so that treatment observations will have a comparable control observation close-by in the PS distribution. Once sufficient overlap was found, treated and control units with similar propensity scores were matched using the Kernel matching method, to calculate the average treatment effect on the treated (ATT).

The estimation of ATT is:

$$ATT = E[Y(1) - Y(0) | Z=1] = E[Y(1) | Z=1] - E[Y(0) | Z=1] \quad (eq.2)$$

Where $E[Y(1) | Z=1]$ is the mean value of the outcome variable in the treatment group, and

$E[Y(0) | Z=1]$ is the mean value of the outcome variable in the matched control group.

A good matching estimator does not eliminate many of the original observations from the analysis and should, at the same time, still yield statistically equal covariate means for households in the treatment and control groups (Caliendo and Kopeinig, 2008). In this regard, the use of Kernel matching is helpful as more information is used to construct the counterfactual outcome by using a weighted average of all individuals in the control group. This is inversely proportional to the propensity score distance between the treated and control units, which thus reduces variance (Caliendo and Kopeinig, 2008). As PSM results are sensitive to matching methods (Imbens, 2004; Caliendo and Kopeinig, 2008), neighbourhood matching was estimated as a check for robustness. Bootstrap standard errors were used to test the statistical significance of the estimated ATT to account for the variation caused by the matching process. Finally, the balancing of the covariates was checked by testing

that the means of each covariate between the treated and control groups did not differ after matching.

Next, the ATT was explored against the farm characteristics to test for an impact difference amongst the different groups of member households (H2). Inspired by similar work (Bernard et al., 2008; Abebaw and Haile 2013; Mutucet al., 2013; Verhofstadt and Maertens 2015), the estimated ATT of each outcome variable was used as a dependent variable in a linear regression model to investigate how the cooperative effect may vary for different household and farm characteristics. The impact of heterogeneity was graphically assessed by plotting the ATT over the propensity score distribution and household and farm characteristics (results provided in Annex 3.1).

3.2.3 The definition of variables used in the analytical framework

A number of variables are thought to influence membership of a coffee cooperative. These include household demographic characteristics, farm characteristics, income, and some physical factors including distance to coffee collection points and geographic location. The matching of members and non-members was conducted on the basis of these observable characteristics in order to point to the treatment effect on the outcome variables. Table 3.1 defines and quantifies the treatment, outcome and confounding variables.

Table 3.1: Definitions of variables and their measurement

Variables	Type	Definitions and measurements
<i>Treatment Variable</i>		
Cooperative membership	dummy	1 if member, 0 otherwise
<i>Outcome variables</i>		
Income from agriculture , including coffee	continuous	Total income (in birr) obtained from the sale of all agricultural products, including coffee, in the

		2013 season
Income from agriculture, excluding coffee	continuous	Total income (in birr) obtained from the sale of agricultural products, excluding coffee, in the 2013 season
Income from coffee	continuous	Total income (in birr) obtained from the sale of both berries and dry coffee in the 2013 season
Total volume of supply	continuous	The amount of marketed berries and dry coffee (in kg) in the 2013 season
Volume of berries supplied	continuous	The amount of marketed coffee berries (in kg) in the 2013 season
Price received	continuous	Price (birr/kg) received from the sale of coffee berries in the 2013 season
Yield of berries	continuous	Yield of berries (kg/ hectare) produced in the 2013 season
Yield of dry coffee	continuous	Yield of dry coffee (in kg) obtained from a hectare of berries in the 2013 season
Net margin	continuous	Net margin (in birr/kg) obtained from sale of coffee berries in the 2013 season.
<i>Confounding variables</i>		
Age	continuous	Age of the household head in years
Years of schooling	continuous	Years of schooling of the household head
Active household members	continuous	Number of family members aged between 15 and 65 ($15 \leq \text{age} \leq 65$) within a household
Area of coffee land	continuous	Area of farm land planted with coffee (hectares)
Distance from the cooperative's coffee collection point	continuous	Time (in hours) needed by the farmers to travel to reach their cooperative's coffee collection point (assuming travel on foot).
Availability of off-farm income	dummy	1 if a household has an off-farm source of income, 0 otherwise.
Risk 1 of effect of price volatility on coffee income	dummy	1 if 'high' and 0 otherwise

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Risk 2 of effect of price volatility on coffee income	dummy	1 if 'medium' and 0 otherwise
Zonal location	dummy	1 if Jimma, 0 if Kaffa
Living in certified cooperative village	dummy	1 if yes, 0 otherwise

The choice of the explanatory variables (in table 3.1) was made on the basis of available empirical studies on the determinants of cooperative membership. In terms of household characteristics, Bernard et al. (2008), Bernard and Spielman (2009) and Abebaw and Haile (2013) show that the age of the household head positively correlates with the likelihood of cooperative membership. Bernard and Spielman (2009) and Verhofstadt and Maertens (2015) illustrate a positive relationship between education level and the probability of cooperative membership. They also depict a direct and significant relationship between the number of economically-active household members and the likelihood of cooperative membership. In terms of farm characteristics, Bernard et al. (2008), Bernard and Spielman (2009), Fischer and Qaim (2012) and Abebaw and Haile (2013) found a positive relationship between the size of a landholding and cooperative membership. Landholding size may also influence membership in our two study areas since some of the cooperatives set a minimum coffee land size (0.25 or 0.5 hectare) as a requirement for membership. The literature reports mixed results of the relation between market or road distance and cooperative membership. Although Fischer and Qaim (2012) and Abebaw and Haile (2013) show a direct and significant link between cooperative membership and the distance to the nearest road, Verhofstadt and Maertens (2015) found a significant negative effect of market distance on cooperative membership. In this study, we assume an inverse relation between the distance to the cooperative's coffee

collection point and the probability of cooperative membership, as farmers living nearby may potentially benefit more from the cooperative's marketing services.

While Fischer and Qaim (2012) and Abebaw and Haile (2013) show a positive relation between off-farm income and cooperative membership, we assumed the opposite relation in this case study. This is because having diverse sources of income makes farmers less vulnerable to poverty and potentially less likely to engage in collective action to safeguard their income from coffee.

Jena et al. (2012), Mujamawariya et al. (2013) and Abate et al. (2014) indicate that cooperatives are viewed as a safety net protecting their member farmers from low and fluctuating prices in the mainstream market. Hence, we assumed that feeling at risk of coffee price volatility would be an incentive for farmers to become members of a cooperative. That is, if farmers perceive high risk of low income from volatile coffee prices in the mainstream market, they are more likely to become cooperative members so as to feel secure about their coffee prices. Finally, we introduced zonal and certified village dummy variables to capture other institutional, market and socioeconomic heterogeneities between the sample zones and villages that might otherwise remain unobserved.

3.3 Descriptive results

Table 3.2 provides an overview of the main characteristics of the cooperatives from which we drew our sample. Coffee is the main cash crop sold by the cooperatives. There are also other crops e.g. maize and fruit produced by these cooperatives. The cooperatives were all established between 1976 and 1982, and most (but not all) are certified to sell fair-trade and organic coffee. Membership size of the cooperatives varied greatly. Generally, registration fees were low and the value paid in shares was

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reasonable across the cooperatives. Table 3.3 compares the observable characteristics of cooperative membership and non-membership households.

Table 3.2: Overview of cooperative characteristics

Name cooperative	Zone (Wereda)	Year of establishment	Certification	Membership			Membership requirements			
				Male	Female	Total	One time Fees (birr)	No.o fshare	Total minimum share value in birr	Minimum size of coffee land (ha)
Baha	Kaffa (Decha)	1980	Fair-trade and organic	250	109	359	5	1	100	No minimum size
Ambuye	Jimma (Limu)	1977	Uncertified	1547	86	1633	20	10	300	No minimum size
Chirri	Kaffa (Decha)	1978	Fair-trade and organic	320	108	428	10	1	105	0.5
Afeta	Jimma (Mana)	1977	Fair-trade and organic	1205	85	1290	5	5	125	0.25
Wanja Babu	Jimma (Limu)	1977	Uncertified	1575	165	1740	5	1	200	No minimum size
KassoDabo	Jimma (Goma)	1982	Fair-trade and organic	736	64	810	10	1	60	No minimum size
OmoBako	Jimma (Goma)	1977	Fair-trade and organic	1279	101	1380	5	1	55	No minimum size
GarukeMazoria	Jimma (Mana)	1977	Uncertified	987	15	1002	3	1	67	No minimum size
Kutti	Kaffa (Gimbo)	1976	Fair-trade and organic	315	75	390	5	1	100	No minimum size
Wodiyo	Kaffa (Gewata)	1978	Fair-trade and organic	287	146	433	10	1	55	0.5
Dirri	Kaffa (Gimbo)	1977	Fair-trade and organic	210	40	250	20	1	120	No minimum size
Emicho	Kaffa (Gewata)	1981	Fair-trade and organic	250	62	312	5	1	55	0.25

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Table 3.3 Comparison of the characteristics of cooperative members and non-members

Characteristics	Members	Non-members	t-values (P-values)
	Mean (Std.dev)	Mean (Std.dev)	
Age	47.56 (9.69)	40.37 (8.74)	6.22*** (<0.001)
Number of years of schooling	5.34 (2.55)	4.95 (2.39)	1.26 (0.21)
Family members in the productive age range (15≤age≤65)	4.28 (1.92)	4.01 (1.85)	1.15 (0.25)
Amount of land planted with coffee (ha)	1.33 (0.94)	0.72 (0.55)	6.27*** (<0.001)
Distance to coffee collection point of the cooperative (hours)	0.35 (0.26)	0.33 (0.26)	0.80 (0.43)
Risk of price volatility on coffee income (scale from 1=low to 3= high)	1.90 (0.66)	2.05 (0.77)	-1.63 (0.10)
Income from agriculture including coffee(birr)	34994 (17765.98)	29626.57 (15837.82)	2.546** (0.011)
Income from agriculture excluding coffee (birr)	11307.77 (9435.69)	8504.44 (10133.87)	2.29** (0.023)
Income from coffee berries and dry coffee (birr)	23686.29 (14556.20)	21293.85 (13821.73)	1.34 (0.18)
Volume supplied (berries and dry coffee) (kg)	961.03 (801.91)	639.32 (660.09)	3.09*** (<0.001)
Volume supplied (berries only) (kg)	775.96 (711.11)	494.38 (548.24)	3.53*** (<0.001)
Price received for berries (br/kg)	9.36 (1.02)	9.19 (1.28)	1.16 (0.25)
Yield of berries (kg/ha)	1330.96 (1028.90)	1420.42 (827.34)	-0.76 (0.45)
Yield of dry coffee (kg/ha)	443.65 (342.97)	470.86 (278.64)	-0.69 (0.49)
Net margin on berries (br/kg)	8.25 (1.04)	8.05 (1.08)	1.52 (0.13)
	%	%	Chi-square (P-value)
Availability of off-farm income			0.14
Yes	52	48	(0.71)

	No	51.9	48.1	
Zonal location (1=Jimma)				0.033
	Jimma	52.1	47.9	(0.86)
	Kaffa	50.9	49.1	
Living in certified cooperative village (1= yes)				2.95*
	Yes	54.8	45.2	(0.08)
	No	42.6	57.4	

*** and * denote significance at 0.01 and 0.1 levels

We found that cooperative member household heads were, on average, older than non-members. Members generally had more land planted with coffee than non-members. Meier zu Selhausen (2016), in his study of determinants of women cooperative participation in Uganda, also found that woman members owned more land than non-members. Certified villages had a higher proportion of cooperative members.

In terms of the selected outcome performance variables, a substantially higher volume of supply and income from agriculture (with or without coffee) was noticed among member farmers than non-members, although there was no significant difference between members and non-members in terms of other outcome variables. However, these results cannot be used to draw inferences about the impact of coffee cooperatives on the performance of member farmers, since other confounding factors would need to be accounted and controlled for.

3.4 Econometric results

The econometric results are presented in the following three subsections. The first subsection provides the results of the estimation of the propensity scores and the probability of cooperative membership. The second subsection presents the results of the propensity score matching on the impact of cooperative membership on the selected performance indicators. Finally, the third subsection discusses the

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heterogeneous treatment effect of cooperative membership on the performance indicators among farm households.

3.4.1 Estimation of propensity scores and the probability of cooperative membership

The results show that a substantial number of covariates in the model achieved the expected associations (Table 3.4).

Table 3.4: Results of estimates of the probability of cooperative membership (Logit model)

Variables	Marginal effect (d_y/d_x)	Standard error
Age (years)	0.06*	0.03
Age squared	0.00	0.00
Schooling (years)	0.03	0.06
Schooling squared	0.00	0.01
Active household members	0.01	0.03
Land planted with coffee (ha)	0.49***	0.17
Land planted with coffee squared	-0.05	0.05
Distance to coffee collection point (hours)	-0.28*	0.16
Off-farm income ^a (1=yes)	-0.18	0.14
Risk of price volatility ^a (1=high)	0.30***	0.10
Risk of price volatility ^a (1=medium)	0.01	0.10
Zonal location ^a (1=Jimma)	0.19**	0.09
Living in certified village ^a (1=yes)	0.06	0.09
Pseudo R-square	0.27	
LR ch2 (13)	96.29***	
Prob>chi2	<0.001	
% predicted correctly	52.55	
N	256	

***, ** and * denote significance at 0.01, 0.05 and 0.1 levels respectively. ^amarginal effects are calculated for a discrete change of dummy variable from 0 to 1.

The mean value of the estimated propensity scores for the sample was 0.5156, with minimum and maximum values of 0.0138 and 0.9899 respectively. The propensity scores of the control group ranged between 0.0138 and 0.9618 with a mean score of

0.3425, while the figures for the treated group ranged between 0.0713 and 0.9899 with a mean score of 0.6783. Hence, the region of common support for the distribution of the estimated propensity scores of the control (non-member) and treated (member) groups ranged between 0.0713 and 0.9618. This accounts for 127 members and 124 non-members, with only five members outside this range. The propensity scores in the common support region were used to estimate the Average Treatment effect on the Treated (ATT).

The estimation results (Table 3.4) reveal that cooperative membership directly correlates with some household, farm and risk-related characteristics. Older household heads were more likely to be members of cooperatives. Households further away from the cooperatives' coffee collection points were less likely to be members. The estimated marginal effect indicated that, for each additional hour of travel to the coffee collection point, the likelihood of belonging to a cooperative decreased by 28 percent. In addition, having more land planted for coffee positively and significantly correlated with the probability of being a cooperative member. For each hectare of coffee cultivated the likelihood of being a cooperative member increased by 49 percent. This result is contrary to the findings of Verhofstadt and Maertens (2015), who found that limited access to land was one of the determining factors for land-poor households participating in cooperatives in Rwanda. It is however in line with Abebaw and Haile's (2013) findings.

Respondents who felt a high risk effect of price volatility on their income from coffee were also more likely to be cooperative members. This suggests that members see cooperatives as providing a safety net against price risks. Our results also suggest a positive and significant geographical influence on the probability of cooperative membership, with membership levels being higher in Jimma. Other

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variables including education (i.e. years of schooling), family size in the productive age group, availability of off-farm income, and living in certified villages, did not have any significant impact on the likelihood of cooperative membership.

3.4.2 The overall treatment effects of membership in coffee cooperatives

The results from both the Kernel and neighbourhood matching show that cooperative membership does not have a significant impact on any of the performance indicators (Table 3.5).

Table 3.5: Estimates of ATT

Outcome variables	Kernel matching		NN matching (5 neighbours)	
	ATT coefficients (Bootstrap std. errors)	z-value (P-value)	ATT coefficients (Bootstrap std. errors)	z-value (P-value)
Volume of total coffee berries and dry coffee supplied (kg)	-180.64 (202.90)	-0.89 (0.37)	-100.08 (183.80)	-0.54 (0.59)
Ln (total income from coffee)	-0.27 (0.16)	-1.71 (0.09)	-0.22 (0.17)	-1.27 (0.20)
Ln (total income from agriculture including coffee)	-0.03 (0.14)	-0.18 (0.86)	0.03 (0.18)	0.14 (0.88)
Ln (total income from agriculture other than coffee)	0.30 (0.23)	1.31 (0.19)	0.35 (0.24)	1.44 (0.15)
Volume berries supplied (kg)	-38.97 (163.91)	-0.24 (0.81)	32.38 (159.32)	0.20 (0.84)
Price berries (birr/kg)	-0.22 (0.20)	-1.12 (0.26)	-0.19 (0.20)	-0.98 (0.33)
Yield of berries (kg/ha)	-49.59 (164.07)	-0.30 (0.76)	-28.88 (161.49)	-0.18 (0.86)
Yield of dry coffee (kg/ha)	-16.53 (55.19)	-0.30 (0.76)	-9.63 (48.84)	-0.20 (0.84)
Net margin for berries (birr/kg)	-0.37 (0.37)	-0.98 (0.33)	-0.37 (0.42)	-0.90 (0.37)

Note: Estimates of the matching were obtained using “psmatch 2” command (Leuven and Sianesi, 2003) in Stata. Bootstrap standard errors are calculated with number of replications of 100

3.4.3 Balancing the covariates

In order to fulfill the balancing requirements of PSM, a balancing test was used to verify whether all the observed covariates were similar between members and non-members after matching (Table 3.6). The results of the unmatched samples show a systematic difference between members and non-members in terms of age, size of coffee land, number of family members in the productive age range, and risk perception of price volatility. After the Kernel-based and nearest neighbour matching, there was no systematic difference in the observed characteristics of members and non-members, as depicted by the insignificant t-statistics for both sets of results. The percentage bias values of the covariates are all below 20 percent after matching, suggesting that the differences after both matching procedures were not significant. Only zonal location has a percentage bias value that is slightly above 20, which is tolerable in the PSM balancing.

Heterogenous impact of coffee cooperatives

Table 3.6: Results of balancing tests

	Unmatch ed Matched	Mean Members	Kernel matching				t	t> t	Neighbourhood matching (5 neighbour matching)					
			Mean Non- members	% Bias	% Reduct bias				Mean Members	Mean Non- members	% Bias	% Reduc t bias	t	t> t
Age	U	47.56	40.37	77.90		6.22	<0.001	47.56	40.37	77.9		6.22	<0.001	
	M	47.23	45.72	16.40	79	1.28	0.20	47.23	45.63	17.3	77.70	1.38	0.17	
Age squared	U	2355.30	1705.70	73.80		5.88	<0.001	2355.30	1705.70	73.8		5.88	<0.001	
	M	2323.10	2175.30	16.80	77.20	1.27	0.21	2323.10	2160.90	18.4	75	1.42	0.16	
Schooling	U	5.34	4.95	15.70		1.26	0.21	5.34	4.95	15.7		1.26	0.21	
	M	5.34	5.39	-2.10	86.90	-0.15	0.88	5.34	5.40	-2.70	83	-0.19	0.85	
Schooling squared	U	34.99	30.18	15.40		1.23	0.22	34.99	30.18	15.4		1.23	0.22	
	M	35.12	36.88	-5.70	63.40	-0.40	0.69	35.12	37.19	-6.60	57	-0.46	0.65	
Size coffee land	U	1.33	0.72	79		6.27	<0.001	1.33	0.72	79		6.27	<0.001	
	M	1.24	1.22	2.60	96.70	0.21	0.83	1.24	1.18	7.70	90.30	0.62	0.54	
Size coffee land squared	U	2.64	0.82	61		4.82	<0.001	2.64	0.82	61		4.82	<0.001	
	M	2.19	1.98	7	88.50	0.63	0.53	2.19	1.87	10.7	82.40	0.96	0.34	
Active household members	U	4.42	3.61	47.10		3.76	<0.001	4.42	3.61	47.1		3.76	<0.001	
	M	4.38	4.29	5.30	88.80	0.39	0.70	4.38	4.27	6.50	86.30	0.49	0.63	
Off-farm income(1=yes)	U	0.09	0.10	-4.70		0.37	0.71	0.09	0.10	-4.70		-0.37	0.71	
Risk price volatility (1=high)	M	0.09	0.13	-13.20	-182	-0.98	0.33	0.09	0.11	-5.30	-13.10	-0.41	0.68	
	U	0.17	0.32	-34.70		2.78	0.01	0.17	0.32	-34.8		-2.78	0.01	
Risk price volatility (1=medium)	M	0.18	0.12	15.20	56.30	1.45	0.15	0.18	0.12	13.6	60.70	1.29	0.20	
	U	0.55	0.40	30.20		2.42	0.02	0.55	0.40	30.2		2.42	0.02	
Zonal location (1=Jimma)	M	0.55	0.59	-8.60	71.60	-0.68	0.50	0.55	0.59	-7.90	73.70	-0.63	0.53	
	U	0.57	0.56	2.30		0.18	0.86	0.57	0.56	2.30		0.18	0.86	
Distance to coffee collection point (hours)	M	0.59	0.72	-26	-1048	-2.19	0.03	0.59	0.73	-26.6	-1077	-2.25	0.03	
	U	0.35	0.33	8.80		0.71	0.48	0.35	0.33	8.80		0.71	0.48	
Living in certified cooperative village (1=yes)	M	0.35	0.32	13.70	-55	1.09	0.28	0.36	0.33	9.70	-9.80	0.77	0.44	
	U	0.42	0.44	-5.40		-0.43	0.67	0.42	0.44	-5.4		-0.43	0.67	
	M	0.43	0.42	3.40	37.50	0.27	0.79	0.43	0.45	-2.9	47.30	-0.23	0.82	

In terms of unobservable and hidden biases, we assumed that a positive and significant average treatment effect might result partially from member households having relatively better unobservable characteristics (for example talent, entrepreneurship or risk preference), as opposed to their solely being a result of the effect of cooperatives. In such cases, sensitivity analysis can be used to assess whether the ATT is overestimated as a result of those unobservable characteristics. Since our results indicate that cooperative membership had an insignificant impact on selected performance indicators, it was not relevant to conduct a sensitivity analysis. This is because the insignificant impact of cooperative membership also reveals an absence of any hidden biases between members and non-members, which suggests that cooperative membership has a positive and significant impact (Hujer et al., 2004; Faltermeier and Abdulai, 2009, cited in Abebaw and Haile, 2013).

3.4.4 The heterogeneous treatment impact of cooperative membership

The estimated ATT value of all the outcome variables assumes that the impact of cooperative membership is homogeneous across all members. However, average treatment effects can also hide considerable heterogeneity of this impact between member farmers (Bernard et al., 2008; Abebaw et al., 2010; Ali and Abdulai, 2010; Cunguara and Darnhofer, 2011; Abebaw and Haile, 2013). We refined our analysis to assess the heterogeneity of the impact of cooperative membership across households (see Table 3.7).

Heterogenous impact of coffee cooperatives

Table 3.7: Heterogeneous treatment effect of cooperatives among cooperative members

Independent variables	Treatment effect on overall agricultural income including coffee (Model 1) Coefficients (Robust std error)	Treatment effect on total coffee income (berries and dry coffee) (Model 2) Coefficients (Robust std error)	Treatment effect on total volume of supply (berries and dry coffee) (Model 3) Coefficients (Robust std error)	Treatment effect on volume of supply of berries (Model 4) Coefficients (Robust std error)	Treatment effect on yield (berries) (Model 5) Coefficients (Robust std error)	Treatment effect on price of berries (Model 6) Coefficients (Robust std error)	Treatment effect on net margin of berries (Model 7) Coefficients (Robust std error)
Age	0.09* (0.005)	0.03*** (0.003)	0.03*** (0.003)	0.02*** (0.005)	0.01*** (0.003)	0.03*** (0.004)	0.003 (0.005)
School year	0.05*** (0.02)	0.05*** (0.01)	0.05*** (0.01)	0.03* (0.02)	0.02 (0.01)	0.02 (0.02)	0.05** (0.02)
Family size in the productive age group (15≤age≤65)	0.02 (0.03)	0.04** (0.02)	0.04** (0.02)	-0.01 (0.02)	-0.02 (0.02)	-0.01 (0.03)	0.02 (0.03)
Size of coffee land	0.17*** (0.06)	0.39*** (0.06)	0.38*** (0.05)	0.35*** (0.05)	0.09*** (0.03)	0.27*** (0.07)	0.003 (0.09)
Availability of off-farm income (1=yes)	-0.02 (0.18)	-0.19** (0.07)	-0.16** (0.08)	-0.09 (0.14)	-0.10 (0.12)	0.12 (0.14)	-0.06 (0.23)
Distance in hour to coffee collection point of cooperatives	0.003 (0.03)	0.01 (0.02)	0.02*** (0.002)	0.06* (0.03)	0.04* (0.02)	0.04 (0.03)	0.04 (0.04)
Location (1= Jimma)	0.11 (0.12)	0.20** (0.08)	0.18** (0.08)	0.32*** (0.10)	0.05 (0.06)	0.14 (0.11)	0.004 (0.14)
Living in certified village (1=yes)	0.08 (0.09)	0.04 (0.06)	0.04 (0.05)	0.03 (0.09)	0.003 (0.06)	-0.09 (0.09)	-0.03 (0.11)
Side-sale to traders (1.Yes)	0.15 (0.11)	0.08 (0.07)	0.10 (0.07)	0.06 (0.10)	0.004 (0.06)	0.11 (0.10)	0.14 (0.11)
Constant	9.33 (0.34)	6.72 (0.26)	4.21 (0.26)	4.32 (0.35)	6.39 (0.25)	7.94 (0.30)	9.61 (0.40)
No. of observations	127	127	127	126	126	127	126
F-stat	2.68**	19.57***	20.59***	9.09***	3.11***	10.50***	1.44
Prob>F-stat	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	0.18
R-squared	0.13	0.60	0.60	0.36	0.19	0.33	0.07

*, ** and *** denotes significance at 0.1, 0.05 and 0.01 level respectively

Our results corroborate those of other research (see Bernard et al., 2008; Abebaw and Haile, 2013; Verhofstadt and Maertens, 2015) and demonstrate that not all members benefited equally from membership. Significant heterogeneities relating to the demographic, farm and the physical characteristics of member households were observed (Table 3.7).

The results show a positive and significant impact of cooperatives for relatively older member farmers in all of the performance criteria considered. For farmers who are more educated, membership seems to have had a larger impact on the total volume of coffee supplied and income from agriculture and coffee. These findings imply that cooperatives were less effective in improving performance for younger and less literate members.

A positive and significant impact of cooperative membership on income from agriculture and coffee, volume of supply, price received and yield was observed for members with large farms, implying that cooperatives are less effective for small-scale farmers. Distance to the coffee collection point was positively associated with the ATT on the amount of coffee supplied. The impact of cooperatives on coffee income and volume of supply was higher for member farmers living in the Jimma zone than those in the Kaffa zone.

3.4 Discussions

The significant heterogeneous impact of cooperative membership among the different socioeconomic groups of member farmers can be attributed to different factors. For example, the effectiveness of cooperatives for older members can be attributed to the lower likelihood of young farmers becoming members of cooperatives (Table 3.4). In addition, older members are more committed to their cooperatives as they are more aware of the advantages of collective action and have

invested much of their time into the cooperatives. Despite the insignificant impact of education on the membership of coffee cooperatives (Table 3.4), the results suggest that incentives provided by cooperatives were largely utilised by the more knowledgeable member farmers, as knowledge enhances open-mindedness for more interaction with and experience of other members within the cooperatives.

The significant effect of cooperative membership for large farms can be attributed to the fact that cooperatives contribute to economies of size in inputs and market access, and with a reduction in transaction costs. Large farms that use more inputs and supply more coffee to the market thus benefit more. This result is similar to the findings of Verhofstadt and Maertens (2015), but contradicts the findings of Ito et al. (2012) and Fischer and Qaim (2012) who show that cooperatives have a positive impact on small farms. This result may be explained partly by that fact that land size positively correlates with cooperative membership (Table 3.4). This may be the result of some cooperatives imposing physical capital constraints on membership, thus excluding the small-scale farmers from reaping the benefits of cooperative membership.

The positive relation between distance to coffee collection points of cooperatives and volume of supply relates to cooperatives' marketing activities which can induce supply by reducing transaction costs (which are higher for distant farms). Interestingly, farmers in distant places are less likely to join cooperatives (Table 3.4), although the potential benefits for them are significant. Verhofstadt and Maertens (2015) found a similar positive relationship between market distance and the effectiveness of cooperatives, while Abebaw and Haile (2013) report a negative association of market distance with the adoption of agricultural technologies (fertilisers) by member farmers. Improved benefits from cooperative membership in

Jimma area can be traced to better infrastructural facilities and services in that area. These services provide easier access to markets, increase information sharing and contribute to the higher probability of farmers in Jimma becoming cooperative members (Table 3.4).

Although there were considerable differences between individual members in benefiting from cooperatives, the overall impact of cooperative membership on the performance of coffee farm households in the areas were insignificant. We identify three important institutional factors to explain why coffee cooperative membership in general has an insignificant impact.

Firstly, cooperatives in Southwest Ethiopia are heavily financially constrained for purchasing coffee from their members. Most of the cooperatives (especially in Jimma) are in debt and have already lost trust from banks for borrowing money. Even though cooperative banks were established for the purpose of providing credit or loans to cooperatives, the service is not effective due to a range of administrative and technical factors. Thus, cooperatives are forced to obtain loans through the unions to which these cooperatives belong. The unions thus borrow money from the banks and transfer it to their member cooperatives. However, the money obtained through the unions is not always delivered on time and is insufficient to purchase all the coffee from member farmers at competitive prices. In addition, the cooperative chain is also heavily constrained by payments methods. Traders in the mainstream independent market make full payment to producers immediately upon purchase, whereas cooperatives first settle all outstanding debts and costs, often resulting in payment lags. Coupled with the price problem, payment delays inevitably impair cooperatives' ability to make coffee a lucrative business for more marginal producers, or to transform the power asymmetry in the mainstream/conventional market. Financial

constraints also mean that cooperatives are not in a position to provide credit to their members. Government-sponsored micro-finance schemes are the only financial institutions that provide credit services to producers in the study areas. However, they are not able to help all producers. As a result, a significant number of member farmers (more than 50 percent) are forced into an interlocked contractual agreement with traders in which they obtain loans with a promise to settle the debt with an equivalent amount of coffee at harvest time. In these contracts, non-negotiable prices are set by the traders at the time of delivering the loan, which remain unalterable even if there is an increase in price at the time of harvest/supply.

Secondly, cooperatives provide training and extension services to farmers, so that they can obtain the required knowledge and technical skills needed to improve their production/productivity and income. For example, the study by Meier zu Selhausen (2016) found that previous training and extension services affect production and the women's choice to market their coffee through the cooperatives. However, coffee cooperatives in the study area are not in a position to provide sufficient training and technical advice to their members. Due to the limited number of experts and low commitment of cooperative management, training is organised only yearly in collaboration with the District Bureau of Agriculture. As a result, the yield and the possible income benefit that cooperatives could have realised from the use of improved techniques of production are not achieved at the required level.

Thirdly, cooperative leaders lack managerial competencies. Almost all cooperatives in the region are led by illiterate farmers who have no knowledge and skill in modern organisational management. Some 36 percent of respondents gave their cooperative leadership a low credibility rating, highlighting an absence of managerial transparency and accountability.

Even if cooperatives are unable to directly benefit their members economically, they are able to do so indirectly by improving the working of markets and competition. The fierce price competition between cooperatives and traders wishing to purchase coffee from farmers leads results in higher private trading prices and thus higher turnover for producers (known as the competitive yardstick effect). Thus, despite having an insignificant direct impact on income, coffee cooperatives serve as a safety net to member farmers to prevent exploitation by traders.

3.6 Conclusion

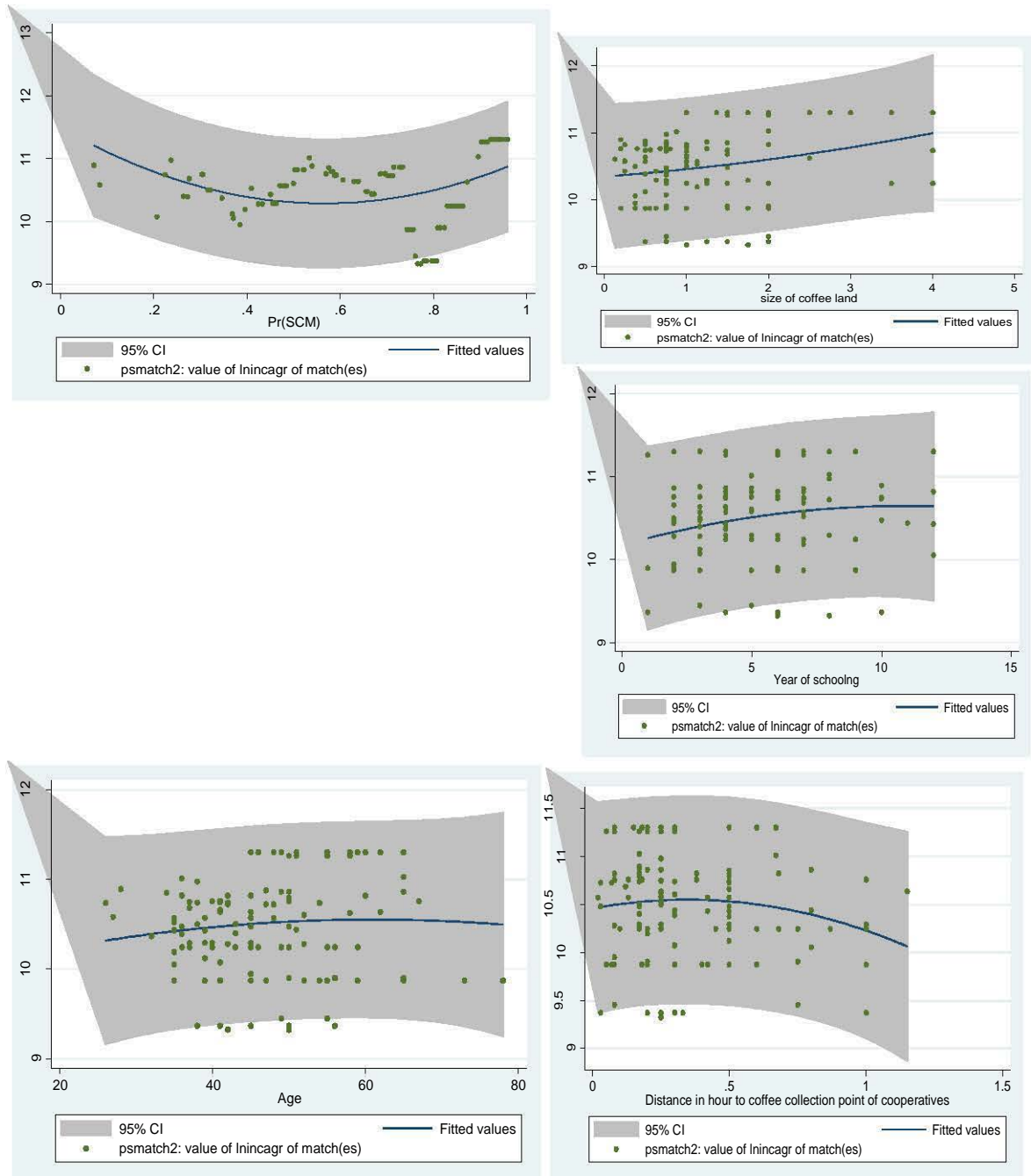
Despite the turbulent history of cooperatives, sometimes associated with Ethiopia's highly centralised socialist governing regime of 1974-1991, the present Federal Democratic Republic of Ethiopia (FDRE) government has expressed renewed interest in collective action to promote greater market participation by smallholders. However, it is worth questioning whether cooperative membership really affects farmers' performance. Using a matching technique on household income, yield, volume of supply, price received and margins obtained as indicator variables, we evaluated the overall and heterogeneous impact of coffee cooperatives on performance of member farm households in Southwest Ethiopia.

Our results suggest that coffee cooperative membership does not have a significant overall impact on the performance of member farm households in any of the selected performance indicators. However, these average values conceal considerable heterogeneity across member households. Our analysis of the heterogeneity of these treatment effects shows that cooperatives are more effective for member households with older, more educated household heads who own larger coffee farms.

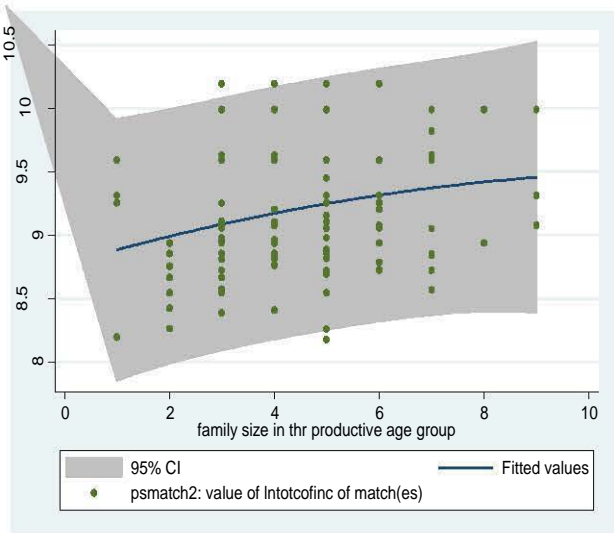
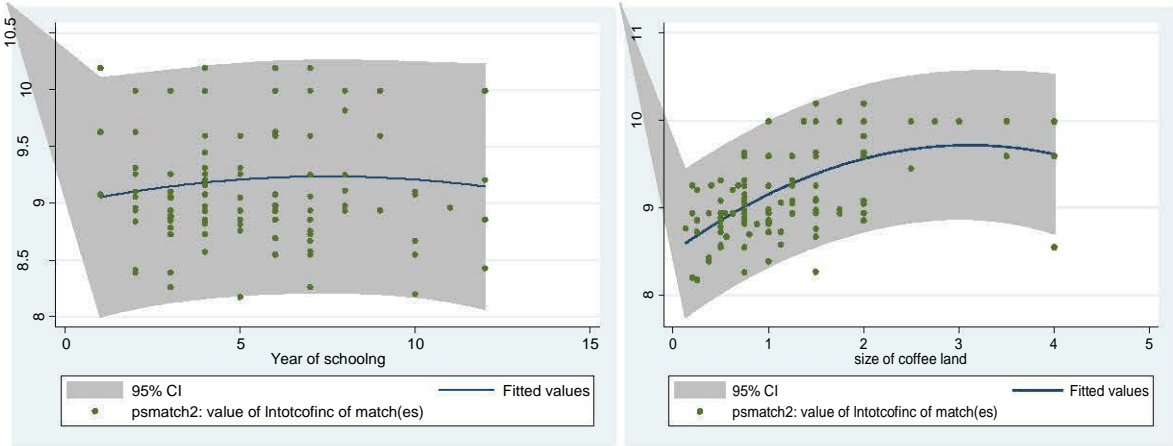
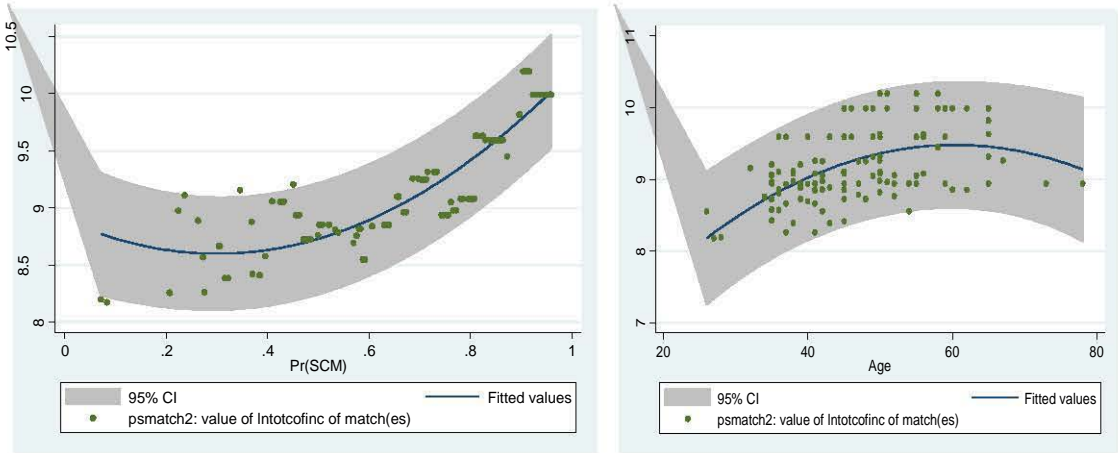
From a policy perspective, our findings stress the need to design strategies for improving the financial power of cooperatives and the competency of members and management personnel, in order to promote the coffee sector development. The positive correlation of cooperative membership and effectiveness with age and size of land suggests that cooperatives should avoid placing membership entry barriers based on human and physical capital, and should be more welcoming and encouraging of young and small-scale farmers. Our findings on the negative selection of the estimated income and supply effects of cooperative membership with distance to the cooperatives' coffee collection point implies the possibility of expanding membership, and calls for continued promotion of cooperatives in more distant places. The higher probability of cooperative membership and effectiveness in the Jimma area also shows the need for a concerted effort to empower and promote cooperatives in the Kaffa area to attract more members and improve their efficacy. Finally, our results demonstrate the relevance of transcending overall treatment outcomes, and examining heterogeneous effects and assessing the impact of institutional innovation in the agricultural sector. We acknowledge that our findings are not necessarily applicable to all coffee cooperatives in Ethiopia, as our samples are relatively small and localised. We therefore suggest further research on the impact of coffee cooperatives in other coffee growing areas of the country.

Annex 3.1: Graphical representation of heterogeneous impact of cooperative membership

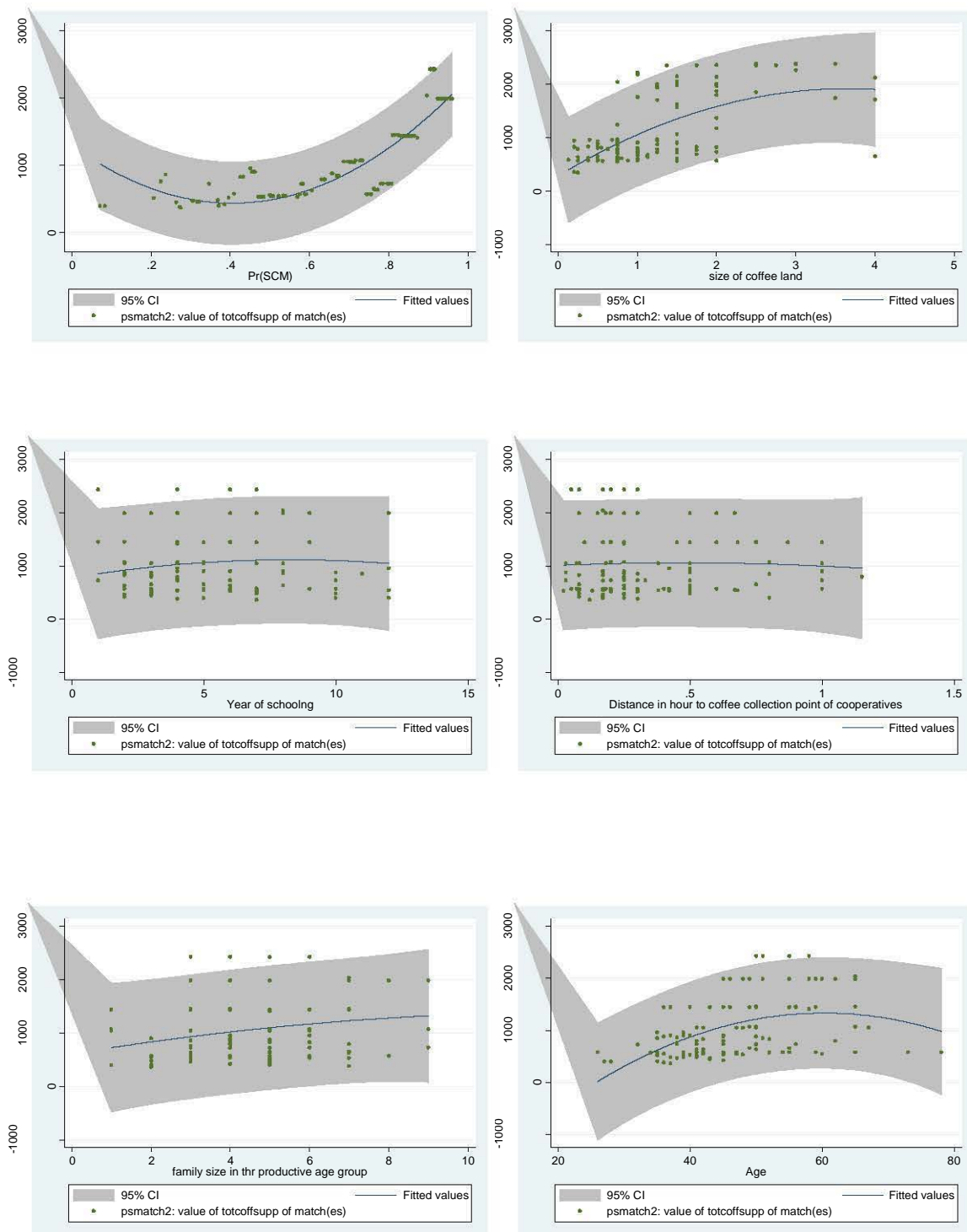
Annex 3.1.1: Heterogeneity of ATT of income from agriculture (including coffee) over different covariates



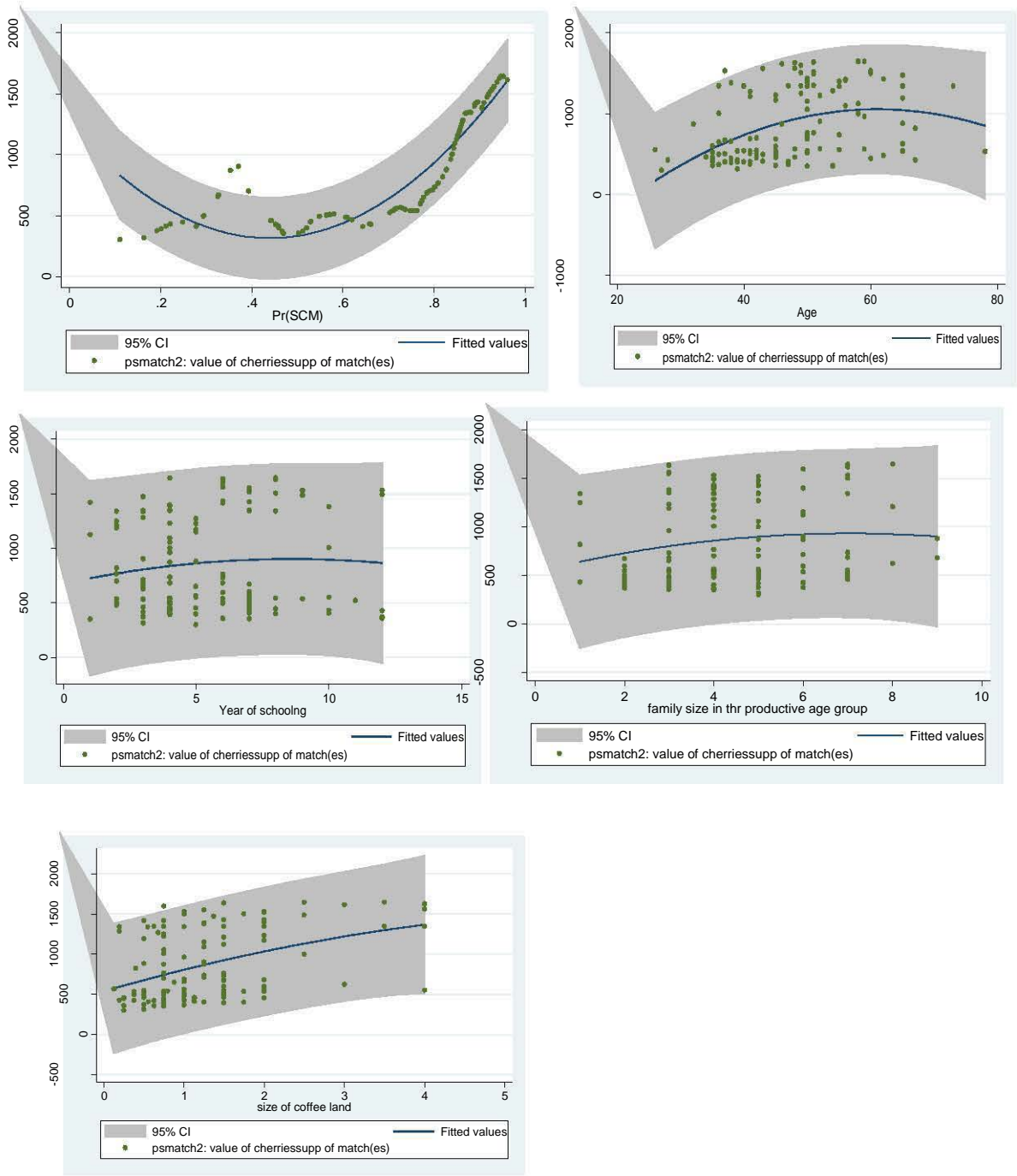
Annex 3.1.2: Heterogeneity of ATT of income from coffee over different covariates



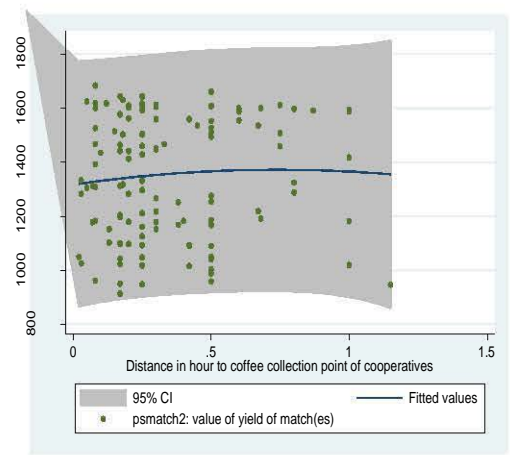
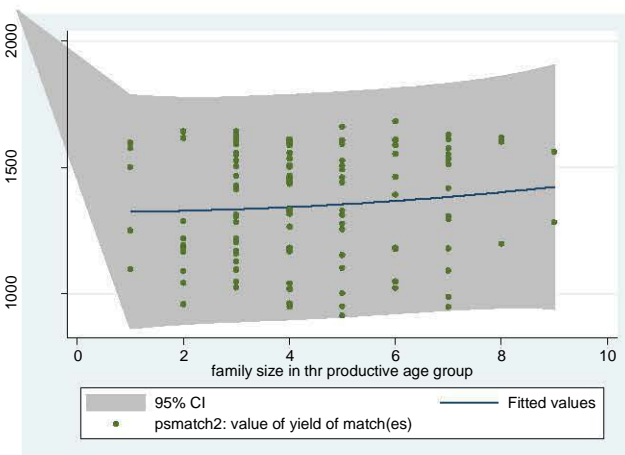
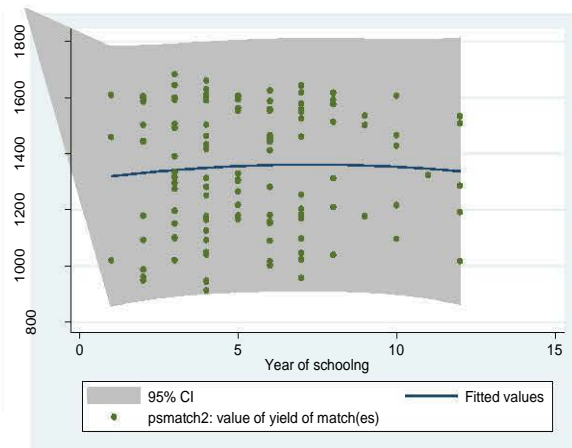
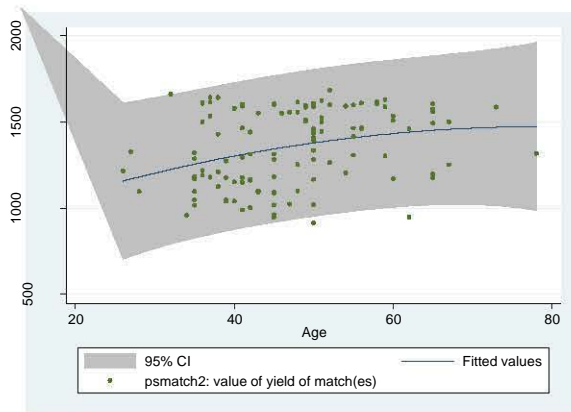
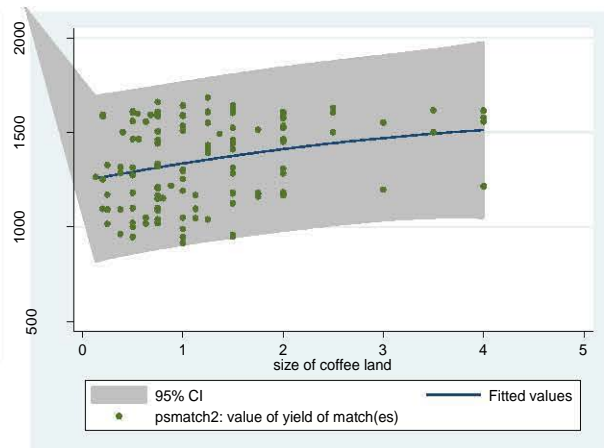
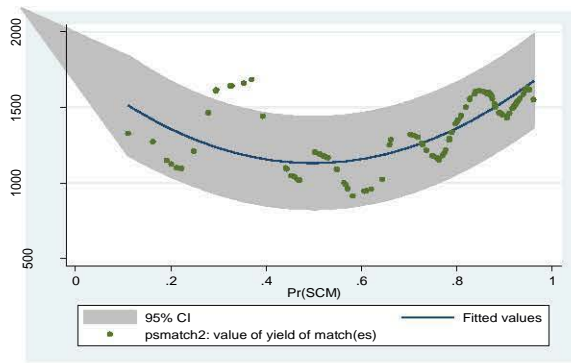
Annex 3.1.3: Heterogeneity of ATT of total volume of supply of cherries and dry coffee over the different covariates



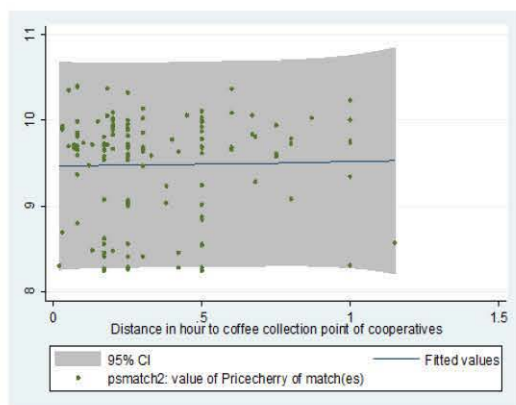
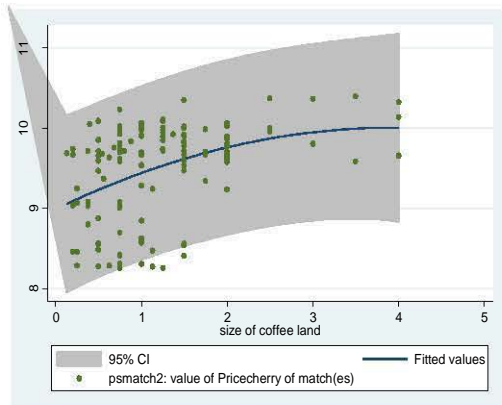
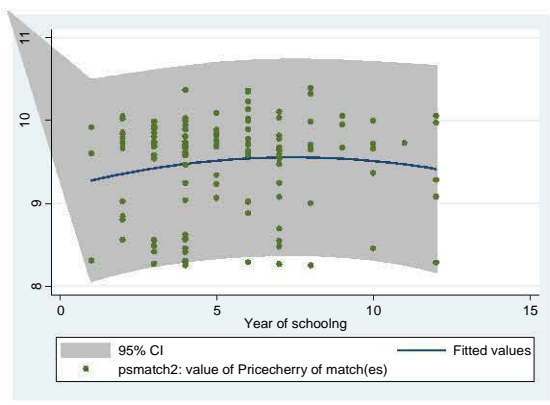
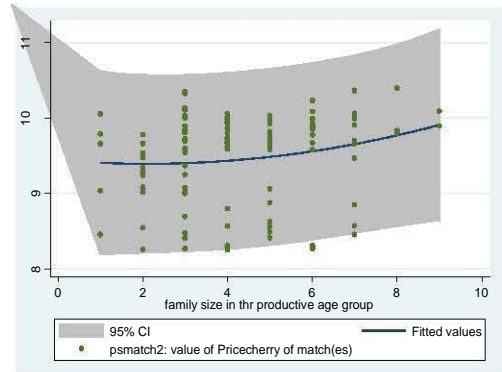
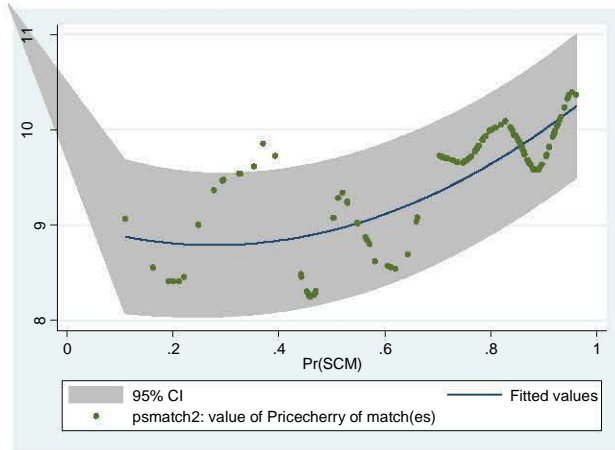
Annex 3.1.4: Heterogeneity of ATT of volume of supply of cherries over the different covariates



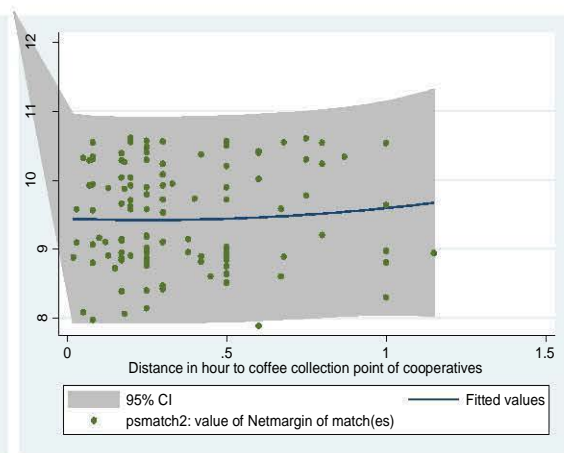
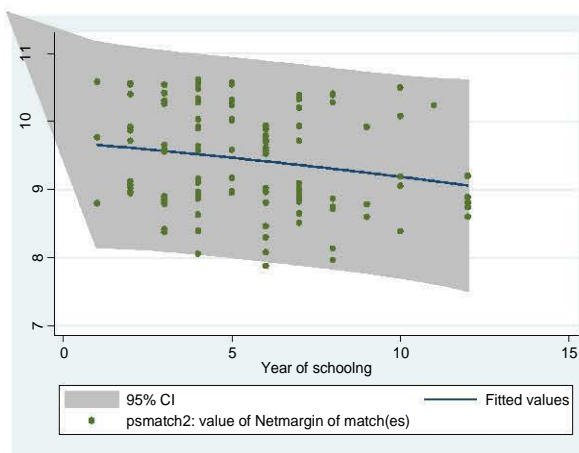
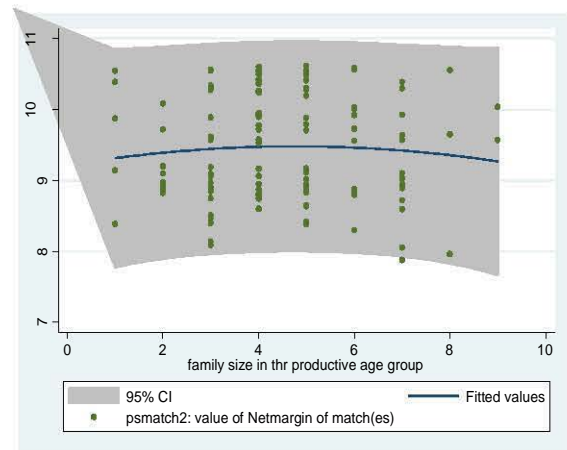
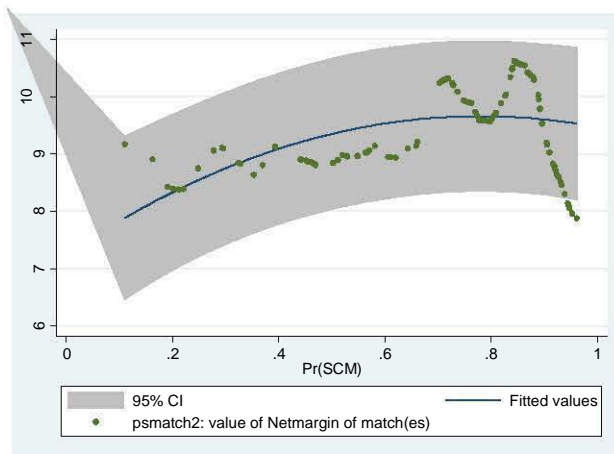
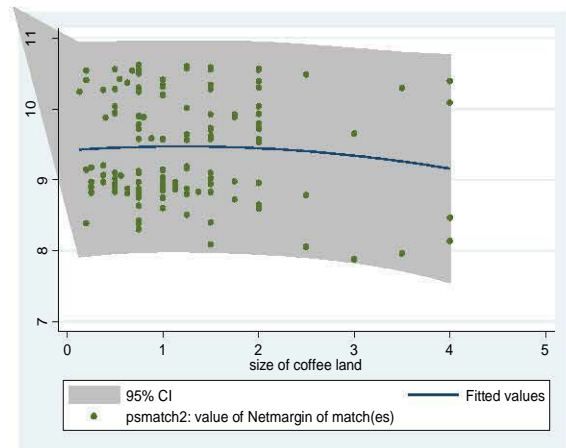
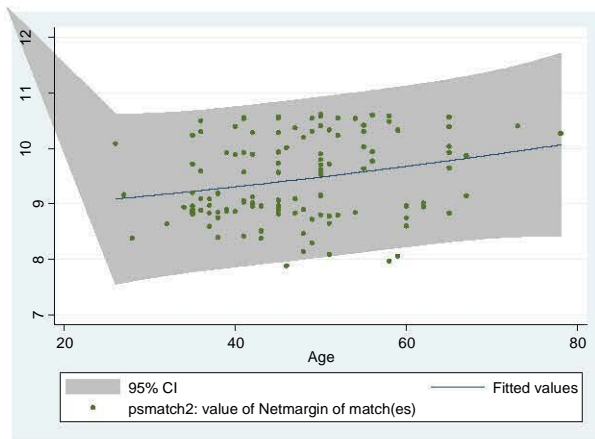
Annex 3.1.5: Heterogeneity of ATT of Yield over different covariates



Annex 3.1.6: Heterogeneity of ATT of Price over different covariates



Annex 3.1.7: Heterogeneity of ATT of net margin over different covariates



Chapter IV

²A two-step econometric estimation of covariates of side-selling: Case of coffee cooperatives in Southwest Ethiopia

Abstract

Cooperatives and farmer associations should contribute to improving the income of their members by linking them to domestic and international inputs, technology and output markets and increasing their bargaining power through collective action. Despite their potential significance in improving producers' market performance, cooperatives often face challenges of leakage/side-selling, where member farmers sell a significant proportion of their output to private traders. Since cooperatives rely on members' contributions to operate effectively, side-selling can threaten their economic performance and may jeopardise their sustainability. Using cross-sectional household data and a Cragg's double hurdle regression model, we identified the determinants of side-selling by coffee cooperative farmers in Southwest Ethiopia. The results suggest that coffee certification has a substantial impact in reducing the scale of side-selling. The results also show that more experienced and better educated farmers, who have off-farm income and trust in their cooperative's leadership, were found to side-sell considerably less than other farmers. In contrast, farmers who experienced late payments from their cooperatives side-sold more coffee. The study also highlights possible interventions to improve members' commitment and increase the performance of coffee cooperatives in the region.

Key words: Coffee, Side-selling, Southwest Ethiopia, Cooperatives, Cragg's model

² Accepted Paper in the Journal of Development Studies

4.1 Introduction

The vital role of agricultural marketing in promoting economic growth and well-being amongst farmer communities is well recognised. However, rural markets in most developing countries are underperforming as market access is constrained by high transaction costs, unstable prices, lack of rural infrastructure, weak market linkages, asymmetric market information and poor bargaining power of smallholders (e.g. Alemu, 2011). Cooperatives have been promoted as an institutional solution to strengthen farmers' linkages to markets and overcome the above-mentioned challenges (Poulton and Kydd, 2006).

Various authors (Bebbington, 1996; D'Haese et al., 2005; Loevinsohn et al., 1994; Markelova et al., 2009; Wollni and Zeller, 2007 and Fischer and Qaim, 2011) show that collective action through producers' organisations can contribute to a pro-poor market development, allowing farmers to exploit size economies in processing and marketing and increasing their bargaining power viz-a-viz larger-scale buyers. The notion that farmers' collective action within cooperatives, particularly through group contract arrangements, can also enhance the reliability and quality of produce marketed, as well as increase the price received (and thus farmers' incomes), has also recently gained popularity (Narrod et al., 2009; Francesconi et al., 2015). In addition, farmers' organisations can provide important platforms for capacity building, information exchange and innovation in rural settings (Bingen et al., 2013).

However, despite the apparent benefits, cooperatives have been found to be vulnerable to problems of side-selling, where individual farmers benefit from the cooperatives without contributing to them (Wollni and Fischer, 2014; Sexton 1986; Staatz, 1987). This can reduce a cooperative's ability to maintain quality controls (or a stable supply), weaken farmers' involvement in the operation of the cooperative

and, in the long-run, jeopardise the economic sustainability of a cooperative. In our research area (Southwest Ethiopia), half of the coffee produced by members is side-sold to private traders in the conventional market. Research (see Calkins and Ngo, 2005; Shiferaw et al., 2009; Markelova and Mwangi, 2010; Mujawamariya et al., 2013; Malan et al., 2015) identifies delays in payment as a significant problem experienced by cooperative members in many African countries, which may well lead member farmers to side-sell to local traders. For example, Shiferaw et al. (2008) and Calkins and Ngo (2005) report payment delays of five weeks for grain in Kenya and three weeks for cocoa farmers in Cote d'Ivoire. A time lapse of two to four weeks in effecting payments after delivery and two to five years in paying dividends is common among coffee cooperatives in Southwest Ethiopia. Late decision-making by cooperatives in determining their final purchase price, due to price wars with traders and time delays in settling payments, are the main reasons for late check payments and the distribution of dividends. Delayed auditing can also be regarded as a reason for the late payment of dividends, as cooperatives need to be audited before releasing dividends to their members.

Farmers usually discount the financial impact of delays in payments when they sell to cooperatives. In such instances, the decision to patronise the cooperative or side-sell to traders partly depends on the specific discount rate for uncertain future payments. One key element here is farmers' access to liquidity (Fulton and Adamowicz, 1993; Staatz, 1989; Wollni and Fischer, 2014). For example, Bhuyan (2007) found that larger farms and farmers with more off-farm income are more likely to patronise their cooperatives. Similarly, Fulton and Adamowicz (1993) indicate that farms with more specialised production methods are more loyal to their cooperatives. Wollni and Fischer (2014) identify a U-shaped relationship between farm size and the

share of member deliveries. Thus, cooperative farmers can either sell to their cooperatives, which pay them patronage refunds but delay the payment, or to traders who pay on delivery.

There are also other internal and external organisational factors which can influence members' commitment to their cooperatives. Trust in the cooperative's leadership should be considered as positive internal organisational factor on a member's decision to patronise a cooperative. Ruben and Heras (2012) found that trust is affected by the level of member heterogeneity and the level of state control in the cooperative. Bijman and Verhees (2011) also found that farmers seem to attach more value to trust in their affiliation with their buyers than the actual price obtained. Hansen et al. (2002) confirmed the role of trust in the sustainability of agricultural cooperatives and members' commitment to patronise their cooperatives over time. They differentiate between cognitive and associative trust, with cognitive trust relating to the trust that members have in the leadership of cooperatives while associative trust refers to trust between members. They also point to the relevance of trust in the sustainability of cooperatives as it improves members' commitment. Fulton and Giannakas (2001) argue that when farmers perceive their cooperative as working on their behalf, their commitment to patronize the cooperative increases.

Conversely, Mujawamariya et al. (2013) discuss the importance of trust that farmers have in traders when they decide to side-sell. However, our study did not quantify this finding. The above-mentioned studies also do not link trust to side-selling.

Some researchers (Fulton and Adamowuz, 1993; Fulton and Gianakas, 2001; Malan et al., 2015) indicate that, besides the price paid by cooperatives at the time of delivery, the anticipated patronage refunds (dividends) might be an important

motivation for farmers to reduce side-selling and patronise their cooperatives. Members may have to trust the cooperative management to pay these dividends. In this paper, we note how trusting in the honesty of cooperative leaders can affect side-selling by member households.

Certification is an organisational factor that could reduce free riding behaviour among cooperative members. Certification licenses, held by the cooperatives, enable them to sell produce as fair-trade or organic, increase their market access and improve stability by providing long-term contracts. Moreover, certified cooperatives are expected to receive support and training from the certifying organisation. This helps farmers attain higher prices for their produce by setting a minimum price and a price premium. Such arrangements usually involve a training component which can assist in developing farming and managerial skills, improving agricultural practices and enhancing organisational development (ICCO, 2012). To our knowledge, no studies have empirically linked side-selling with the certification of a cooperative. Hence, this study seeks to consider different influencing factors or drivers and assumes that farmers engage in a 'two-step' decision-making process when considering side-selling. We distinguish the decision to side-sell as the first step or hurdle, and the decision regarding how much of the total coffee production to side-sell as the second. We argue that side-selling is influenced by various personal, farm and organisational factors.

This paper contributes to existing studies on side-selling in three ways. Firstly, the possible importance of certification has not yet been addressed in previous studies on side-selling, while we believe it may have a significant impact. Fair-trade or organic certification increases joint activities and farmers' involvement in cooperatives. This study therefore aims to draw implications of the impact of

certification on reducing free riding behaviour among member farmers. The importance of other factors driving side-selling, including years of experience in coffee production and members' cognitive trust, have also not received much attention in previous research. Hence, this paper emphasises the effect of certification, experience and trust on the likelihood and extent of side-selling by cooperative members.

Secondly, we compare 12 cooperatives, incorporating a larger sample than previous research studies on side-selling. This allows for the testing of possible diversity between cooperatives and member farmers who sell part of their coffee to private buyers in the conventional market.

Thirdly, this study introduces an alternative econometric approach to analysing side-selling by cooperative farmers. This accounts for member households who are fully committed to their cooperatives and hence have zero levels (censored) of side-sale. A Tobit model can be used to analyse these censored dependent variables, but is criticised for its assumption of simultaneous decision-making to participate and the level of participation. Furthermore, a Tobit model considers the 'corner solution' as the sole reason for zero observation in the dependent variable. A Heckman selection model, by contrast, allows a separate estimation of participation and the level of participation but does not permit a corner solution in the second stage. We therefore propose a model that allows for a more flexible estimation of the factors determining decisions regarding side-selling, i.e. a double hurdle model which considers two separate stages of estimation with a discrete choice of non-participation in the first stage (which does not feature in the Tobit model) and a corner solution for the intensity of participation in the second hurdle (which is not included in the Heckman model).

While previous studies (see Fulton and Adamowicz, 1993; Bhuyan, 2007; Pascucci et al., 2012; Mujawamariya et al., 2013) consider side-selling as a discrete decision, our two-step approach helps to capture decisions on the share of coffee delivered to cooperatives or traders. Mabuza et al. (2014) used a similar analytical approach in their study on the effects of transaction costs on mushroom producers' choice of marketing channels in Swaziland. Another study, by Wollni and Fischer (2014), highlights the relevance of two-stage estimation in accounting for the independent decisions on the likelihood and intensity of members' participation in side-selling coffee in Costa Rica.

The remainder of this paper is structured as follows. Section 4.2 details the background on the certification process of cooperatives. Section 4.3 describes the data collection and analytical tools employed. Section 4.4 presents the descriptive comparative results for side-selling and its determinants among different groups of respondents. Section 4.5 presents the econometric results. Section 4.6 discusses the determinants of side-selling. Finally, section 4.7 provides conclusions with recommendations for further research.

4.2 Certification of coffee cooperatives

Certification of coffee cooperatives in Ethiopia first starts with certifying the unions. This involves certifying agents of FLO (fair-trade) or USDA (organic certification) reaching an agreement with the unions on conditions and payment of certifications and then certifying the unions (Backman, 2009). Once a union is certified, the certifying agent is required to visit the individual cooperatives belonging to the union. Union representatives and certifying agents travel to the area where the cooperatives are located to evaluate them. Formal agreements are then signed among the three parties (the cooperative, the union and certifying agents) regarding the conditions

and payment terms. A cooperative is certified once it fulfils all the conditions of the certification. Initial and renewal costs of certification are pre-financed by the unions, with the expectation that they will be reimbursed by the cooperatives (Personal communication, Oromia and Kaffa Cooperative Unions, 2013).

Currently, there are eight and 18 certified cooperatives (mainly fair-trade-organic) in the Jimma and Kaffa areas respectively, supplying certified coffee to the international market (Personnel communication, Oromia and Kaffa cooperative union, 2013).

4.3 Methodology

4.3.1 Data collection and sampling technique

The data collection for this study took place in May 2013 and the same weredas and cooperatives (detailed in Chapter 3) were used for selecting farm households. A total of 190 farmers were randomly drawn from these cooperatives, using their membership lists as the sampling frame. A formal household survey was administered among the households by the same trained enumerators used in the previous study (Chapter 3). Structured questionnaires with sections on demographic characteristics, market-related information, trust, risk and uncertainty, were used for collecting the required data. Information from focus group discussions and key informant interviews were also utilised to supplement and validate the data from the farm household surveys.

4.3.2 Method of data analysis

The main descriptive results were derived by using independent sample t-tests that compare differences in the hypothesised determinants of side-selling between side-sellers and fully committed farmers. Paired sample t-tests were used to compare the prices that side-sellers received from traders and cooperatives.

We estimated a double hurdle model to quantify the correlation between the amounts sold to cooperatives, side-sold to traders, and the variables that we believe determine side-sales. Producers make two types of decisions regarding their marketable surplus. The first decision is linked to the choice of market outlets, while the second is related to the amount of supply to each channel. Several researchers (Hobbs, 1997; Holloway et al., 2002; Holloway et al., 2004; Gong et al., 2007; Woldie and Nuppenau, 2011) employ a Tobit model to predict farmers' market behaviour. The Tobit (Tobin, 1958) modelling approach presumes that decisions about participation and volume are made simultaneously and the same factors that affect the participation decision also affect the sales volume decision in the same way. The zeros in the dependent variable (intensity of participation) represent the corner solution of non-participation. The shortcoming of this approach is that it does not distinguish between the decision to participate and the intensity of participation. Another weakness is that the zero value of the dependent variable (the intensity of participation) can be due to a discrete choice not to participate or not to sell. Alene et al. (2008) and Goetz (1992) propose a Heckman sample selection model in which participation and volume decisions are assessed in two-steps. Here, the zero observations in the dependent variable are assumed to be discrete choices not to participate. Once a farmer decides to participate, only positive quantities of output can be expected.

A double hurdle model can partly overcome the above-mentioned shortcomings. The model was first presented by Cragg (1971) and further developed by Jones (1989) and Pudney (1989). The double hurdle allows for censoring at two decision stages. Essentially it assumes that individuals pass two different hurdles or decision paths that determine the intensity of their participation in different marketing

channels (Brouhle and Khama, 2005). For example, in the case of side-selling by cooperative members, the model posits that farmers must pass two separate hurdles before they engage in side-selling. The first hurdle concerns the decision on whether or not to engage in side-sales and the second is the level of side-selling. The approach uses different latent variables to model each decision process, with a probit model determining participation and a truncated regression for the level of side-selling. According to this model, positive side-sale can be achieved if a farmer decides to side-sell (first hurdle/participation hurdle) a certain amount of the produce (second hurdle/supply hurdle). In effect, Cragg's model can be considered a more flexible version of the Tobit and the Heckman models.

To select the best choice of model, a likelihood ratio test was used to compare the double hurdle model with the Tobit model, following Mabuza et al. (2014) and Shiimi et al. (2010).

$$ln_{DH} - ln_{LT} \quad (eq.1)$$

Where ln_{DH} is the log likelihood of the double hurdle model and ln_{LT} is the log likelihood of the Tobit model. In addition to using robust standard errors to account for possible heteroscedasticity, a second likelihood ratio test is needed to decide whether or not there is a need to select a model that accounts for heteroscedasticity or not (Eakins, 2014; Newman et al., 2003):

$$LR = 2 * (lnL_{HetroDM} - lnL_{HomoDM}) \quad (eq.2)$$

Where $L_{HetroDM}$ and L_{HomoDM} represent the log likelihoods of the heteroscedastic (restricted) and homoscedastic (unrestricted) double hurdle models, respectively.

The results of these models conclude that the double hurdle model provides better results than a Tobit model (see annexure). The results of the double hurdle model are thus reported here. Based on the higher chi-squared critical value for

selecting the homoscedastic, rather than the heteroscedastic double hurdle model, we reject the use of the restricted model (see annexure). Hence, the results of the homoscedastic (unrestricted) Cragg's double hurdle model are also presented. The model is specified by the following formula (Burke, 2009):

$$f(w, y|x_1, x_2) = \{1 - \phi(x_1\gamma)\}^{1(w=0)} [\phi(x_1\gamma)(2\pi)^{\frac{1}{2}} \sigma^{-1} \exp\left\{\frac{-(y-x_2B)^2}{2\sigma^2}\right\} / \phi\left(\frac{x_2B}{\sigma}\right)]^{1(w=1)} \text{ (eq.3)}$$

Where w is the binary indicator that is equal to 1 if y is positive and 0 otherwise (decision to participate in side-selling), y is the observed dependent variable (quantity of side-selling), and x_1 and x_2 are sets of explanatory variables determining w and y .

It is not easy to interpret the coefficients of the double hurdle model directly as one would do with linear regression coefficients. Instead, the average partial effects need to be calculated in order to assess the impact of the explanatory variables on the dependent variable. Three different average partial effects are calculated, based on three different definitions of the expected value of the dependent variable y_i . The overall effect on the dependent variable or the expected value of y_i for the explanatory variables x , also commonly known as the unconditional expectation (or unconditional mean) of y_i , is expressed as $E[y_i|x]$. The unconditional expectation is built from the conditional expectation, $E[y_i|x, y_i > 0]$ which is the expected value of y_i for the value of the explanatory variables x , conditional on $y_i > 0$, and the probability of a positive value of y_i for the value of explanatory variables x , $P[y_i > 0|x]$. The decomposition is summarised in the following equation (Burke, 2009):

The unconditional expected value of y is given as

$$E(y_i|x_{1i}, x_{2i}) = \phi(x_{1i}\gamma) \{x_{2i}B + \sigma * \lambda\left(\frac{x_{2i}B}{\sigma}\right)\} \text{ (eq.4)}$$

The probabilities of whether or not y is positive are given as

$$P(y_i = 0|x_{1i}) = 1 - \phi(x_{1i}\gamma) \quad (\text{eq.5})$$

$$P(y_i > 0|x_{1i}) = \phi(x_{1i}\gamma) \quad (\text{eq.6})$$

The expected value of y , conditional on $y > 0$ is

$$E(y_i|y_i > 0, x_{2i}) = x_{2i}B + \sigma * \lambda(x_{2i}B/\sigma) \quad (\text{eq.7})$$

Where $\lambda(c)$ is the inverse mills ratio (IMR) and is given as $\frac{\phi(c)}{\Phi(c)}$. ϕ is the standard normal probability distribution functions while x_{1i} and x_{2i} are individual explanatory variables affecting the probability and amount of side-selling respectively.

Average partial effects are calculated by differentiating each of the above equations with respect to each of the explanatory variables. The average partial effect of the unconditional expected value on the independent variable x_j is stated as follows (Burke, 2009):

$$\frac{\partial E(y_i|x_1, x_2)}{\partial x_j} = \gamma_j \phi(x_1\gamma) \{x_2B + \sigma * \lambda(x_2B/\sigma)\} + \phi(x_1\gamma) * B_j [1 - \lambda(x_2B/\sigma) \left\{ \frac{x_2B}{\sigma} + \lambda(x_2B/\sigma) \right\}] \quad (\text{eq.8})$$

The partial effect of an independent variable x_j around the probability that $y > 0$ is given as

$$\frac{\partial P(y_i > 0|x_1)}{\partial x_j} = \gamma_j \phi(x_1\gamma) \quad (\text{eq.9})$$

The partial effect of an independent variable x_j on the expected value of y , given $y > 0$ is

$$\frac{\partial E(y_i|y_i > 0, x_{2i})}{\partial x_j} = B_j [1 - \lambda\left(\frac{x_2B}{\sigma}\right) \left\{ \frac{x_2B}{\sigma} + \lambda\left(\frac{x_2B}{\sigma}\right) \right\}] \quad (\text{eq.10})$$

The new variables representing three values ($x_{1i}\hat{\gamma}$, $x_{2i}\hat{B}$, $\hat{\sigma}$) were generated for each observation³. Using the information from these newly generated variables, the partial

³See Burke, W. J. (2009). "Fitting and interpreting Cragg's Tobit alternative using Stata" The Stata Journal 9 (4): 584-592.

effects of the independent variables on the probability, conditional and unconditional expected values of the dependent variable were calculated and then summarised to arrive at average values. However, the partial effects from these summaries are descriptive and only yield mean values. As such they cannot be used to make inferences. To do so, a bootstrapping technique was applied to generate average partial effect coefficients of which the standard errors were then used to make inferences (Burke, 2009).

4.3.3 Description of the variables used in the models and the research hypothesis

4.3.3.1 Dependent variables

In this two-step model, the first hurdle is the practice of side-selling. The variable takes a value equal to one if farmer side-sells, and zero if he does not. The second hurdle is the amount of coffee side-sold. To satisfy the normality assumption of the model, the dependent variable in the second model was transformed into logarithmic function using a 1+coffee side-sale approach to avoid the conversion of the zeros into missing values after transformation (Angula, 2010). Side-selling of both cherries and dried coffee were considered. Data on how much coffee the farmers sold in cherries and dried coffee and how much of this was side-sold was collected. A ratio of 1kg dried coffee to 3kg cherries was applied (Zonal Bureau of Agriculture, 2013).

4.3.3.2 Independent variables and hypothesis

The selection of the determinants included in the model was made in alignment with the findings of previous research and experiences drawn from the field survey. Some variables in the second tier, which are less likely to have an extended effect beyond the first hurdle, were excluded. Moreover, including the same set of explanatory variables in each hurdle made it difficult to correctly identify the parameters of the model (Newman et al., 2003). We included variables relating to members' and

cooperatives' characteristics, attachment with cooperatives, discount factors for payment delays, and risk and trust variables affecting members' perception in delivering to cooperatives or side-selling to traders.

In the members' characteristic variables, we included members' ages, levels of education and experience in production. Anteneh et al. (2011) and Wollni and Fischer (2015) reported a positive and significant impact of age and level of education of the household head on side-selling while others (for example Pliete, 2004; Jussila et al., 2012; Mujawamariya et al., 2013) found a positive effect of members' ages and experiences on their commitment to cooperatives. In our study, we hypothesised age to be negatively correlated with side-selling. We believe that older farmers tend to be more conservative and loyal to their cooperatives as they invest much of themselves in the cooperative and expect returns on their investment. In addition, older farmers might find it difficult to come up with search costs to invest in new partnerships. The effect of education on side-selling is an empirical issue. A positive impact is expected because as farmers become more educated, they have better access to market information and a larger pool of potential buyers and therefore have more outside market options, such as selling to traders instead of delivering to cooperatives. The impact may also be negative because, as their level of education improves, farmers could have an increased awareness of the benefits of collective action as well as the benefit-seeking behaviour of traders, resulting in increased selling to cooperatives. Experience in production was also assumed to have both positive and negative effects, with side-selling for reasons similar to those given for education.

Research question 1 (members' characteristics): Do cooperative members in Southwest Ethiopia side-sell less when they are older, better educated, and more experienced?

In terms of cooperatives' characteristic variables, we included group size, certification and zonal location variables. In some literature (e.g Vorlaufer et al., 2012; Wollni and Fischer, 2015) group size positively correlates with side-selling as the cost of monitoring members' free riding behaviour is higher in larger groups. Using the same reasoning, we also hypothesised the same impact of group size on the side-selling behaviour of coffee cooperative farmers in Southwest Ethiopia. By considering the monetary and non-monetary benefits of certification, we also assumed that farmers in certified cooperatives are less likely to side-sell and are more motivated to patronise their cooperatives, compared with those in the uncertified cooperatives. A location dummy was also introduced to capture some zonal market and institutional heterogeneities between the two coffee producing zones considered in the study. As previously indicated, the two production zones differ in the type of coffee produced as well as in market access.

Research question 2 (Cooperative characteristics); Are member farmers in Southwest Ethiopia less likely to side-sell if they are members of certified and small size cooperatives located in the Jimma area?

We also included off farm income, land size and non-coffee agricultural income as variables determining members' discount rate for late payment. Anteneh et al. (2011) report a positive significant impact of off farm activity and land size with side-selling while others (for example Bhuyan, 2007; Wollini and Fisher, 2015) report an inverse relationship. We assumed that these variables are negatively correlated with side-selling as farmers with greater and alternative sources of cash income are expected to have a lower discount rate for late payment and hence are more committed to their cooperatives.

Research question 3 (discount rate of late payment): Do cooperative members in Southwest Ethiopia side-sell less when they have off farm income sources, own large farms and obtain higher non-coffee agricultural income?

We further included variables associated with members' attachment to cooperatives, including frequency of contact for training with cooperatives, having a say in cooperative-decision-making and proximity to coffee collection points of cooperatives. Like previous studies (eg. Osterberg and Nilson, 2009; Bijman and Verhees, 2011; Cechin et al., 2013; Wollini and Fisher, 2015), we expected that farmers are less likely to side-sell if they have frequent contact with their cooperatives, actively participate in democratic decision-making and are in close proximity to coffee collection points of their cooperatives.

Research question 4 (farmers' attachment to the cooperative): Do cooperative members side-sell less when they have frequent contact for training with their cooperative, feel their voices are heard in cooperative decision-making and are close to coffee collection points of the cooperatives?

Regarding the risk variables influencing members' perceptions towards supplying to cooperatives or side-selling to traders, previous studies (for example, Mujawamariya et al., 2013; Mabuza et al., 2014) confirm that farmers with high risk of low income as a result of low quality coffee are more likely to side-sell to traders, whose quality requirements are less stringent than cooperatives. Also, during our fieldwork, farmers reported that they would side-sell more when they believed there was a higher risk of low income from low quality coffee. We also assumed a negative impact of side-selling with the risk of low availability of input. Since cooperatives in this study were mainly established for multipurpose reasons and are hence involved in input provision, farmers who envisage the risk of low availability of input elsewhere

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are less likely to side-sell as they expect to benefit from input provision by patronising their cooperatives. As hypothesised by multiple authors (see, for example, Fulton and Giannakas, 2001; Bijman and Verhees, 2011), trust in cooperative leadership is also assumed to be negatively correlated with side-selling, as it helps to create positive perceptions of supplying to cooperatives by developing transparency and accountability in their operations.

Research question 5 (risk): Do farm members side-sell less when they perceive a low risk of low income from the quality of their coffee, high risk of unavailability of input and have a positive feeling on the trustworthiness of their cooperative leadership?

The list of variables used in the model and their expected signs are summarised in Table 4.1.

Table 4.1: Expected signs of the variables used in the model

Dependent variables		
Model 1. Value 1: Side-sales to traders; 0: sales to cooperative only		
Model 2. Amount of coffee side-sold to traders		
Independent variables	Type of variables	Expected sign
Members' characteristics		
Age of head of household (years)	Continuous variable (years)	-
Years of schooling of head of household (years)	Continuous variable (years)	- +
Experience in coffee production (years)	Continuous variable (years)	- +
Cooperatives' characteristics		
Certification	Dummy variable (1=certified 0= otherwise)	-
Group size	Continuous	+
Location	Dummy (1=Jimma 0=Kaffa)	+
Late payment and discount factor variables		
Delays in payment affect your commitment for transactions with the cooperative	Dummy variable (1=yes. 0=otherwise)	+

Area of coffee farm land (ha)	Continuous variable	-
Availability of off-farm income	Dummy variable (1=yes. 0=otherwise)	-
Non-coffee agricultural income (birr)	Continuous variable	-
Variables relating to farmers' attachment to their cooperatives		
Distance to cooperative's coffee collection point	Continuous variable (km)	+
Member feeling that his/her voice is heard in the cooperative's decision-making	Ordinal variable (1=disagree. 2=neutral. 3=agree)	-
Frequency of attending training run by the cooperative (times in a year)	Continuous variable	-
Risk and trust variables		
Risk of low income from low quality coffee	Ordinal variable (1=low. 2=medium. 3=high)	+
Risk of low availability of inputs	Ordinal variable (1=low. 2=medium. 3=high)	-
Cooperative leadership can be trusted	Ordinal variable (1=disagree. 2=neutral. 3=agree)	-

4.4 Descriptive results

Some years ago, the Ethiopian government revitalised the activities of the country's cooperatives, introducing a new system in which cooperatives are formed by individuals voluntarily (Emana, 2009). Despite the options to create these 'grass-root' cooperatives, cooperatives are still government instruments with a development agenda. For example, the role of cooperatives was central in the agriculture and rural development strategies of PASDEP (Plan for Accelerated and Sustained Development to End Poverty) and in the Agricultural Transformation policy (Tefera et al., 2016). Also, within the agricultural marketing strategy, cooperatives are given an active role in strengthening smallholder commercialisation (Tefera et al., 2016).

Like many cooperatives in most developing countries, coffee cooperatives in Southwest Ethiopia are also involved in the provision of agricultural inputs, public facilities (roads, schools, clinics, water-wells in the area) and private goods

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(consumables such as sugar, oil etc.). Cooperatives pay dividends to their members and provide them with price information and technical assistance through organised training sessions. However, side-selling or leakage remains problematic.

During field visits, the management of cooperatives strongly expressed their concerns regarding the possible adverse impact of side-selling on the performance of the cooperatives and highlighted three important factors for its widespread occurrence. Firstly, traders are the main source of credit for farmers, since the financial reserves of cooperatives are too limited to extend credit to their members. To obtain a loan, farmers often enter an interlocked contractual agreement with traders, in which they promise to pay the loan in coffee at harvest time (this reflects the findings of Mujawamariya et al., 2013). Secondly, cooperatives turn down batches of low quality coffee (immature and/or broken beans) while traders typically accept all coffee, irrespective of quality parameters. This is not to say that traders do not check and appreciate quality. However, they will also buy low quality coffee and negotiate a lower price for the bulk coffee. A similar trend was identified by D' Haese and Vink (2003) who attribute this to the relative risk-taking behaviour of traders as opposed to the farmers' associations. Thirdly, cooperatives are not financially strong enough to compete with traders who can pay farmers on delivery. Although the price difference that farmers reported receiving from traders as opposed to cooperatives was not very large, it was statistically significant (Table 4.2).

Table 4.2: Average price received when selling to cooperatives and traders (n=141)

Traders' price	Cooperatives' price	Traders'-cooperatives' price	Paired sample t-value
Mean	Mean	Mean difference	
(std.dev)	(std.dev)	(std.dev)	(P-value)
11.95	11.50	0.46	28.86***
(1.99)	(1.94)	(0.19)	(<0.001)

Note: *** denotes significance at 0.01 level

We also aimed to derive inferences on the difference between side-sellers and fully committed farmers (Table 4.3).

Table 4.3: Descriptive statistics comparing fully committed and side-sellers

	Fully committed (n=49)	Side-sellers (n=141)	t-value (P-value)
Members' characteristics			
Age of head of household (years)	54.82 (6.70)	47.29 (7.41)	6.27*** (<0.001)
Years of schooling of head of household (years)	5.39 (1.64)	3.01 (1.60)	5.49*** (<0.001)
Experience in coffee production (years)	26.47 (6.57)	20.80 (5.56)	5.86*** (<0.001)
Cooperatives' characteristics			
Certification (1=yes 0=otherwise)	0.73 (0.04)	0.47 (0.07)	3.42*** (<0.001)
Location (1=Jimma 0=otherwise)	0.69 (0.47)	0.65 (0.48)	0.53 (0.60)
Late payment and discount factor variables			
Delays in payment affect your commitment for transactions with the cooperative (1=yes 0=otherwise)	0.22 (0.42)	0.45 (0.50)	-2.88*** (0.01)
Area of coffee farm land (ha)	1.05 (0.84)	1.25 (0.90)	-1.36 (0.18)
Non-coffee agricultural income (birr)	11,418.19	12,007.4	-0.63

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	(5416.68)	(5720.52)	(0.53)
Availability of off-farm income (1=yes 0=otherwise)	0.67	0.23	6.20***
	(0.47)	(0.42)	(<0.001)
Variables related to farmers' attachment to their cooperative			
Distance to coffee collection point of cooperatives (km)	1.37	2.50	-4.78***
	(1.31)	(1.47)	(<0.001)
Frequency of attending training run by the cooperative	2.31	2.05	2.385**
	(0.65)	(0.65)	(0.02)
Member feeling that his/her voice is heard in the cooperative's decision-making (scale ranging from 1=disagree to 3=agree)	2.41	2.21	1.62
	(0.67)	(0.78)	(0.11)
Risk and trust variables			
Risk of low income from low quality coffee (scale ranging from 1=low to 3=high)	1.69	1.82	-1.12
	(0.62)	(0.72)	(0.27)
Risk of low availability of inputs (scale ranging from 1=low to 3=high)	2.18	1.93	2.04**
	(0.73)	(0.76)	(0.04)
Cooperative leadership can be trusted (scale ranging from 1=disagree to 3=agree)	2.16	1.85	2.41**
	(0.75)	(0.79)	(0.02)

Note: *** and ** denote significance at 0.01 and 0.05 level respectively.

Table 4.3 suggests that fully committed farmers have significantly more years of schooling and experience in production than side-sellers, who are also further away from cooperative coffee collection points in comparison to fully committed members. Fully committed farmers expressed more concern about the availability of inputs, and also indicated more trust in their cooperatives' leadership.

In addition, a substantially larger proportion of fully committed farmers reported having access to off-farm income, while a higher proportion of side-sellers expressed "delays in payment" as a problem in their transactions with cooperatives. The

significantly lower proportion of side-sellers in certified cooperatives illustrates the possible leverage that certification may have in reducing side-selling by member farmers.

The lack of money that cooperatives have to pay farmers may be a cause, as well as a consequence, of side-selling. Members do not sell to cooperatives, or are “pushed” to sell to traders because cooperatives do not pay. This reduces the volume of coffee at cooperatives which in turn reduces cooperatives’ income and thus their liquidity to purchase coffee, resulting in a vicious cycle. However, farmers side-sell because they are seeking opportunities (pool motives) to secure immediate payment and credit services from traders, which are not provided by cooperatives (e.g. Mujawamariya et al., 2013). Our field experience revealed that side-selling is largely affected by the advantages farmers receive from traders (pool motives). We tested the importance of certain cooperatives and farm characteristics with the level of side-selling from the farmers’ point of view as they are the decision-makers regarding whether to side-sell or not.

4.5 Econometric results

The magnitude of the estimates in the double hurdle model cannot be directly interpreted in the same way as OLS estimates. Instead, the average partial effects of the expected values and probabilities are calculated from the coefficients of the model (Table 4.4).

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Table 4.4: Results of Cragg's Double Hurdle regressions for the determinants of side-selling (N=190)

	Participation in side-sale (1 st hurdle)		Proportion of side-sale (2 nd hurdle)		Unconditional (E[y _i x])		Conditional (E[y _i x, y _i >0])		Probabilities (P[y _i >0 x])	
	coefficients (R. std.error)	z-value (p-value)	coefficients (R.std.error)	z-value (p-value)	APE (bs.std.error)	z-value (p-value)	APE (bs.std.error)	z-value (p-value)	APE (bs.std.error)	z-value (p-value)
Members' characteristics										
Ln(age)	-2.97 (1.05)	-2.82** (0.01)	-0.01 (0.04)	-0.27 (0.78)	-0.14 (0.05)	-2.54** (0.01)	-0.01 (0.03)	-0.30 (0.76)	-0.45 (0.21)	-2.13** (0.03)
Ln(school years)	-1.38 (0.35)	-3.94*** (<0.001)	-0.05 (0.01)	-4.16*** (<0.001)	-0.10 (0.03)	-3.42*** (<0.001)	-0.04 (0.01)	-3.84*** (<0.001)	-0.21 (0.08)	-2.57** (0.01)
Ln(production experience)	-0.90 (0.64)	-1.42 (0.15)	-0.08 (0.03)	-2.85** (0.01)	-0.10 (0.07)	-1.32 (0.13)	-0.06 (0.03)	-2.47** (0.01)	-0.14 (0.16)	-0.81 (0.42)
Cooperatives' characteristics										
^a Certification (1=certified)	-0.16 (0.51)	-0.32 (0.75)	-0.05 (0.02)	-2.86*** (0.001)	-0.03 (0.04)	-0.89 (0.37)	-0.04 (0.02)	-2.60** (0.01)	-0.02 (0.12)	-0.21 (0.83)
Ln (Group size)	1.41 (0.39)	3.60*** (<0.001)	0.02 (0.01)	1.15 (0.25)	0.05 (0.02)	2.02** (0.04)	0.01 (0.01)	1.09 (0.27)	0.22 (0.07)	3.03*** (<0.001)
^a Zonal location (1=Jimma)	1.39 (0.71)	1.96** (0.05)	0.01 (0.03)	0.31 (0.75)	0.07 (0.04)	1.70* (0.08)	0.01 (0.03)	0.30 (0.76)	0.21 (0.15)	1.41 (0.16)
Late payment and discount factor variables										
Delays in payment affect transaction with cooperative (1=yes)	0.41	1.27	0.08	6.18***	0.08	3.56***	0.06	6.06***	0.06	0.96

	(0.32)	(0.20)	(0.01)	(<0.001)	(0.02)	(<0.001)	(0.01)	(<0.001)	(0.07)	(0.34)
Ln(size of coffee land)	0.23	0.90	0.01	1.16	0.01	0.94	0.01	1.09	0.04	0.60
	(0.26)	(0.37)	(0.01)	(0.24)	(0.02)	(0.35)	(0.01)	(0.27)	(0.06)	(0.55)
^a Off farm income (1=Yes)	-0.97	-3.06***			-0.04	-2.33**			-0.15	-1.69*
	(0.32)	(<0.001)			(0.02)	(0.02)			(0.08)	(0.09)
Ln (non-coffee agricultural income)	-0.02	-0.15			-0.001	-0.09			-0.002	-0.10
	(0.12)	(0.88)			(0.01)	(0.93)			(0.03)	(0.92)
Variables related with attachment to cooperatives										
Ln (frequency of training)	-0.32	-0.58			-0.01	-0.46			-0.05	-0.46
	(0.55)	(0.56)			(0.03)	(0.65)			(0.11)	(0.65)
Ln (distance to coffee collection point of cooperatives)	0.44	2.05**			0.02	1.47			0.07	1.51
	(0.22)	(0.04)			(0.01)	(0.14)			(0.04)	(0.13)
^a Strong feeling of my voice heard in cooperative decisions (1.agree)	-0.37	-0.89			-0.01	-0.68			-0.05	-0.65
	(0.41)	(0.37)			(0.02)	(0.49)			(0.08)	(0.51)
^a Strong feeling of my voice heard in cooperative decisions (1.neutral)	0.01	0.02			0.0004	0.01			0.001	0.01
	(0.45)	(0.98)			(0.03)	(0.99)			(0.1)	(0.99)
Risk and trust variables										

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^a Risk of low income from low quality coffee (1.high)	0.77 (0.59)	1.29 (0.19)	0.03 (0.04)	0.84 (0.40)	0.12 (0.15)	0.79 (0.43)
^a Risk of low income from low quality coffee (1.medium)	0.05 (0.40)	0.13 (0.89)	0.002 (0.03)	0.08 (0.93)	0.01 (0.07)	0.10 (0.92)
^a Risk of low availability of input (1.high)	-0.26 (0.56)	-0.46 (0.65)	-0.01 (0.05)	-0.22 (0.82)	-0.04 (0.18)	-0.22 (0.82)
^a Risk of low availability of input (1. medium)	-0.03 (0.74)	-0.04 (0.97)	-0.001 (0.07)	-0.02 (0.98)	-0.004 (0.25)	-0.02 (0.98)
^a Cooperative leadership can be trusted (1.agree)	-1.02 (0.56)	-1.80* (0.07)	-0.04 (0.07)	-0.66 (0.51)	-0.16 (0.23)	-0.68 (0.50)
^a Cooperative leadership can be trusted (1.neutral)	-0.66 (0.48)	-1.34 (0.18)	-0.03 (0.04)	-0.66 (0.51)	-0.10 (0.21)	-0.49 (0.63)
Log pseudo likelihood	127.82					
Wald chi2	93.41					
Prob>chi2	<0.001					

Note: *, ** and * denote significance at 0.01, 0.05 and 0.1 level respectively, a= average partial effects are calculated for a discrete change of dummy variable from zero to one. APE=Average partial effect R.std.error= robust standard error Bs.std.error= bootstrap standard error.**

The results reflected in Table 4.4 indicate that older farmers appear less likely to side-sell. Similarly, years of schooling and experience in production were found to have a substantial effect in reducing side-selling. Certification was found to substantially decrease the quantity of side-selling, despite its insignificant impact on the probability of side-selling. Respondents who indicated that delays in payment would affect their cooperative membership tended to be more likely to side-sell, compared with those who mentioned that delays in payment adversely affected their transactions with cooperatives. Farmers with an off-farm income were also found to be less likely to side-sell. Furthermore, we found that trust in cooperative leadership had a significant effect on side-selling.

4.6 Discussions

Decreased side-selling by older cooperative members can be attributed to the fact that they may be more at risk and therefore may exaggerate the search and adjustment costs of seeking alternatives. In addition, older farmers may value non-monetary and intangible social benefits provided by cooperatives, and may be less attracted to pursuing financial goals. Our results suggest that members' schooling and experience can also increase their awareness of the advantages of cooperatives, resulting in an increased supply to their cooperatives.

In addition, more experienced members may value the social and psychological benefits of collective action above the material advantage received from the cooperatives. These results are in alignment with the findings of Pleite (2004), Jussila et al. (2012) and Wollni and Fischer (2015).

The substantial positive effect of certification on the probability of side-selling can be attributed to its positive advantage in securing sustainable markets through its long-term contracts and price benefits, such as a minimum floor price during periods

of low coffee prices in the mainstream market. However, the insignificant impact of certification in reducing the probability of side-selling is contrary to what was expected and can be attributed partly to the following institutional realities of cooperatives in the region. Firstly, cooperatives do not provide credit to farmers due to their financial constraints, while traders do so in an interlocked contractual agreement. Secondly, traders buy coffee of any quality while cooperatives require a minimum quality standard (e.g. 11 percent moisture content, maturity and purity of beans) and pay a fixed price, irrespective of coffee quality. Thirdly, there is a delay in the payment when selling to cooperatives, while traders pay on delivery and meet the immediate cash requirements of farmers for various household and farm expenditures. The substantial positive effect of group size on side-selling can be associated with the high cost of monitoring the free riding behaviour of member farmers as group size increases. In addition, members of cooperatives in the Jimma zone side-sell 7 percent more than members of cooperatives in the Kaffa area. This can be attributed to the prevalence of a large number of financially powerful traders in the Jimma area, who have the capacity to divert more coffee from the cooperatives compared with those in the Kaffa zone.

The impact of delayed payment on side-selling can be explained by the uncertainties farmers experience with payment modalities of cooperatives. Even if cooperatives seem to provide farmers more certainty regarding the price they may expect to receive, late payment is mentioned as affecting transactions with cooperatives. As farmers require cash to satisfy their immediate requirements, they side-sell their coffee to traders who make immediate payments after purchase. These results are again in accordance with our assumptions and corroborate findings of Mujawamariya et al. (2013) and Wollni and Fischer (2015). This effect may be due to

farmers having different sources of income, and they feel less in need of immediate cash.

The positive relationship between trust and side-selling supports the fact that when cooperative decisions are trusted, and perhaps not subjected to manipulation by management, it is more likely that members will reduce side-selling and patronise their cooperative, as they are more likely to perceive that the cooperative is acting in their best interests. Other studies (for example, Bijman and Verhees, 2011; Jussila et al., 2012) have also confirmed the positive relationship between cognitive trust (trust of members on cooperatives' leadership) and members' commitment to their cooperatives.

Information obtained from the key informant interviews showed that cooperative members receive dividends ranging from 2 to 4 birr per kg of coffee delivered, a range that also depends on the number of membership shares purchased. According to the interview with cooperative leaders, 60 to 70 percent of the coffee sale proceeds (surplus after accounting for all costs) are distributed as dividends to farmers, while the remaining proceeds are retained by cooperatives. Unfortunately, we could not capture the value of these dividends in our data as the dividends for the relevant season when the data was collected had not yet been distributed and farmers could not recall the amount paid in previous years. Nonetheless, farmers did mention dividend payments as an important incentive to sell coffee to their cooperatives.

Side-selling can be conducted in both the earlier and later stages of the coffee harvesting period. Side-selling during the early stages of coffee harvesting can be attributed to the payment of debt, made to obtain credit in an interlocked advance sale contractual agreement with traders, and the need for immediate cash for

household expenditures. Side-selling at a later stage may be related to better price offers by traders as cooperatives' financial constraints may not enable them to withstand traders' price competition, which increases at this stage of harvesting. It is also important to mention that cooperatives do not have a penalty system (e.g. denying future input supply or marketing services) for member farmers who side-sell their coffee to private traders.

4.7 Conclusion

In this study we analysed the determinants of side-selling by members of coffee cooperatives in the Jimma and Kaffa zones of Southwest Ethiopia. Using cross-sectional household data and a Cragg's double hurdle regression model for our analysis, we identified age, years of schooling, experience in production, off-farm income and trust in cooperative leadership as significant factors that could reduce side-selling, while delays in payment were found to increase the extent of side-selling. Certification had a substantial impact in reducing the proportion of side-selling, although it had an insignificant impact on the probability of side-selling.

While certification does have an impact on reducing side-selling activities, its effect is limited by the constraints facing cooperatives. Strategies to improve cooperatives' financial capacity could be important if it allowed cooperatives the opportunity to extend credit to their members, provide more price guarantees, and make payments on delivery. This could make cooperatives more attractive as buyers, compared with traders, as well as reduce the possible 'push' of farmers to traders during periods when cooperatives do not have the financial means to pay for the coffee.

Mechanisms should also be established to leverage the capacity of cooperatives to allow them to provide regular technical training and market

information to their members. An awareness campaign, aimed at young and illiterate member farmers highlighting the advantages of collective action through organised farmer groups, could also have a positive effect. The relationship between the distance from farms to cooperative coffee collection points and the likelihood of side-selling also implies the need to establish nearby market places or to organise a collection system for coffee. In addition to improving the supply of coffee to cooperatives, this could also assist in reducing coffee smuggling, which is a critical problem in the area.

Trust is a key social capital variable that contributes to increased patronage of cooperatives. This confirms the need to establish strong, regular audits of cooperatives to ensure transparency, create a feeling of accountability and avoid potential corruption among cooperatives' leadership. Measures should also be taken to upgrade the managerial competencies of the cooperatives' leadership through organised training sessions and seminars.

In summary, certification appears insufficient to overcome problems in the current functioning of the cooperatives in the study area leading farmers to side-sell. Whether these problems are due to the design of the cooperatives (i.e. its origin as multipurpose cooperatives established within government programmes) or its functioning (i.e. management and organisational structure) or both, is a subject for future research. Moreover, the potential to change cooperatives according to the abovementioned recommendations needs to be researched.

The findings of this research may not be applicable to all cooperatives since the context is different. As side-selling can be problematic for different types of cooperatives in various locations, more research on its determinants in different settings should be conducted. It is known that side-selling seriously hampers the

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economic viability of cooperatives, although no empirical study has been conducted on the scale of this problem. Detailed quantitative research on how side-selling impacts the economic performance of coffee cooperatives in the region could contribute to an understanding of the urgency of the problem.

Annex 4.1: List of cooperatives studied

Name of cooperative	Zone (wereda)	Type of certification
Omo Bako	Jimma (Goma)	Fair-trade and organic
Kasso Dabo	Jimma (Goma)	Fair-trade and organic
Babu	Jimma (Limu)	Uncertified
Ambuye	Jimma (Limu)	Uncertified
Garuke Mazoria	Jimma (Mana)	Uncertified
Afeta Wanja	Jimma (Mana)	Fair-trade and organic
Baha	Kaffa (Decha)	Fair-trade and organic
Chirri	Kaffa (Decha)	Fair-trade and organic
Dirri	Kaffa (Gimbo)	Fair-trade and organic
Kutti	Kaffa (Gimbo)	Fair-trade and organic
Wodiyo	Kaffa (Gewata)	Fair-trade and organic
Emicho	Kaffa (Gewata)	Fair-trade and organic

Annex 4.2: Likelihood ratio test result for model selection

	Ho= Tobit model	Ho= Homoscedastic (normal)
	H1=Homoscedatic	H1= Heteroscedastic
	Double hurdle model	Double hurdle model
Test statistics	168.26	11
Chi square critical value at 0.05	31.41	31.41
Degrees of freedom	20	20
Decision	Reject Ho	Accept Ho

Annex 4.3: Tobit and Double Hurdle models of side-selling

Variables	Tobit model	Heteroscedastic Double hurdle model		Hetero
	Coefficients (robust std. error)	Tier 1 Coefficients (robust std. error)	Tier 2 Coefficients (robust std. error)	
Members characteristics				
Ln (age)	-0.20*** (0.07)	-2.97*** (1.05)	-0.02 (0.05)	0.06* (0.03)
Ln (school Year)	-0.09*** (0.02)	-1.38*** (0.35)	-0.05*** (0.02)	-0.01 (0.01)
Ln (production experience)	-0.10 (0.06)	-0.90 (0.64)	-0.09** (0.04)	0.02 (0.04)
Cooperative characteristics				
Certification	-0.04 (0.04)	-0.16 (0.51)	-0.05** (0.02)	
Group size	0.09*** (0.03)	1.41*** (0.39)	0.01 (0.02)	
Location	0.12** (0.60)	1.40* (0.71)	0.01 (0.04)	
Late payment and discount rate variables				
Delays in payment	0.08*** (0.02)	0.41 (0.32)	0.06*** (0.01)	
Ln (size of coffee land)	-0.002 (0.01)	0.23 (0.26)	0.01* (0.007)	0.02** (0.01)
Off farm income	-0.13*** (0.03)	-0.97*** (0.32)		
Ln (Total income from agriculture without coffee)	-0.09*** (0.03)	-0.02 (0.12)		
Variables related with farmers' attachment to the Cooperative				
Ln (distance to coffee collection point of cooperatives)	0.06*** (0.02)	0.44** (0.22)		0.01 (0.01)
Ln (frequency of training by cooperatives)	-0.05 (0.04)	-0.33 (0.55)		
Feeling of voice heard in Cooperative decision making (1.agree)	-0.01 (0.03)	-0.36 (0.41)		
Feeling of voice heard in Cooperative decision making (1.neutral)	-0.03 (0.03)	-0.01 (0.45)		
Variables related with risk and trust				
Risk of low income from low quality coffee (1.high)	0.01	0.77		

	(0.04)	(0.60)
Risk of low income from low quality coffee (1.medium)	0.01	0.05
	(0.03)	(0.41)
Risk of low availability of input (1.high)	-0.02	-0.26
	(0.03)	(0.56)
Risk of low availability of input (1.medium)	-0.03	-0.03
	(0.04)	(0.74)
Cooperative leadership can be trusted (1.agree)	-0.08**	-1.02*
	(0.03)	(0.57)
Cooperative leadership can be trusted (1.neutral)	-0.03	-0.66
	(0.03)	(0.49)
No. of observations	190	190
Log Pseudo likelihood	43.69	133.33
F(20,170)	10.51	
Prob>F	0.00	
Pseudo R2	2.09	
Wald chi 2(20)		93.41
Prob>chi2		<0.001

Note:*, ** and *** denote significance at 0.1, 0.05 and 0.01 level respectively.

CHAPTER V

Women empowerment through coffee cooperative membership in Southwest Ethiopia: Communalities with diversity

Abstract

While cooperatives may directly impact peoples' lives through the services they deliver, evidence of their significance for social inclusion and empowerment of minority groups, especially women, requires more attention in a development agenda. This chapter thus reports on an investigation of the effect of coffee cooperatives in Southwest Ethiopia in empowering women, specifically. We hypothesise that shared decision-making and knowledge and information flow in the cooperative can spill over to women empowerment levels. Using cross-sectional household data and a principal axis factoring method, we constructed three latent factors for empowerment, viz. women's decision-making on expenditure, awareness/knowledge of improved techniques, and control over finance. Thereafter we used a propensity score matching technique to test the effect of cooperative membership on these dimensions, but found no significant results.

Key words; Coffee, cooperatives, Southwest Ethiopia, women empowerment, principal axis factoring, propensity score matching

5.1 Introduction

Although gender equality is a universal issue, it is particularly evident in developing countries like Ethiopia. Despite their significant contributions to agricultural production and other income-generating activities, women face great inequalities compared with men in terms of status, opportunities and market knowledge, ownership of assets, decision-making power, access to information, and training (Pionetti et al., 2010). Men tend to dominate the productive and paid segments of the economy, whereas women move between reproductive and productive work (Barrientos, 2001; Elson paraphrased in Tallontire et al. 2005). In Africa, women are responsible for up to 80 percent of food production, but receive only 7 percent of the agricultural extension services, are awarded less than 10 percent of credit offered to small-scale farmers, and own only 1 percent of the land (FAO, 2011). This imposes severe restrictions on women's access to resources and prevents them from actively participating in socioeconomic and political matters (Mehra and Hill Rojas, 2008; Pionetti et al., 2010). Moreover, women are more restricted in their access to markets (Meier zu Selhausen, 2016).

Because of its emphasis on equity, social responsibility and community development, the cooperative model could promote empowerment and the inclusion of women in its strategies to reduce poverty (Hill, 2005). In principle, autonomous and voluntarily-organised cooperatives aim to activate democratic processes by extending social power and involving more people in social choice formation (Hill, 2005). By spreading new knowledge and values, cooperatives could empower small-scale farmers and women in rural areas. Therefore, participation in cooperatives could broaden human choice and foster equal gender relations, helping both men and women to exercise their human agency. More precisely, in patriarchal settings,

cooperative membership may help to increase women's self-confidence and self-determination, support the autonomous choices they make, and enable them to pursue valuable avenues (Ibrahim and Alkire, 2007; Alkire, 2009; Burchi and Vicari, 2014).

Several empirical studies report on the impact of cooperatives on women empowerment. In his study on women empowerment in coffee cooperatives in Uganda, Meier zu Selhausen (2016) provides a comprehensive overview of literature relating to collective action against gender issues. He describes barriers that women face in accessing agricultural markets and explains how cooperatives could contribute to overcoming these barriers. Agarwal (2007) shows the insignificant impact on costs and the benefits of women's cooperative in India.

Burchi and Vicari (2014) suggest that cooperative membership has a positive impact on the intra-household decision-making of women in Brazil. Similarly, studies conducted by Datta and Gailey (2012) and Meera and Gowda (2013) present evidence of the positive impact of cooperative membership on women's economic empowerment. However, in contrast, Sharma and Vanjani (1993) describe a negative impact of cooperative membership on women's income control in the household. Dohmwirth (2013-14) and Meier zu Selhausen and Stam (2013) describe an insignificant impact of cooperative membership on women household decision-making. Some studies (e.g. Kaur, 2010; Jones et al., 2012) report varied effects of cooperative membership on the different indicators of women empowerment. Therefore, due to the mixed evidence described above, it cannot be taken for granted that cooperative membership will improve women's economic and social situations. This is potentially due to costs involved in cooperation, differences in the level and

type of involvement, and powerful context- and location-dependent gender relations within the society.

As coffee is one of the most prominent cash crops channelled through cooperatives in the producing countries, the impact on empowerment through membership of coffee cooperatives should not be underestimated (Lyon et al., 2010). However, we lack evidence of the efficacy of the ways in which cooperatives contribute to the empowerment of female members in Ethiopia. Although previous studies on the impact of coffee certifications in the region (Jena et al., 2012; Stellmacher and Grote, 2011; and Stellmacher et al., 2010) contribute to understanding how the coffee market could be made more conducive for small-scale coffee producers, they do not consider the effect of cooperative membership on women empowerment.

This study therefore seeks to contribute to literature by investigating the effects of coffee cooperative membership on women's empowerment in Southwest Ethiopia. We hypothesise that women's empowerment may result from spill-over effects of participatory dynamics, potential income, training and information benefits. The analysis focuses on how cooperative membership benefits women's empowerment at the household level, using an index of empowerment and its proxy indicators, comprising a set of questions characterising women's autonomy in decision-making, access to knowledge and control over finances. We assume that women benefit from being members of a cooperative which could provide better access to (1) markets (for the sale of products), (2) production inputs, and (3) training and farm advice, of which they might otherwise be deprived. Therefore, we do not focus on how women are empowered within the cooperative, but rather how they are empowered by being able to access the cooperatives' services.

The remainder of this chapter is organised as follows. Section 5.2 introduces key concepts of women empowerment. Section 5.3 outlines the methodology employed to address the objective of the study. Sections 5.4 and 5.5 describe the results and econometric outputs respectively. Section 5.6 provides a discussion of the results. Section 5.7 provides the conclusion and makes recommendations for further research.

5.2 Conceptualising Empowerment: Resource, agency and achievement

In our study, we understand empowerment as defined by Kabeer (1999), i.e. “the acquirement of the ability to make strategic life choices for those that have been previously denied of this ability.” This ability can be understood as three interrelated dimensions, viz. resources, agency, and achievements (Kabeer, 1999).

Resources include material, human, and social elements and form the condition under which choices can be made (Kabeer, 2001). Resources are perceived as “enabling factors”, i.e. possibly acute inputs to nurture an empowerment process (Malhotra, 2002). Material resources refer to the conventional economic resources including land, equipment, and finance. Human resources include one’s knowledge, skills, creativity, and imagination. Social resources are the rights, duties and anticipations which are inherent in the interactions, linkages and contacts, and which support people to improve their situation and life chances beyond what would be possible through their individual efforts alone (Kabeer, 2001).

Agency is understood as the ability to define one’s goals and act upon them, to control resources, and to make decisions that affect important life outcomes (Kabeer, 1999; Malhotra, 2002). While agency often leans towards “individual decision-making” when operationalised in mainstream economic literature, it is operationalised as having a much wider range of purposive actions including bargaining, negotiation,

deception, manipulation, subversion and resistance (Kabeer, 2001). It also covers both collective and individual reflections and actions.

Achievements are outcomes of different choices or of empowerment, and also refer to valued ways of “being and doing”, realised by different individuals in a given context (cf. capabilities by A. Sen). Two major concerns require further exploration of using achievements as a measurement of empowerment. The first is that possible inequalities in people’s abilities to make choices are more pertinent in understanding empowerment than the differences in the choices they make. It is thus possible that all members of a society attach an equal value to different capabilities of being and doing. Yet, if we fail to observe homogeneity in achievement, then achievement cannot automatically be assumed to be evidence of inequality in people’s abilities to make choices. Therefore, in cases where gender differentials in achievements are found, it is important to distinguish differences in preferences and priorities from those which symbolise a denial of choices (Kabeer, 2001). The second concern is that, in societies where social norms push women to follow practices which internalise their social status as persons of “lesser” value, women are likely to make choices which stem from and serve to reinforce their subordinate status. This in turn may reflect false consciousness and choices. Therefore, in order to assess whether achievements are good measures of meaningful choices, we need to question not only whether choices were materially possible, but also whether they were perceived to be within the realms of possibility (Kabeer, 2001), defined by societal norms and by women themselves. As a result, conclusions also need to be carefully interpreted.

The dimensions of ability need to be understood as communicating vessels. Change in one dimension contributes to or benefits from a change in the other (Kabeer, 2001), making empowerment a dynamic and complex process to study (see

literature references in Meier zu Selhausen, 2016). In order to affect achievements, resource and agency inequalities between men and women should be reduced (Kabeer, 1999). Structural inequalities, including cultural values, norms, and rules which constrain women's ability to make strategic choices, cannot be addressed by individuals alone, but they do shape individual resources, agency and achievements.

In a value chain context, empowerment can be operationalized as the process of decreasing imbalances in people's capacities to make choices concerning their level of participation in the chain. This can be realised according to two aspects (Coles and Mitchell, 2010), viz. the freedom of choice to participate in a certain chain or not, and whether the participant's gain is ruled by a complex set of gender-related factors. Levels of participation and gains at the household level are influenced by gendered division of labour time, budgets and intra-household decision-making. At the value chain level, these participation levels are determined by differences in access to functions, services and resources, and by power disparities in chain management (Coles and Mitchell, 2010).

Women empowerment in supply chains forms part of a more inclusive chain empowerment, which is concerned with "increasing the capacities of farmers to add value to the activities they are involved in and become part of chain management" (KIT et al., 2006). It is thus about the farmers' ability to both create and control values which can be reached through upgrading strategies. As women are excessively represented in low value chains and the lower value nodes within them, concerns for chain empowerment for women are even more pertinent. This is a well-known, and particularly strong, feature of globalised export chains, e.g. coffee chains, which are typically more lucrative than the conventionally feminised domestic markets (Dolan, 2001 cited in Coles and Mitchel, 2010).

5.3 Methodology

5.3.1 Data collection and sampling techniques

The same weredas and cooperatives mentioned in Chapter 3 were considered for this survey which was conducted in August-September, 2013. Households in these cooperatives were stratified on the basis of their membership status and sex of household head. This resulted in a random selection of 48 women from the female-headed households (26 members and 22 non-members) and 208 women from the male-headed households (132 members and 76 non-members) in the selected cooperative villages. Thus, a total of 256 women were considered for this study.

Structured questionnaires focusing on different aspects of the position of women were used. The questionnaires comprised questions relating to the following: women's roles in decision-making; access to and control over household income, budget and other resources; women's contributions to the growing, processing and selling of coffee; training attendance; and access to extension services. The household data were supplemented by the information obtained from key informant interviews and focus group discussions with selected female farmers.

5.3.2 Method of data analysis

5.3.2.1 *Descriptive statistics*

Chi-square tests were used to compare the different empowerment variables of cooperative membership. Table 5.1 presents three components of empowerment considered in this study, viz. participation in decision-making and coffee sales, improved awareness or knowledge, and control over finance. These components operationalize gender empowerment in value chains. Participation in decision-making is a source of agency, improved awareness or knowledge refers to empowerment in terms of resources, and control over finances is considered to be an achievement.

Table 5.1: Questions on gender empowerment included in the survey

Decision and amount of coffee sales variables
Participation in decision-making on purchase of basic household needs
Participation in decision-making on large purchases by the household
Participation in decision-making on farm investments
Participation in decision-making on crops to grow
Estimated amount of coffee sold by women
Awareness and knowledge variables
Extension on production technology
Extension on processing technology
Extension on health issues
Extension on marketing practices
Finance-related variables
Amount/share of women's off-farm income in the total household income
Ownership of saving account
Control over remittances

Each of these components are operationalised and measured by different aspects of women empowerment at the individual level. Five components measure participation in decision-making and coffee sales, viz. decisions on the purchase of household needs, decisions on large household purchases, decisions on farm investment, decisions on which crops to grow, and levels of participation in coffee sale. The awareness or knowledge component is realised by four aspects, viz. participation in production technology training, processing technology training, health training, and marketing practices training. The final component of access and control over finances include aspects on availability of off-farm income, control over a saving account, and remittances. In order to facilitate questioning and interpretation, all variables were measured by questions using an equal three point scale, and thus formed categorical variables where 0 is 'not empowered' and 2 is 'empowered'.

5.3.2.2 Econometric tools

A factor analysis was used to construct factors of variables which we suspected were needed to measure a latent variable or dimension indicating empowerment. Principal axis factoring was used as an extraction method, since its conceptual approach, which understands the shared variance in a set of X measurements through a small set of latent variables (factors), is more convenient than the mathematically simpler Principal Component approach (PCA), which represents all of the variance in the X variables through a small set of components (Bruce et al., 2001).

Factor scores were calculated based on the above 12 variables and three dimensions of women empowerment (participation in decision-making and coffee sales, awareness/knowledge level, and access to financial resources) (see Table 5.2). Firstly, the scores were calculated by orthogonal factoring, in which the axes are perpendicular to each other (Young and Pearce, 2013). Secondly, the scores were calculated by oblique factoring, which permits factors to correlate with each other by allowing the axes to rotate freely. The factor scores were then assigned to each woman interviewed, with the highest score representing higher empowerment in both the orthogonal and oblique factoring.

A propensity score matching technique was used to test if any significant differences in the generated latent factor scores of empowerment between members and non-members existed. This technique has greater merit in handling the confounding variables compared with the regressions (refer to Chapter 3, page 56 for more details on this model). Both Kernel and five neighbourhood matching were applied to verify the robustness of the result.

5.4 Descriptive results

Table 5.2 presents the descriptive results of the different empowerment dimensions of women between cooperative members and non-members.

Table 5.2: Comparison of cooperative members and non-members on women empowerment dimensions (Total sample=256)

Empowerment dimensions		Members (n=132)	Non-members (n=124)	Chi-square (P-value)
Decision and amount of coffee sale variables		%	%	
Decision on purchase of basic household needs	Husband	7.60	6.10	0.44 (0.80)
	You and husband/partner jointly	72.80	71.40	
	You	19.60	22.50	
Decision on large household purchases	Husband	16.50	10.20	1.96 (0.38)
	You and husband/partner jointly	60.10	64.30	
	You	23.40	25.50	
Decision on farm investments	Husband	15.80	20.40	2.00 (0.37)
	You and husband/partner jointly	63.90	55.10	
	You	20.20	24.50	
Decision on which crops to grow	Husband	19.70	25.50	2.83(0.24)
	You and husband/partner jointly	63.70	53.10	
	You	16.50	21.40	
Estimated coffee sold by women	None	28.90	35.40	4.34 (0.11)
	Less than half	52.10	38.50	
	Half/more than half	19.00	26.00	
Awareness/knowledge variables				
Extension on production technology	None	41.10	24.50	16.84***(<0.001)

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	Little	48.70	46.90	
	Average/more than average	10.10	28.60	
Extension on processing technology	None	58.20	42.90	17.42*** (<0.001)
	Little	32.90	28.60	
	Average/more than average	8.90	28.60	
Extension on marketing practices	None	97.50	88.80	8.29***(0.004)
	Little	2.50	11.20	
	Average/more than average	-	-	
Extension on health issues	None	17.10	11.20	16.09***(<0.001)
	Little	72.80	59.20	
	Average/more than average	10.10	29.60	
Finance-related variables				
Amount/share of women off-farm income in the total household income	None	87.80	88.50	0.10 (0.75)
	Less than half (50%)	3.80	4.20	
	Half /more than half	8.30	7.30	
Control over saving account	Husband	60.80	54.10	5.54 (0.06)*
	Joint account with husband/partner	16.50	28.60	
	Own account	22.80	17.30	
Control over remittance	Husband	61.40	52.00	7.15 (0.07)*
	Jointly with husband/partner	14.60	26.50	
	You	24.10	20.50	

* and *** denotes significance at 0.1 and 0.01 level respectively

Compared with non-members, a large proportion of women members (63.7 percent) make a joint decision on the type of crop to grow with their husbands. No significant differences were found in the participation in expenditure decisions between members and non-members. The majority of the decisions on expenditure for basic household needs, large household purchases and farm investments are made jointly by husband and wife for both member and non-member households. Similarly, no differences were noted in the proportion of coffee sold by member and non-member women. The majority of women in both groups reported that they sell little coffee (less than average) from the total supply of the household. Even if women are largely involved in the production and processing activities of coffee, the sale is largely dominated by the husbands of both member and non-member women.

Regarding the awareness and knowledge dimension, a significantly larger proportion of non-cooperative women reported that they improved their knowledge on production, processing, marketing and health through extension than cooperative women. This seems unexpected. However, the majority of women still reported little/below average access to the services.

In terms of finance, a larger share of women cooperative members than non-members has their own saving account. However, a relatively large share of non-cooperative women has a joint account and reports having control over remittances with their husbands.

5.5 Econometric Results

5.5.1 Factor analysis

As previously indicated (e.g. Kabeer, 1999; Malhotra et al., 2002), although it is a challenging exercise, empowerment can be assessed by measuring its dimensions. There is, however, no clear consensus on which dimensions need to be taken and a

wide array of different options can be considered. In their studies, Kishor (2000), Pitt (2006) and Fofana et al. (2015) used factor analysis or constructed scale variables to measure dimensions of empowerment, due to the extreme difficulty in capturing empowerment with just a single variable.

We used equal scale coded categorical variables in our study to have ordered categories. In the first analysis, all the variables used to measure empowerment (Table 5.1) were included. The KMO (Kaiser Mayer-olkin) and Cronbach's alpha had a value of 0.809 and 0.762 respectively, greater than the minimum requirement of 0.6. Bartlett's test of sphericity was also significant with a chi-square value of 1352.454 at 66 degrees of freedom, all suggesting the internal coherence of the variables for factor analysis. Individual communalities in Table 5.3 indicate how well the model is working for individual variables. It illustrates the proportion of variations of a variable explained by the model.

Table 5.3: Communalities of variables used in the model

	Initial	Extraction
Decision and amount of coffee sale variables		
Decision on purchase of household needs	0.72	0.80
Decision on large household purchases	0.66	0.72
Decision on farm investment	0.66	0.70
Decision on which crop to grow	0.52	0.54
Estimated coffee sold by women	0.54	0.56
Awareness/knowledge variables		
Extension on production technology	0.62	0.70
Extension on processing technology	0.63	0.73
Extension on marketing practices	0.19	0.20
Extension on health issues	0.65	0.76
Finance-related variables		
Amount/proportion of women off-farm income in the total household income	0.09	0.06
Control over saving account	0.47	0.76
Control over remittance	0.41	0.51

Communalities show the degree of variation that the factor model captures for each variable. Almost all variables exhibited larger values of communalities after extraction. The results in Table 5.3 indicates that 80 percent, 72 percent and 70 percent of the variations on decisions of purchase of household needs, farm investment and large household purchases respectively were explained by the factor model. Similarly, the factor model explained 70 percent, 73 percent and 76 percent of the variations of extension on production, processing and health issues variables respectively. In addition, 76 percent of the variation in the savings account variable was explained by the factor model after extraction, and this is said to be substantial when compared with the initial value. The overall assessment of the performance of the model can be obtained by dividing the sum of communalities of each variable by the number of variables. This proportion of variation explained by the first three Eigen values is provided in Table 5.4.

Table 5.4: Eigen values and Variances explained by factors

Total Variance Explained						
Factor	Initial Eigen Values			Extraction sum of squared loadings		
	Total	% variance	Cumulative %	Total	% of variance	Cumulative %
1	3.96	33.00	33.00	3.63	30.23	30.23
2	2.70	22.53	55.54	2.38	19.80	50.03
3	1.41	11.77	67.30	1.02	8.51	58.54
4	0.91	7.55	74.85			
5	0.76	6.33	81.18			
6	0.51	4.26	85.44			
7	0.41	3.41	88.85			
8	0.34	2.86	91.71			
9	0.32	2.63	94.34			
10	0.26	2.19	96.53			
11	0.23	1.89	98.42			
12	0.19	1.58	100.00			

The Kaisers's criterion considers factors with an Eigen value greater than one as common factors (Nunnally, 1978). Table 5.4 shows the statistics of the three factors with Eigen values larger than one. The first factor is the most influential factor and explains 33 percent of the variance. The second and third factors have Eigen values of 2.704 and 1.412 and explain 22 and 12 percent of the variance respectively. These three factors cumulatively explain 67 percent of the variance. Similarly, a factor scree plot (Cattell, 1966) confirms the decision to consider three factors (Figure 5.1).

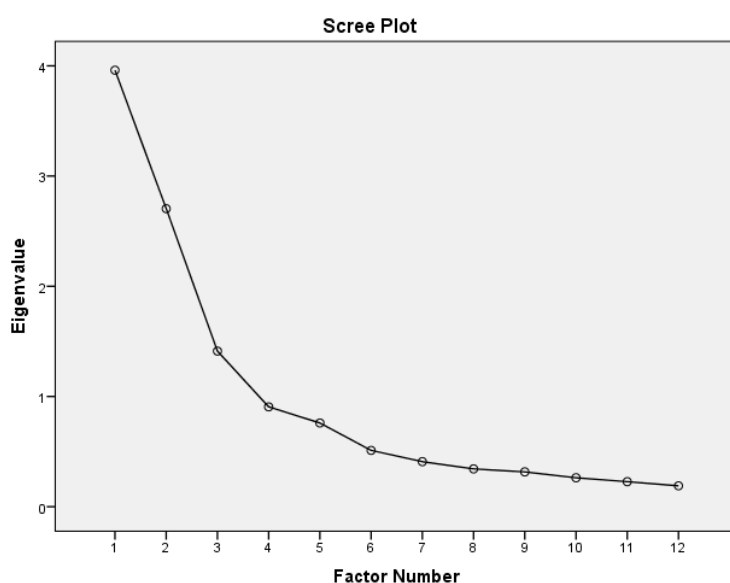


Figure 5.1: Scree plot of principal axis factoring method

The other condition for extracting factors considers the interpretability criteria, i.e. it considers that at least three items with significant loadings greater than 0.3 should be present in order to be a good factor. It is also expected that variables that load on different factors should measure different constructs by having high loadings on one factor and low loadings on the other. To verify whether our factors are in alignment with these criteria, factor loadings of each variable are reported for both the orthogonal and oblique factoring of the principal axis method (Table 5.5).

Table 5.5: Factor loadings of principal axis factoring with both un-rotated (orthogonal) and rotated (oblique) factoring

Factors and Variables	Orthogonal			Oblique			Cronbach's alpha
	1	2	3	1	2	3	
Decision and amount of coffee sale variables							0.89
Decision on which crop to grow	0.74	-0.03	-0.03	0.68	0.01	0.13	
Decision on purchase of HH need	0.87	-0.03	-0.23	0.92	0.02	-0.06	
Decision-making on large purchase	0.83	-0.08	-0.12	0.83	-0.03	-0.05	
Decision on farm investment	0.81	-0.07	-0.21	0.85	-0.02	-0.04	
Estimated coffee sold by women	0.72	-0.05	-0.19	0.76	-0.002	-0.04	
Awareness/knowledge variables							0.80
Extension on new production technology	0.07	0.83	-0.03	-0.002	0.84	0.04	
Extension on new processing technology	0.07	0.85	0.01	-0.03	0.85	0.08	
Extension on health	-0.07	0.84	-0.21	-0.02	0.85	-0.18	
Extension on marketing practices	0.06	0.44	-0.01	0.02	0.44	0.03	
Finance-related variables							0.59
Proportion of women off-farm income in the total household income	0.11	-0.07	0.20	-0.01	-0.07	0.23	
Control over remittance	0.44	0.09	0.55	0.06	0.09	0.68	
Control over saving account	0.50	0.16	0.70	0.03	0.15	0.85	
Cronbach's alpha =0.76							
KMO= 0.81							
Bartlett test of sphericity							
Approximately chi square=1352.45 ***							
Degree of freedom=66							

Table 5.5 represents the un-rotated (orthogonal) and rotated (oblique) factor loadings from factor and pattern matrix tables respectively. In both factoring exercises, the first factor (which includes five variables on decision-making and coffee sales) shows the highest loading. The factor loadings of the variables in this factor ranges from 0.72 to 0.87 in the orthogonal factoring, and from 0.68 to 0.92 in the oblique factoring. Three variables in the second factor exhibited factor loadings of 0.83 and above in both the orthogonal and oblique factoring, making the awareness/knowledge factor the second important factor in explaining women empowerment. In the third factor, variables on remittance and savings account have significant item loadings of greater than 0.5 in both factoring models, while the corresponding factor loadings of off-farm income in the orthogonal and oblique factoring were 0.20 and 0.23.

Cronbach's alpha of the first two latent factors of empowerment is strong, while the third factor has a Cronbach's alpha value of 0.59 which is just below the threshold of good variance estimation by its variables. Despite the third factor slightly deviating from the interpretability criteria of a factor (i.e. to have at least three items with factor loadings greater than 0.3 and minimum Cronbach's alpha value of 0.6), we considered it to be a factor of women empowerment, as the deviations were fairly small and because it fully satisfied the scree plot and Eigen value criteria.

5.5.2 Propensity score matching

Propensity score matching was applied to see differences in the three latent scores of empowerment between coffee cooperative members and non-members. After the matching, only five treatment observations were off-support, i.e. propensity scores were calculated from 96 percent of the observation. In addition, the fact that almost all confounding variables (except one) had insignificant mean difference after matching proves the soundness of our matching results (see annexure 5.2). Table

5.6 presents the propensity matching estimates of the three latent factors of empowerment extracted using orthogonal and oblique principal axis factoring.

Table 5.6: Propensity score matching estimates of cooperative membership on latent factors of empowerment

	Kernel Matching		5 Neighbourhood matching	
	Coefficients (Bootstrap Std.error)	Z- value (P –value)	Coefficients (Bootstrap Std.error)	Z- value (P –value)
Orthogonal factor score on decision- making and coffee sales	-0.13 (0.18)	-0.74 (0.46)	-0.14 (0.19)	-0.72 (0.47)
Orthogonal factor score on awareness	0.15 (0.17)	0.90 (0.37)	0.15 (0.20)	0.72 (0.47)
Orthogonal factor score on finance	-0.16 (0.17)	-0.94 (0.35)	-0.23 (0.21)	-1.14 (0.26)
Oblique factor score on decision- making and coffee sales	-0.11 (0.20)	-0.53 (0.60)	-0.93 (0.21)	-0.45 (0.66)
Oblique factor score on awareness	0.16 (0.22)	0.73 (0.47)	0.15 (0.22)	0.70 (0.49)
Oblique factor score on finance	-0.21 (0.19)	-1.06 (0.29)	-0.27 (0.22)	-1.22 (0.22)

Contrary to our expectations, the coefficients of latent factors of empowerment between the treated and control groups were insignificant in both the orthogonal and oblique factoring. It was therefore not possible to conclude that coffee cooperative

membership had an impact on the empowerment of women in terms of improving their household decision-making, awareness/knowledge level and access to finance.

5.6 Discussion

Although the results seem contradictory to the expectation that cooperatives can be used as breeding grounds for the social empowerment of women, it corroborates findings of previous studies (e.g. Agarwal, 2007; Dohmworth, 2013-14; Meier zu Selhausen and Stam, 2013; Sharma and Vanjani, 1993). Therefore, it may be relevant to move beyond an idealistic view of cooperatives as acting as “magic bullet” or encouraging “virtuous spirals” for women’s’ agency at the household level, as the impact of collective action on gender roles can be multifarious, depending on the social setting, the type of collective activities, and the rights that women have within the group (Fischer and Qaim, 2012). The insignificant impact of coffee cooperative membership on women empowerment in this study could be explained by the following four factors.

Firstly, it is essential to consider the existing tensions between growing expectations of cooperatives and the limited capacity that they have to manage their responsibilities. In this regard, coffee cooperatives in the region are challenged by severe financial constraints to provide credit and other capacity-building services to address the needs of members, in general, and of women, in particular. Cooperatives are also constrained by technical skills to achieve their objectives, as they are sometimes led by illiterate farmers who lack organisational management knowledge. Despite efforts from the government to elicit support from NGOs for cooperatives, the support is insufficient in terms of material resources, finance and training, and cannot generate a significant effect that is visible in the econometric analysis.

Secondly, despite their membership, women often have high opportunity time costs due to their multiple responsibilities on the farm and in the household. This possibly lowers their incentive to be active participants in cooperatives. In addition, traditional social norms dictating that women belong inside the home also prevents women from participating in activities outside the household and hence from actively participating in the cooperatives.

In most cases, women are still underrepresented in cooperatives in terms of membership or leadership, and are hindered by limited access to assets and education as well as by adverse cultural discrimination with regards to gender equality (Majurin, 2012; Rawlings and Shaw, 2013; Burchi and Vicari, 2014). Our specific context is characterised by a similar situation where almost all cooperative managerial and board positions are occupied by men, making it more difficult for women to assert their interests. Therefore, it is less likely that gender roles will change in favour of women through the implementation of strategies designed by men. This in itself invariably leads to the replication of existing power structures within society and contributes to “imposed participation” of women in cooperatives, where male agencies have decided on a particular model and strategic framework.

Fourthly, coffee cooperatives in Southwest Ethiopia are of mixed gender. The co-membership of wives in their husband’s cooperative is presumed not to matter as it erodes the theoretical improved bargaining position of women as being the single person in the household to sell coffee to cooperatives, and thus to receive technical and other awareness training from the cooperatives. Men have more access to coffee income by dominating the sales to cooperatives, which in turn contributes to increasing the husband’s bargaining power, resulting eventually in the decline of women’s negotiation power on expenditure and other aspects of household

decisions. Some studies (e.g. Dohmworth, 2013-14; Meier zu Selhausen and Stam, 2013) also indicate that group membership of women is sometimes a conditional blessing, in that, despite the potential economic advantage, it might also have an adverse impact on women's household decision-making when the husband is a member of the same cooperative.

A number of studies have shown that the impact of cooperatives or collective action on gender should not be expected to materialise quickly and smoothly, as there are various hindering factors which could inhibit its success. For example, as cited in Dohmworth (2013-14), Mayoux (1992, 1993, and 1995) indicates that cooperatives should contest power structures and gender divisions of labour in a society if they want to enact a significant impact for women empowerment. This, however, is difficult. Jones et al. (2012) also assert that gender equity cannot immediately be realised via market access through cooperatives because, *"it is a combination of enabling organisational dynamics and functional effectiveness, strong market linkages, the multifaceted functions of marketing, access to resources and capital, and the degree of external support that must ultimately converge to produce positive results."*

5.7 Conclusion

In this study we investigated the impact of cooperatives on women empowerment and tested whether coffee cooperatives in Southwest Ethiopia have a positive and significant impact on women empowerment. Using cross-sectional household data of women cooperative members and non-members and a principal factor analysis, we constructed three factors or dimensions of empowerment: (1) participation in household decision-making and coffee sales, (2) awareness and knowledge, and (3) access and control over finances. A propensity score matching model tested the

impact of cooperative membership on the three dimensions but rendered no significant results.

We assume that several internal and structural conditions currently prevent the relative success of coffee cooperatives for empowering member women in the region. However, exploring these conditions was beyond the scope of this study. The results suggest some problems that cooperatives face in addressing the specific needs of women members. This may be due to the level of women's involvement, as their time is limited due to the work burdens at home. Furthermore, they face traditional norms and behaviours ascribed to women as belonging to the inside of the home. The coffee cooperatives in the study area were all led by men which may impact the interest and response these cooperatives have on particular women's needs. One particular need could be the extension of credit to female members. Coffee cooperatives in the region are heavily challenged by a shortage of financial resources and credit, which restricts easy access to saving and low-cost credit services

It is challenging to make inferences on policy options based on our results, but they do indicate that the role cooperatives have on empowering women could be enhanced and greatly improved.

Annex 5.1: Estimates of logit model on variables affecting women's cooperative membership

Variables	Coefficients (std. error)	Z-value (P-value)
Gender of household head (1.Female. 0. Men)	-0.678 (0.392)	-1.73* (0.084)
Age (years)	0.349 (0.109)	3.19*** (0.001)
Age square	-0.004 (0.001)	-3.12*** (0.002)
Household size (number of members)	-0.109 (0.076)	-1.43 (0.152)
Farm size (ha)	0.155 (0.239)	0.65 (0.517)
Location (1. Jimma)	1.247 (0.299)	4.16*** (<0.001)
Constant	-6.453 (2.186)	-2.95 (0.003)
No of observations	256	
Log likelihood	-156.32	
LR chi 2 (6)	28.06	
Prob>chi2	0.0001	

*and*** denotes significance at 0.1 and 0.01 level respectively.

Annex 5.2: Balancing of confounding variables after Kernel matching

	Unmatche		Mean				
	Matched	Treat	Control	% bias	% reduct	t-value	P> t
	d	d		(bias)			
Gender of household head	U	0.158	0.223	-16.6		-1.26	0.210
	M	0.164	0.152	2.9	82.6	0.25	0.800
Age	U	38.403	38.362	0.4		0.03	0.973
	M	38.4	39.286	-9.4	-2027	-0.84	0.402
Age square	U	1544.5	1573.2	-3.7		-0.25	0.778
	M	1547.6	1615.9	-8.8	-137.5	-0.80	0.423
Household size	U	6.086	6.340	-13.2		-0.98	0.329
	M	6.149	6.377	-11.8	10.4	-0.99	0.325
Farm size(ha)	U	0.912	0.836	12.1		0.89	0.374
	M	0.911	0.747	26.3	-116.8	2.23	0.027
Location (1. Jimma)	U	0.640	0.446	39.4		2.96	0.003
	M	0.626	0.639	-2.5	93.6	-0.21	0.835

Chapter VI

Do coffee farmers benefit in terms of food security by participating in coffee cooperatives? Evidence from Southwest Ethiopia coffee cooperatives

Abstract

Much of the coffee in Ethiopia is produced by smallholder farmers, who struggle daily to bring in income and also feed their families. Many of these smallholder coffee producers are members of cooperatives. However, literature has paid little attention to the effect of cooperatives in combating food insecurity amongst coffee producers. Using cross-sectional household data and inverse probability weighting estimation, this study investigates the effect of coffee cooperative membership on food security amongst farm households in Southwest Ethiopia. Results reveal that cooperative membership has a positive effect on food production (maize and teff) and facilitates technological transformation through enhanced agricultural input supply. The effect on food expenditure and income, however, was not confirmed. Findings demonstrate a trade-off between the coffee marketing and input supply functions of cooperatives, affecting their true impact on food security in comparison to the effect from pooled production and income.

Key words: Food security, Coffee, Cooperatives, Southwest Ethiopia, Inverse probability weighting

6.1 Introduction

There has been increasing international concern regarding the prevalence of food insecurity in coffee-growing areas of the world. A FAO report (2008) shows that, of 34 countries listed as in being in food crisis or at risk due to high food prices, more than one-third (38.2 percent) are coffee-producing countries. Empirical work by, for example, Mendez et al. (2010), Bacon et al. (2008); Fujuaka (2007), Gross (2011) and Morris et al. (2013) confirm that more than 50 percent of farmers in the coffee-growing regions of some Latin American countries, including Nicaragua, Mexico, Guatemala, El Salvador and the Dominican Republic, are not able to meet their basic food needs. Beghin and Teshome (2016) calculate that 43 percent of coffee-growing households in Southwest Ethiopia experience food insecurity.

Food insecurity translates into nutrition insecurity. Regions in developing countries that primarily produce cash crops like coffee are amongst those that experience the worst under-nutrition, resulting in poor productivity levels, low school performance among children and a poor health situation among farming families (Chiputwa and Qaim, 2016). Apart from the effect on families, this adverse effect also impacts on local economic development. COHA (2014) estimates that the cost of malnutrition falls between 1.9 and 16.5 percent of country's GDP in Africa. As a result, different donor-sponsored initiatives are being undertaken to leverage food and nutrition-sensitive agriculture in the developing world through various mechanisms including nutritive food production, income, and gender-impacting programmes (Beyero et al., 2015; Haddad, 2000).

While there are multiple layers of vulnerability contributing to food insecurity, some studies (for example Bacon et al., 2008; Caswell et al., 2012; Mendez et al., 2010; SCAA, 2013) acknowledge the causes of food insecurity among the coffee-

growing communities as follows: Firstly, with the prospect of escaping from what is often seen as the poverty trap of subsistence agriculture by participating in the cash economy, many producers reduce subsistence food production and invest more of their resources in coffee and other cash crops. They appear to accept the risk, believing that the extra money will allow for additional food purchases. Secondly, since most coffee-growing households receive only one annual payment for their crops, they need to distribute that lump-sum throughout the following year to meet all their household needs until the next harvest. Furthermore, the income that farmers receive from coffee is often less than their annual expenditure needs (i.e. shelter, food, farm investments, education, healthcare, debt payment etc.). With the threat of income scarcity, spending on food is often compromised. Thirdly, it is not feasible to alternate between using land for coffee and food crops. As a result, there is a great incentive for producers to continue growing coffee once they have established their coffee plantation, as the crop is perennial and requires substantial capital investment. Fourthly, the price variability in global markets for coffee and food is high. Food prices sometimes increase even more than coffee prices. For example, international coffee prices reached an all-time high in 2012 (ICO, 2012; Caswell et al., 2012) almost simultaneously with price spikes in standard food staples (FAO, 2012; Caswell et al., 2012). Therefore, at a time of high food and/or low coffee prices, producers with large investments in coffee can be left with a surplus crop, which they cannot consume (Caswell et al., 2012; Mendez et al., 2010; SCAA, 2013). Hence, the relationship between coffee (and cash crops in general) production and food security is critical in terms of agricultural development supported by smallholder farmers (Govereh and Jayne, 2003; Kuma et al., 2016; SCAA, 2013).

Cooperatives could play a critical role in both food security and value addition to coffee. Literature (e.g. Chambo, 2009; Nugusse et al., 2013, Fischer and Lewin, 2013 and Vuthy et al., 2014) observes this role from four perspectives. Firstly, by pooling supply purchases and sales, coffee cooperatives can help reduce price risks and enhance the bargaining power and market access of members. Members may earn a better income, guaranteeing increased and diverse food purchases. Secondly, cooperatives enhance the dissemination of improved technologies, such as inputs and improved agricultural practices, which could maximise potential food production. Thirdly, cooperatives can serve as a platform for different awareness-creation forums. These platforms could transfer knowledge regarding livelihood diversification strategies so that member farmers can have multiple sources of income and food. Finally, cooperatives ease access to a variety of stakeholder funds outside the direct coffee value chain, including government subsidies, donor funds and research and development, which may contribute to improving the production and income effect of cooperatives on food security. However, the impact of cooperatives on food security and other welfare also depends on the cooperatives' ability to deliver high quality services and ensure a comprehensive and well-organised governance system, which allows them to deal with various internal and external challenges in their operations.

Mixed results on the impact of cooperative membership on food security are reported. For example, Nugusse et al. (2013) and Vuthy et al. (2014) found positive significant impacts of cooperatives on the food security of members in Northern Ethiopia and Cambodia respectively. Other studies (Wangana et al., 2008; Getnet and Annulo, 2012; Verhofstadt and Maertens, 2015 amongst others) show how cooperative membership could have a significant positive effect in reducing poverty, thereby implying a possible significant effect on food security, as poverty and food

insecurity exist side by side. On the other hand, a study by Bolwig et al. (2007) suggests that members of organically-certified coffee cooperatives in tropical African countries substitute food production with coffee. Others found no effect of cooperatives on food security. Churk (2015) did not find an impact of cooperatives on the livelihood of member farmers in Makungu Ward Iringa, Tanzania, and Addai et al. (2014) could not show an effect of farmer-based organisations on technical efficiency of maize across various agro-ecological zones of Ghana.

In this paper, we report on a study of the effect of coffee cooperatives in contributing to food security in their member households through staple food production and expenditure in Ethiopia. The expenditure effect is considered to be an important impact pathway for leveraging nutrition-sensitive agriculture in developing countries, as it measures whether income gains, often resulting from high-value markets, contribute to improved nutrition by influencing diet and other nutrition-relevant expenditures (Beyero, 2016; Haddad, 2000). Some studies (e.g. Ayele and Peacock, 2003; Okike et al., 2005; Sibhatu et al., 2015) demonstrate improved nutritional impact due to enhanced agricultural income. Therefore, understanding this effect is important from the perspective of both food security and nutrition.

The Ethiopian cooperatives supporting coffee farmers are typically multifunctional. These cooperatives provide services such as input supply and technical support but are also focused on coffee-marketing and the certification of coffee production (fair-trade, organic and others). We assume that coffee cooperatives improve food security among member farmers by increasing the production of food crops through improved production inputs and technical advice, as well as improved income (and hence increased purchasing power) through better market access and enhanced cooperative prices.

This study contributes to the literature regarding food security in at least three ways. Firstly, our focus on coffee cooperatives contributes to deducing policy implications for the specific organisation of multipurpose cooperatives in Ethiopia which render services to both food production and coffee. Secondly, the study helps to draw implications of the broader research direction on the link between cooperatives and agriculture-nutrition. Thirdly, by applying inverse probability weighting estimation, this paper presents an efficient tool to assess treatment effects.

The remainder of this paper is organised as follows. Section 6.2 describes the methodology employed in this study. Sections 6.3 and 6.4 present the descriptive and econometric results and section 6.5 concludes and describes policy implications.

6.2 Methodology

6.2.1 Method of data collection

The survey was conducted in November, 2013, using the same sample weredas, cooperatives, farm households and data collection techniques specified in Chapter 3.

6.2.2 Method of data analysis

Both descriptive and econometric tools were used to assess the impact of coffee cooperative membership on food security.

6.2.2.1 Descriptive statistics

Independent sample t-tests were used to compare members and non-members in terms of food production and membership characteristics.

6.2.2.2 Econometric model

Following the recommendation of Casel et al. (1983), Rosenbaum (1987) and Hirano and Imbens (2001), we applied inverse probability weighted (IPW) estimations, adjusting for confounding factors, to estimate the food production effect of coffee cooperative membership, as it has greater merits than propensity score matching. That is, IPW assigns greater weight to the control group, with higher estimated

likelihoods of participation, while matching estimation assigns greater weight to the comparison group members, with estimated propensities that more closely match those of the participants (Handouyahia et al., 2013). IPW is acknowledged as having less varying results compared with other forms of matching (kernel matching, nearest neighbour matching and local linear regression matching) as it retains most of the cases to construct comparison groups, thus allowing for greater generalisation of the result (Curtis et al., 2007). Unlike kernel matching, IPW does not require a bandwidth choice which can be advantageous in terms of computational and research time (Handouyahia et al., 2013). The average treatment effect estimate using IPW can be stated as (Curtis et al., 2007):

$$\sum_{i=1}^n \frac{I(A_i=a)(R_i-u_a)}{\pi_a(X_i, \gamma)} = 0, a = (1, 0) \text{ (eq.1)}$$

With, A_i = treatment indicator, R_i = response (outcome) variables, X_i = individual covariates assumed to be independent and identically distributed $i= 1 \dots n$, $\pi_a(X_i, \gamma) =$ estimated propensity scores, $I =$ treatment indicator function taking the value of 1 if the condition holds and 0 otherwise, and $u_a =$ the inverse probability-weighted estimate of the treatment effect.

Assessing the extent to which the model balances the treatment and the control group is critical. According to Curtis et al. (2007), there are two ways of checking the balance of covariates. The first is to check the distribution of predicted probabilities (propensity scores) by treatment group. Graphically, the distributions should overlap between the treatment and control groups, suggesting that one or more baseline covariates are predictive of the treatment selection. The second option is to show that the distributions of the baseline covariates between the treated and the control groups are similar. Therefore, we constructed graphs to show both the

overlapping distribution of the propensity scores and the similar distributions of the covariates to verify the balance (annexure 6.1 and 6.2).

6.2.3 Definition of variables used in the IPW

The Rome Declaration on World Food Security states: “Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAO, 1996 cited in Morris et al. 2013). In this regard, cooperatives are assumed to contribute to both physical and economic access to food through enhanced production (by providing information, inputs and facilitating technology adoption) and improving income (by increasing commercialisation and price). We consider farm-level production and yield of maize and teff (the two most important staple food crops in the area) and the quantity of improved seed and fertiliser used in the production of these staple food crops as one group of food security indicator variables reflecting the physical access effect of cooperatives. Expenditure on food and income accounts for the economic access effect of cooperatives for preferred and nutritionally healthy food. The selected outcome variables were also used in other studies (e.g. Morris et al., 2013 and Fischer and Lewin, 2013).

We applied similar variables used in the logit model of the PSM in Chapter 3 for the treatment model of the IPW estimation.

Table 6.1: Summary of variables used in the IPW estimation

Variables in the treatment model (logit)	Type	Expected sign
Dependent variable —Cooperative membership	Dummy (1.member and 0. otherwise)	
Independent variables		
Age of household head	Continuous	+
Years of schooling of household head	Continuous	+
Family size within the productive age group	Continuous	+

(15<age<65)		
Size of coffee land (ha)	Continuous	+
Availability of off-farm income	Dummy (1.yes 0. otherwise)	+
Distance on foot in time to coffee collection point of cooperatives	Continuous	-
Living in certified village	Dummy (1.yes 0. otherwise)	+
Location	Dummy (1.Jimma 0. otherwise)	+
Risk of price volatility on coffee income	Categorical (1.high 2.medium 3. low)	+
Outcome variables		
Maize produced (kg)	Continuous	
Maize yield (kg/ha)	Continuous	
Teff produced (kg)	Continuous	
Teff yield (kg/ha)	Continuous	
Improved maize seed used (kg/ha)	Continuous	
Improved teff seed used (kg/ha)	Continuous	
Chemical fertiliser used (kg/ha)	Continuous	
Expenditure on food (birr)	Continuous	

6.3 Descriptive results

Table 6.2 compares household and farm characteristics between cooperative members and non-members which were used as independent variables in the logit model of the IPW. The results suggest that household heads who were members of cooperatives were on average older than non-members. Members, on average, had more land on which they cultivate coffee than non-members. Certified villages had a higher percentage of cooperative members.

Table 6.2: Comparative descriptive results of household and farm characteristic variables

Variables	Members	Non-members	t-values (P-values)
	Mean (std.dev)	Mean (std.dev)	
Age of the household head	47.56 (9.69)	40.37 (8.74)	6.22*** (<0.001)
Number of years of schooling of household head	5.34 (2.55)	4.95 (2.39)	1.26 (0.21)
Family members in the productive age range	4.28	4.01	1.15

(15≤age≤65)			
	(1.92)	(1.85)	(0.25)
Size of land planted with coffee (ha)	1.33	0.72	6.27***
	(0.94)	(0.55)	(<0.001)
Distance to coffee collection point of the cooperative (time)	0.35	0.33	0.80
	(0.26)	(0.26)	(0.43)
Availability of off-farm income (1.yes 0.no)	0.09	0.10	-0.37
	(0.29)	(0.31)	(0.71)
Risk of price volatility on coffee income (scale from 1=low to 3= high)	1.90	2.05	-1.63
	(0.66)	(0.77)	(0.10)
Zonal location (1=Jimma)	0.58	0.56	0.18
	(0.50)	(0.50)	(0.86)
Living in certified village (1= yes)	0.78	0.69	1.72*
	(0.42)	(0.47)	(0.09)

*, ** and *** denotes significance at 0.1, 0.05 and 0.01 level.

Regarding food production measures, members exhibited a significantly higher level of production and yield of maize and teff with substantially more inputs as opposed to non-members. Members were also found to spend more on food than non-members (Table 6.3). However, these results cannot be used to draw conclusions as there are no controls for confounding variables.

Table 6.3: Comparison of food security indicators between members and non-members

Variables	Members	Non-members	t-value
	Mean (Std. dev)	Mean (Std. dev)	(p-value)
Maize produced (kg)	1420.90 (211.64)	1270.88 (105.26)	7.12*** (<0.001)
Maize yield (kg/ha)	5586.21 (846.04)	5085.96 (425.79)	5.91*** (<0.001)
Teff produced (kg)	186.74 (18.79)	160.90 (21.39)	10.28*** (<0.001)
Teff yield (kg/ha)	1493.95 (150.35)	1373.66 (166.95)	6.06*** (<0.001)
Improved maize seed used	22.84	17.20	8.82***

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(kg/ha)	(5.08)	(5.12)	(<0.001)
Improved teff seed used (kg/ha)	5.21	4.05	7.22***
	(1.27)	(1.28)	(<0.001)
Chemical fertiliser applied (kg/ha)	256.51	203.02	7.85***
	(51.88)	(57.01)	(<0.001)
Expenditure on food (birr)	3499.40	2962.65	2.54**
	(1776.59)	(1583.78)	(0.01)

**** and *** denotes significance at 0.05 and 0.01 level respectively**

6.4 Econometric results

The IPW estimation of the impact of cooperative membership on food production and expenditure of coffee-farming households is presented in Table 6.4.

Table 6.4: Estimated treatment effect of IPW model for the impact of coffee cooperative membership on food production and expenditure

Outcome variables	ATET	
	Coefficients (Bootstrap standard errors)	Z-value (P-value)
Maize produced (kg)	95.67 (29.24)	3.27*** (<0.001)
Maize yield (kg/ha)	277.59 (125.06)	2.22** (0.03)
Teff produced (kg)	24.36 (3.43)	7.09*** (<0.001)
Teff yield (kg/ha)	111.40 (26.66)	4.18*** (<0.001)
Improved maize seed used (kg/ha)	4.88 (1.32)	3.64*** (<0.001)
Improved teff seed used (kg/ha)	0.96 (0.39)	2.44** (0.02)
Chemical fertiliser used (kg/ha)	46.62 (14.55)	3.20*** (<0.001)
Ln(expenditure on food)	0.04 (0.16)	0.25 (0.80)
Ln(Total agricultural income including coffee)	-0.17 (0.15)	-1.10 (0.27)

**** and *** denotes significance at 0.05 and 0.01 level respectively**

The results reveal that cooperative membership has a strong and positive impact on production and productivity of maize and teff and input variables. More specifically, the amount of maize produced, the maize yield, the amount of teff produced and the teff yield would decrease by 95.67, 277.59, 24.36 and 111.40 kg respectively if farmers were not cooperative members. Similarly, utilisation of improved maize and teff seed and acquisition of chemical fertiliser would have substantially dropped by 4.88, 0.96 and 46.62 kg respectively if farmers had abandoned cooperative membership. Conversely, the production and yield of maize and teff and utilisation of inputs by non-members would have substantially increased by the same amount had they become members of cooperatives. Despite this, the effect of cooperatives on food expenditure and income was not statistically significant.

6.5 Discussions

The results suggest that coffee cooperatives provide a suitable environment for food crop production by facilitating the dissemination and adoption of inputs, particularly improved seed and chemical fertiliser. Several studies (Devaux et al., 2009; Odoemenem and Obinne, 2010; Getnet and Anullo, 2012; Fischer and Qaim, 2012; Chagwiza et al., 2016) have documented the significant contribution of cooperatives to facilitating innovation and access to technology. Given the fact that almost all coffee-farming households derive the largest portion of their food from their own production using their food plots, the results confirm the relatively better position of cooperative farmers in food production in comparison with non-members. This may lead to a better food security position. The positive effect of coffee cooperatives on food production can be explained by their multifunctional nature. Besides coffee marketing, cooperatives in the area are involved in facilitating the production of food crops through the provision of improved technological inputs at a fair price. These

findings are in line with the results of other studies (e.g. Nugusse et al., 2013, Fischer and Lewin, 2013 and Vuthy et al., 2014).

Coffee cooperatives were found to have no significant impact on food expenditure and the income of their members in our study. This can be attributed to numerous structural and contextual problems, including difficulties in accessing working capital, low managerial capacity, corruption, and unnecessary government intervention and control in the operations (Chagwiza et al., 2016). Farmers buy additional food (e.g. rice, sorghum, sugar and cooking oil) which are not produced on their plots, but their expenditure is not significantly influenced by cooperative membership.

Our findings have two important implications. Firstly, they demonstrate a trade-off between different cooperative functions, i.e. technology transfer/input provision and improved income. These gaps are also documented in literature. For example, Bernard et al. (2008) found that marketing cooperatives in Senegal and Burkina Faso performed better in providing advice and information while their effect on financial services and material investment was minimal. Fischer and Qaim (2012) showed a substantial impact of marketing cooperatives on the level of commercialisation and income of banana farmers in Kenya although no effect on price was found. Chagwiza et al. (2016) found a positive and significant impact of dairy cooperatives in disseminating technological innovations in Ethiopia (Selale) despite their negligible effect on price. Our findings reveal that coffee cooperatives in Southwest Ethiopia are adept at providing inputs, but weak in ensuring a better income, which could limit the overall success of the cooperatives in improving the livelihoods of member farmers in the area.

Secondly, since the current definition of food security goes beyond food availability based on food production, and includes economically accessing nutritionally-appropriate and preferred food from market purchase, the significant production and input effect of cooperatives elucidates their leverage to contribute to physical food access only. However, their overall performance in achieving true food security from joint production and income effect still remains doubtful.

Despite the functional trade-offs they exhibit, cooperatives can be considered as relevant institutional avenues to pave the way for improved food security and rural livelihood in Ethiopia and other developing countries, provided that the different structural and contextual situations are conducive for their operation.

6.6 Conclusion

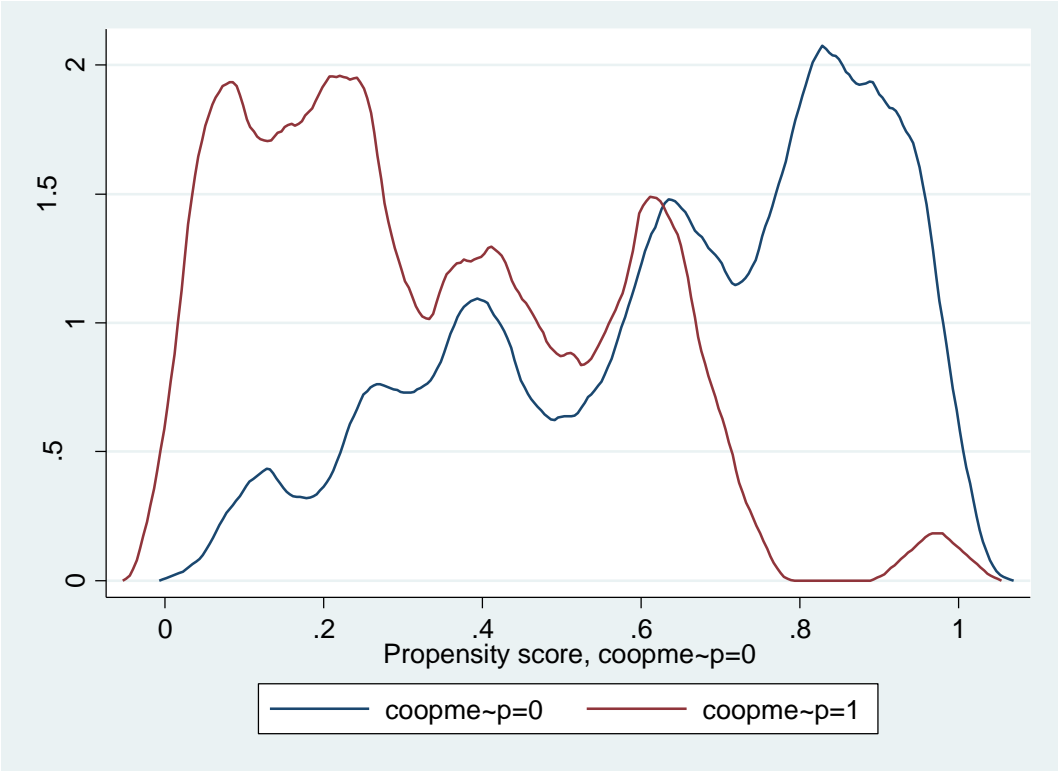
Within the spectrum of the available potential interventions, cooperatives are often seen as one of the best options of supporting food production and generating income among smallholders. Despite increased focus on collective action in the production and marketing of high value crops, literature focuses less on investigating the relationship between membership in cash crop cooperatives and food security. We used food crop production and yield, input utilisation, expenditure on food, and income as indicators of food security and applied an inverse probability weighting estimation to investigate the impact of coffee cooperative membership on these indicators of food production and expenditure among farm households in Southwest Ethiopia. The results suggest that cooperatives have a substantial effect on increasing the production and yield of the selected staple food crops (maize and teff) and accessibility to productivity-enhancing inputs, specifically improved seed and chemical fertiliser. However, no effect was found on food expenditure and income.

Other than physical access to food through own production, economic access to nutritionally-appropriate and preferred food types from market purchase is also a prerequisite for attaining true food security (FAO, 2003). This calls for leveraging the income effect of cooperatives in order to increase the purchasing power of member farmers to allow them to acquire diverse and preferred type of food from the market. We recommend financial empowerment and structural changes in the organisation of cooperatives to achieve a sizeable income effect of cooperative membership. Therefore, there should be a smooth environment for cooperatives to get easy access to loans and credits with a relatively low interest rate and longer repayment periods. Furthermore, the income effect of cooperatives in the study area can be improved if they become entrepreneurship-driven cooperatives, which depart from the traditional member-patronage to a member-investor mode of operation, where the latter provides incentives to sustain the cooperatives and motivation to take risks to expand equity capital and rate of return on investment. Such transformations could also attract qualified entrepreneurial leaders and managers, who can implement good governance, transparency, accountability and members' satisfaction, which cooperatives in the study area seemingly lack. Cooperatives can also be more effective if current policies and legislation, which allow government-control rather than freeing the cooperative movement, are revised. There should be an explicit move away from government rule and control in the running of cooperatives to allow their long-term welfare to impact on member households.

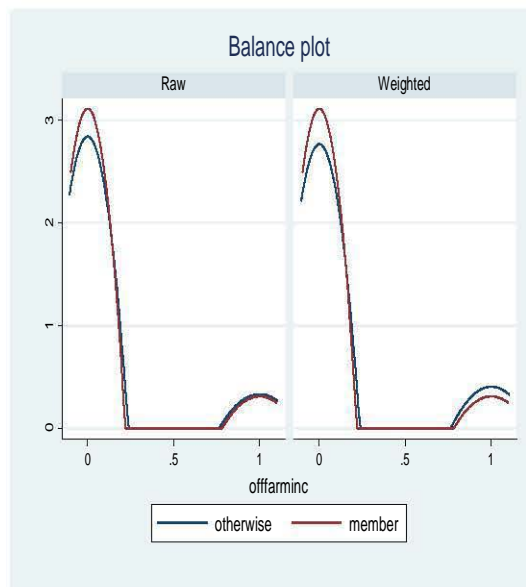
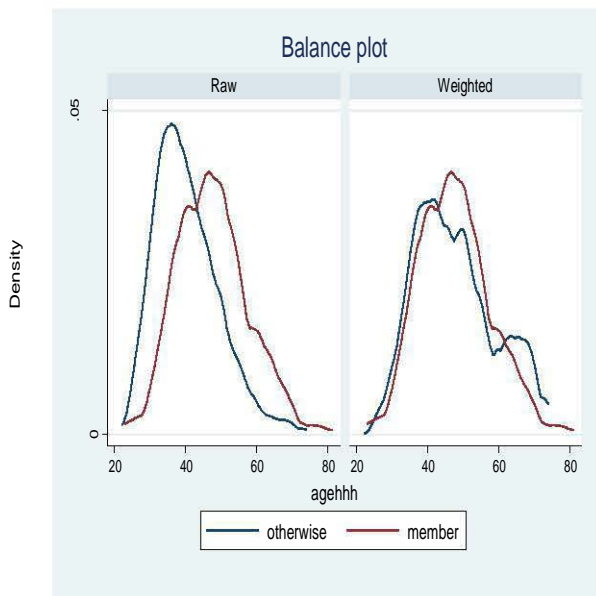
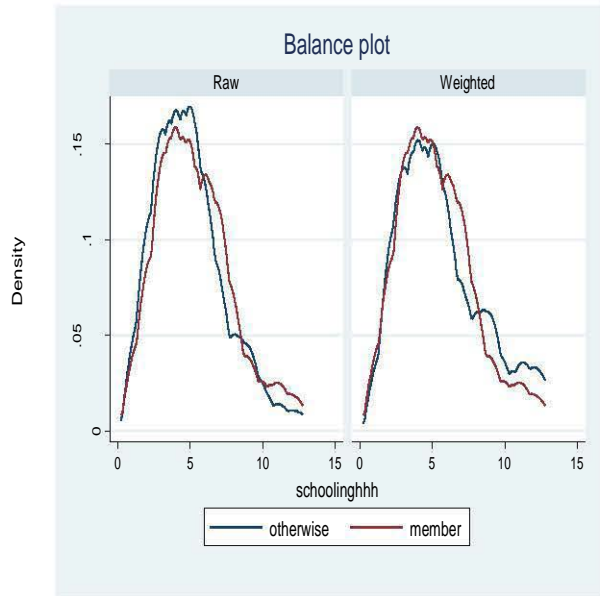
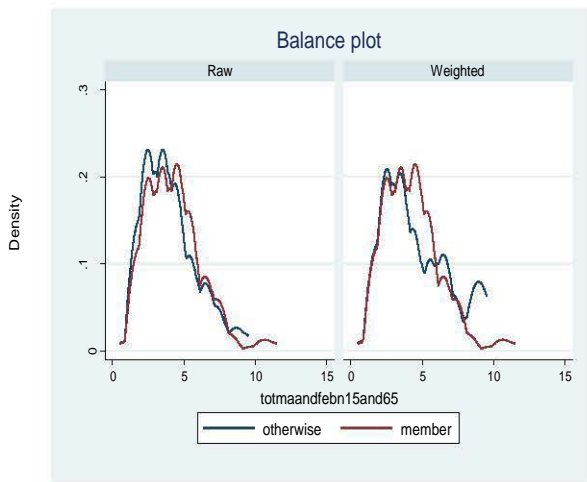
Our findings may not be universally applicable to all coffee cooperatives, as the settings in which they operate could differ. We therefore suggest more extensive cooperative-food security studies in other coffee-growing areas. We also recommend that future studies show the effects of cooperative membership on food security using

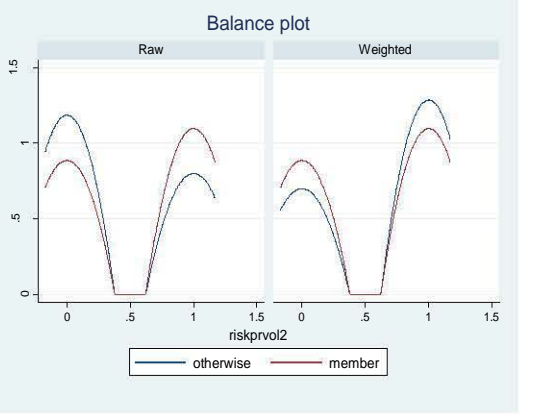
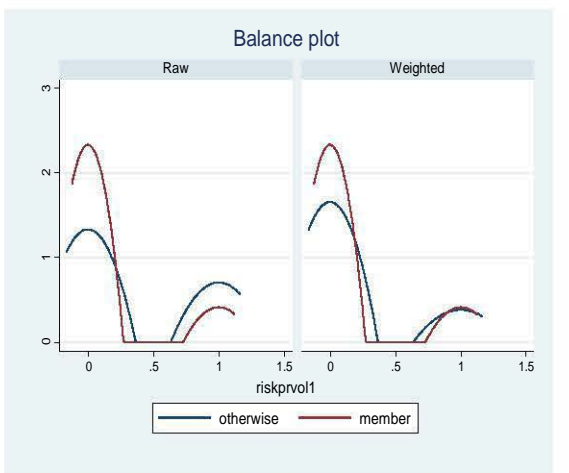
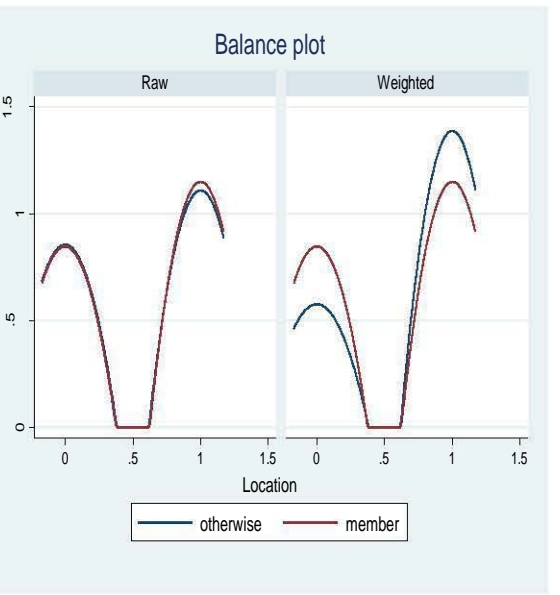
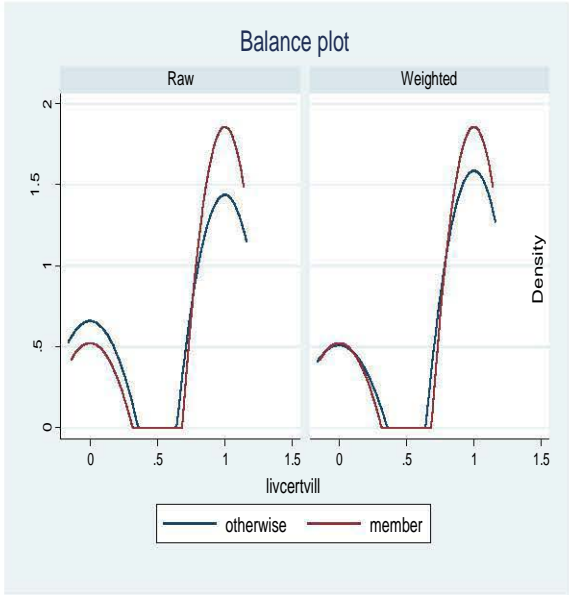
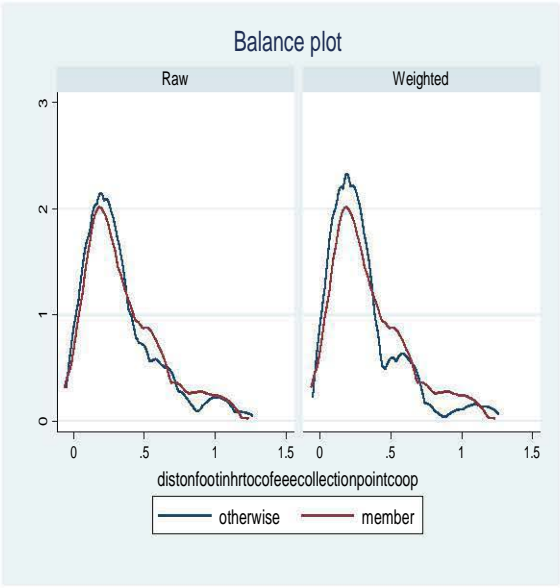
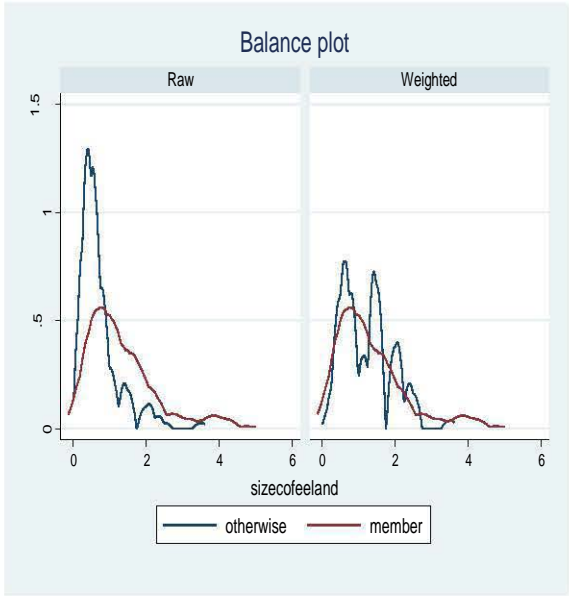
panel data, as the food security situation in most rural areas of developing countries are time-variant, depending on various natural and human calamities.

Annexure 6.1: Overlapping of propensity scores by treatment group



Annexure 6.2: Balancing plot of covariates showing their similar distributions





Annexure 6.3: Covariate balance summary

	Raw		Weighted	
Number of observations	256		256.0	
Treated observations	132		128.6	
Control observations	124		127.4	

	Standardised difference		Variance ratio	
	Raw	Weighted	Raw	Weighted
Age of HHH	0.78	-0.01	1.23	0.76
Age square	0.74	-0.04	1.55	0.74
Schooling of HHH	0.16	-0.11	1.14	0.79
Schooling square	0.15	-0.13	1.26	0.70
Family size within productive age group (15<age<65)	0.14	-0.15	1.08	0.70
Off farm income	-0.05	-0.12	0.88	0.74
Size of coffee land	0.79	0.12	2.92	1.92
Size of coffee land square	0.61	0.21	6.69	3.66
Distance to coffee collection point of cooperatives	0.10	0.19	1.01	1.11
Living in certified village	0.21	0.06	0.79	0.93
Location	0.02	-0.27	0.99	1.18
Risk of price volatility 1	-0.46	-0.10	0.57	0.84
Risk of price volatility 2	0.30	-0.19	1.03	1.08

Annex 6.4: Logit model for determinants of cooperative membership

Variables	Marginal effect (d_y/d_x)	Standard error
Age (years)	0.06*	0.03
Age squared	0.00	0.00
Schooling (years)	0.03	0.06
Schooling squared	0.00	0.01
Active household members	0.01	0.03
Land planted with coffee (ha)	0.49***	0.17
Land planted with coffee squared	-0.05	0.05
Distance to coffee collection point (time)	-0.28*	0.16
Off-farm income ^a (1=yes)	-0.18	0.14
Risk of price volatility ^a (1=high)	0.30***	0.10
Risk of price volatility ^a (1=medium)	0.01	0.10
Zonal location ^a (1=Jimma)	0.19**	0.09
Living in certified village ^a (1=yes)	0.06	0.09
Pseudo R-square	0.27	
LR ch2 (13)	96.29***	
Prob>chi2	0.00	
% predicted correctly	52.55	
N	256	

*, ** and *** denotes significance at 0.1, 0.05 and 0.01 level. a=marginal effects are calculated for a discrete change from 0 to 1.

CHAPTER VII

GENERAL DISCUSSION

7.1 Overview of the aim of the study and main findings

The emergence of market imperfections following the dismantling of the International Coffee Organisation has placed enormous pressure on the bargaining power and income of small-scale coffee producers in developing countries. Horizontal coordination, in the form of cooperative membership (initiated by grassroots organisations or the government), and vertical coordination, via certification (initiated by civil society organisations or the private market), were implemented as strategies to provide support to producers facing vulnerable and unsecured positions in the coffee market and to enable them to directly participate in international markets. However, the actual effectiveness of cooperatives in achieving a tangible impact on smallholder coffee farmers is still uncertain and the results of previous studies have been inconclusive.

The main objective of our research was to analyse the impact of cooperative membership on smallholder coffee producers in Southwest Ethiopia. Four major research hypotheses were tested.

The first hypothesis tested was: *“Coffee cooperatives have a substantial impact in improving coffee production and marketing and these effects differ across the member farmers.”*

We assessed the overall and heterogeneous impact of cooperative membership on the performance of smallholder farmers. The heterogeneity among members of a cooperative is challenging, as it compels the cooperative to find a balance between equity and efficiency (World Bank, 2007). Multiple studies (e.g. Bernard et al., 2008; Verhofstadt and Maertens, 2015; Fischer and Qaim, 2012; Ito et

al., 2012) have already shown that the impact of cooperatives may differ across the various socioeconomic groups of cooperative members. However, none of these studies examine coffee cooperatives, despite the importance of coffee in income-generation and employment-creation for a substantial number of smallholders in developing countries. Chapter 3 assesses whether cooperative membership impacts on the economic performance of coffee farmers in Southwest Ethiopia.

The results of a propensity score model suggest that coffee cooperative membership does not have a positive and significant impact on all the selected performance indicators, namely income, volume of supply, yield, price received and margins obtained. We could not attribute differences in these outcome variables to membership. We further refined our analysis and assessed the heterogeneous impact. The results reveal that cooperatives have a significant performance impact for older and more educated members with larger farms living in the Jimma area. Our findings on the positive effect of cooperatives for large farms corroborate those of Bernard et al. (2008) and Verhofstadt and Maertens (2015) but contradict those of Fischer and Qaim (2012) and Ito et al. (2012).

The results have important policy implications in that, for land poor households, cooperative membership has no or far less effect on their performance, which in turn raises concerns for the need to design strategies aimed at building the capacity of pro-poor members within cooperatives (Bijman et al., 2016). The weakness of cooperatives to serve all members is challenged, especially given the management structure of the cooperatives in the research areas. As mentioned above, cooperatives struggle to manage the cooperative operations and to provide sufficient support to their members. Another issue is the extension of cooperative activities to more remote areas. Farmers living in a far-distant places benefit from

membership, which supports the argument for expanding cooperative membership to more remote areas, as cooperatives will assist members in increasing supply at reduced transaction costs.

The second hypothesis tested was: “*Certification and other farm, physical and institutional characteristics have a significant impact on the probability and quantity of side-selling by cooperative farmers.*”

Side-selling by cooperative members is a major challenge in ensuring the future of cooperatives. This chapter reports on the study of the extent of side-selling by focusing on the factors that lead farmers to side-sell, as well as factors that determine the amount that farmers side-sell. We also describe whether certification of the cooperative has any impact, as we assume that certification enhances organisational development (ICCO, 2012). It is expected to reduce the free riding behaviour of cooperative members. However, no previous studies have linked certification with side-selling and most previous studies on certification (e.g. Jena et al., 2012; Stellmacher et al., 2010; Stellmacher and Grote, 2011) mainly focus on its livelihood and environmental effects. Therefore, in this chapter we pay particular attention to the impact of certification, along with other socioeconomic variables, in reducing the probability, as well as quantity, of side-selling. We do so using Cragg’s double hurdle regression model.

Certification was found to have a significant impact in reducing the quantity of side-selling but had little effect on decreasing the probability of side-sales. Age, education, experience in production, availability of off-farm income, and trust variables significantly influenced the negative likelihood of side-selling, while delays in payment and group size were found to have a substantial positive impact on quantity and probability of side-selling. The finding that certification reduced the

quantity of side-selling may be attributed to the guaranteed minimum price that it ensures when the coffee price is very low in the mainstream market, as well as the additional funds that a certified cooperative receives. However, its limited effect in reducing the probability of side-sales can be linked to institutional factors. That is, cooperatives do not provide credit, unlike traders who do so through interlocked contractual agreements. There is often late payment by cooperatives while traders make immediate payments after purchase. Cooperatives set preliminary quality criteria (moisture content, purity, maturity) for purchasing coffee while traders buy any coffee without stringent quality requirements. However, in rare cases, cooperatives may not be in a position to buy all the coffee from their members due to financial constraints.

The third hypothesis tested: *“Coffee cooperatives have a positive and significant impact in empowering member women.”*

Indirect effects, such as women empowerment, have received minimal attention in cooperative literature. Although some studies (Sharma and Vanjani, 1993; Datta and Gailey, 2012; Meier zu Selhausen and Stam, 2013; Burchi and Vicari, 2014; Dohmwirth, 2013-14) focus on the relationship between cooperatives and women empowerment, there is a general lack of evidence of the efficacy of cooperatives in contributing to the empowerment of women members in Ethiopia. We therefore analysed the impact of cooperative membership on women empowerment to determine the indirect social effects. The study specifically focused on empowerment at the household level and not on women’s positions within cooperatives. Three latent factors of empowerment, namely participation in decision-making and coffee sale, self-awareness and knowledge, and access and control over finance, were constructed using factor analysis. Propensity score matching was

applied to test the effect of cooperative membership on the aforementioned dimensions of empowerment, but rendered no significant results. The insignificant impact is potentially due to the limited capacity of cooperatives in addressing the specific needs of their members. Other issues may include women's low levels of participation in cooperatives due to their high involvement in unpaid domestic work, as well as social norms which conceptualise women as belonging "inside" the home. However, these latter factors were not a focus of our study and cannot be confirmed. Our findings corroborate with those of Sharma and Vanjani (1993), Dohmworth (2013-14), and Meier zu Selhausen and Stam (2013), but contradict those of Datta and Gailey (2012) and Burchi and Vicari (2014).

The final hypothesis tested was: "*Coffee cooperative membership has a positive and significant impact on food security of farm households.*"

Given the highly volatile nature of coffee prices, farmers who share their limited available resources with coffee production are believed to be vulnerable to food insecurity during times of low coffee prices. Multiple studies (Bacon et al., 2008; Caswell et al., 2012; Mendez et al., 2010; SCAA, 2013) acknowledge the vulnerability of farmers in terms of food insecurity in various coffee-growing areas. However, despite the relevance of assessing such food security concerns among coffee farmers, the available literature gives little attention to assessing the impact of coffee cooperatives in supporting food production among their members. In this chapter, we report on the analysis of the effect of coffee cooperative membership on food security among farm households using an inverse probability weighting estimation and cross-sectional household-level data in terms of production and yield of staple food crops, utilisation of inputs, expenditure on food, and income. The results show a significant impact of cooperative membership on staple food production and input utilisation,

while no effect was found on food expenditure and income. The results indicate the trade-offs between the different functions of cooperatives, namely technological transformation and improved income generation. Since the concept of food security extends beyond staple food production and involves the acquisition of preferred and nutritious types of food from market purchase, such trade-offs limit the leverage cooperatives could have in addressing hunger and food shortages. Other studies (e.g. Bernard et al., 2008; Fischer and Qaim, 2012 and Chagwiza et al., 2016) have also documented similar trade-off effects between the different functions of cooperatives.

7.2 Research and policy implications

Our findings have important implications for both research and policy. From a research point of view, the results of this study could contribute to empirical literature on supply chain coordination and its implication on free riding behaviour, performance and food security of farmers along the coffee value chains in the following ways:

Firstly, our study shows the relevance of going beyond comparing the mean treatment effects when dealing with economic performance implications of supply chain coordination. More research is needed to investigate the potential heterogeneity in treatment effects as it helps to analyse how the treatment effects vary within the population and allows for an understanding of the combined effects of inclusion and effectiveness of an intervention or a programme. It can also increase the efficiency of programme-targeting by assigning eligibility to subjects who benefit the most from participation.

Secondly, as most empirical literature focuses on the direct economic effects of participation in a product market, our study demonstrates the importance of social

impact including women empowerment and the indirect or spill-over effects of supply chain coordination, such as food production, as it assists in obtaining more information on the overall performance impact by adding to the findings of direct economic effect.

Thirdly, apart from performance implications, our research contributes to the limited literature on the conduct implications of supply chain coordination/upgrading. As performance is a direct outcome of conduct, assessing the impact of supply chain coordination on the marketing behaviour of participants (e.g. free riding, price setting etc.) contributes to understanding the challenges of chain upgrading.

Generally, our focus on the free riding and performance implications of cooperative membership is timely, since it can serve as an important input for the current national and international trends of using cooperatives as avenues for paving the way to improving the welfare of smallholders. We applied econometric techniques (propensity score matching, regression analysis and inverse probability weighting estimation) on selected cross-sectional outcome variables to ensure that our results were as robust as possible. However, the results of this study may not be applicable to other areas due to contextual differences. The outputs of this study would also have been more exhaustive if panel data had been used as the situation can be time-variant, depending on changes in the prevailing internal and external factors of operations.

Our results also focus on intervention strategies in terms of programme or policy formulation. While cooperative membership is believed to have a substantial positive impact in improving the conduct, performance and food production situation of farmers, its effectivity is limited by financial constraints, ineffective management and top-down bureaucratic procedures, the combined effect of which results in

cooperatives not being in a position to provide credit, pay better prices to their members, and make payments at the time of delivery.

In terms of policy implications, we propose the following strategies which can be implemented as short and long term interventions to solve the above-mentioned problems. In the short term, government and non-government organisations working on the commercialisation of farmers in the area (e.g. Techno Serve, Action Aid) could help cooperatives access finance by providing revolving loan funds, bank guarantees or equity capital, and engaging with banks to improve their willingness to provide finance to cooperatives on favourable terms and at low interest rates. Short-term training programmes could be organised by different non-governmental organisations and higher education institutions working in the area to improve the leadership skills of cooperative managers.

Furthermore, attention should be given to revising legislation governing cooperatives, which privileges the government to control rather than free cooperatives. Revising legislation could do away with the top-down procedures in organising and managing cooperatives. In the long term, there is a need to establish specialised cooperatives which perform coffee-marketing services and delivery of inputs independently, since trade-offs are observed between these two different cooperative functions. Such specialisation may contribute towards increasing institutional efficiency. Apart from specialisation by purpose, organising cooperatives based on sex (single sex cooperatives) could also create the opportunity for women to have their own cooperatives, which they manage themselves and benefit from without the interference of men. In addition, there could be an institutional platform which involves various stakeholders from cooperative agencies, non-governmental organisations, higher institutions of learning and unions/cooperatives to develop a

mechanism for restructuring cooperatives on business principles and transform them from the traditional member-patronage type into a member-investor form of cooperation, by separating them from state control so that members can expand equity capital and rates of return on investment. Such transformations could also help to attract qualified cooperative leaders who can share their knowledge and experience on how to improve the operational efficiency of the cooperatives. Table 7.1 summarises possible intervention strategies to improve the leverage of cooperatives in order to impact their members in a substantial manner.

Table 7.1 Summary of possible intervention strategies for leveraging cooperatives

Time horizon	Possible intervention strategies	Responsible body
Short term	a) Providing revolving funds, bank guarantees and equity capital	Government, financial institutions and non-government organisations (such as Techno Serve, Action Aid) working in the area
	b) Provision of training to improve the managerial skills of cooperative leaders	Non-governmental organisations and higher education institutions working in the area
	d) Revising cooperatives' legislation which gives more privilege for government to control cooperatives	Government legislative body
Long term	a) Organising cooperatives disaggregated by function and sex to avoid trade-offs between	Cooperative agencies

<p>the different cooperative functions and give more privilege to the disadvantaged (women) to benefit from the cooperatives</p> <p>b) Restructuring cooperatives on business principles to improve their financial power and attract qualified management personnel</p>	<p>Cooperative agencies, non-governmental organisations, higher education institutions and farmers</p>
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7.3 Future Research

While this study evaluates the core dimensions of the impact of cooperatives and highlights policy implications, there are still concerns warranting future research.

Firstly, heterogeneous impact analysis should not result in assessing differences among members only. As cooperatives' impact differs among various socioeconomic groups of member households, there can also be differences among cooperatives in impacting their member households. Therefore, we recommend that future heterogeneous impact research considers differences in cooperatives in impacting their member households.

Secondly, existing literature on side-selling mostly focuses on identifying the determinants of side-selling. However, no research has been done to assess the impact of side-selling on the performance of cooperatives and member households in general. Assessing this impact can be one area of future research as it helps to initiate immediate intervention by highlighting the significance of the problem.

Thirdly, most of the literature on women empowerment and cooperatives focus on the effect of household empowerment. Rare empirical evidence on the

empowerment of women within cooperatives therefore requires further investigation in future research.

Fourthly, regarding the techniques of impact assessment, future research should deal with the generation of a wide range of outcome variables, which could measure the effects of interventions. Although there are a growing number of programme interventions, which demand more impact evaluations on a wide array of socioeconomic and behavioural aspects, existing literature does not provide a reliable and exhaustive set of outcome indicators to measure the impact of interventions (e.g. indicators for empowerment, food security etc.). Thus, more emphasis should be given to studying standard measures of impact evaluation from economic, social and behavioural perspectives.

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Curriculum Vitae

1.0 Personnel Information

- 1.1. Full Name: Zekarias Shumeta Nedjo
- 1.2. Current Position: PhD student at Gent University and Associate Professor in the department of Agricultural Economics of Jimma University
- 1.3. Current address: Coupure Links 653, Gent 9000, Belgium
E-mail: zekishum@yahoo.com

2.0 Educational and training background

2.1 Educational Background

Degree	Field of specialization	Duration	University
BSc	Agricultural Extension	1995-1998	Haromaya, Ethiopia
Msc	Agricultural economics (Agricultural Marketing, major)	1999-2002	Haromaya, Ethiopia

2.2 Additional trainings

Place	Duration	Type of training	Organizer(s)
EIAR, Nazereth, Ethiopia	March 1-5, 2004	"Sub sector analysis of Agricultural Markets"	IFPRI, CIMMYT, FOOD NET, CIAT and EIAR
Ethiopian management Institute	March 31-April 11, 2008	Basic managerial skill	Ethiopian management Institute and JUCAVM
Netherlands	Nov, 3-December 12, 2008	Sustainable horticulture production	Wageningen International and PTC+
Netherlands	March 2-20, 2009	Participatory planning, monitoring and Evaluation	Wageningen International

3.0 Work Experience

Institution	Position	Time period
Ethiopian Institute of Agricultural Research, Jimma Agricultural Research Centre	Researcher and head of socioeconomics research division in the centre	Jan 2003-Jan 2006
Jimma University, College of Agriculture and Veterinary Medicine	Instructor (Lecturer, Assistant professor, Associate professor)	Sept, 2006-to date
	Head of Department	Jan, 2007-Jan, 2012
	Coordinator of Netherlands initiative for capacity building in Higher education (NICHE-ETH-019) project at the college level	Sept, 2010-Jan, 2012

4.0 Participation / Involvement

1. Involved in consultancy research work as a researcher for FAO project on sustainable land management
2. Involved in consultancy research work on assessment of coffee value chain in Oromia region which was initiated and sponsored by Oromia Bureau of Agriculture
3. Participated in different research review workshop organized by Ethiopian Institute of Agricultural Research
4. Member of Research Review Board of Jimma University, College of Agriculture and Veterinary Medicine
5. Participated in a national curriculum development workshop by leading the team of department of Agricultural Economic from Jimma University
6. Centre strategy development
7. Coordinating and Supervising community based training program (CBTP) of Jimma University at department level
8. Advising of a number of research works done by undergraduate and post graduate students
9. Involved in examining a number of thesis of post graduate students.

10. Participated in different Research Review Workshops organized by Ethiopian Development Research Institute (EDRI) and International Food Policy Research Institute (IFPRI) in Addis Ababa

5.0 List of Publications

1. **Zekarias Shumeta**, Marijke D'Haese and Wim Verbeke (2017); A two-step econometric estimation of covariates of side-selling; Case of coffee cooperatives in Southwest Ethiopia. *Journal of Development Studies* (Accepted paper)
2. **Zekarias Shumeta** and Marijke D'Haese (2016); Do coffee cooperatives benefit farmers? An exploration of heterogeneous impact of coffee cooperatives in Southwest Ethiopia. *International Food and Agribusiness Management Review*. 19 (4);_37-52
3. Essays Mendesil, **Zekarias Shumeta**, Peter Anderson and Birgitta Ramert (2016). Smallholder Farmers' knowledge, perception and management of pea-weevil in north and north-western Ethiopia. *Crop Protection*. 81:30-37
4. **Zekarias Shumeta** and Shiferaw Mulugeta (2012) Milk supply shortfall in Jimma town: An option for investment. *World Journal of Agricultural Science* 8 (4):366-374.
5. **Zekarias Shumeta** (2012). Hot pepper production and marketing in South West Ethiopia; an alternative enterprise for small scale farmers. *Trends in Agricultural Economics*. 5 (3): 83-95
6. **Zekarias Shumeta**, Kaba Urgessa and Zerihun Kebebew (2012). Analysis of market chain of forest coffee in Southwest Ethiopia. *Academic Journal of plant Science*. 5 (2):28-39
7. **Zekarias Shumeta**, Kaba Urgessa and Zerihun Kebebew (2011). A book on Analysis of Market Chain of NTFP in Southwest Ethiopia. VDM Verlag Dr. Müller e.K. ISBN 978-3-639-36234-3, Paperback, 68 Seiten
8. **Zekarias Shumeta** (2010); Avocado production and marketing in Southwest Ethiopia. *Trends in Agricultural Economics*. 3(4): 190-206.
9. Esayas Mendesil, Chemedda Abdeta, Abush Tesfaye, **Zekarias Shumeta** and Habte Jiffar. 2007. Farmers' perceptions and management practices of

insect pests on stored sorghum in Southwestern Ethiopia. *Crop protection*.

26: 1817-1825

10. **Zekarias Shumeta**. Admasu S. 2006; Adoption of coffee technology in the major coffee growing areas of Jimma Zone; *In proceeding of annual review of socioeconomics research*, Institute of Ethiopian Agricultural Research, Addis Ababa Ethiopia.