



**ST. MARY'S UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

**WELFARE IMPLICATION OF COFFEE COOPERATIVES ON
SMALLHOLDER FARMERS IN ETHIOPIA: THE CASE OF SIDAMA
ZONE IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLES
REGIONAL STATE**

BY

ADDISU GEBREHANA

**DECEMBER, 2015
ADDIS ABABA, ETHIOPIA**

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**A Thesis Submitted to St. Mary's University, School of Graduate Studies,
in Partial Fulfillment of the Requirements for the Degree of Master of
Science in Agricultural Economics**

ADDISU GEBREHANA

**DECEMBER, 2015
ADDIS ABABA, ETHIOPIA**

ST. MARY’S UNIVERSITY
SCHOOL OF GRADUATE STUDIES
INSTITUTE OF AGRICULTURE AND DEVELOPMENT STUDIES

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BY
ADDISU GEBREHANA

APPROVED BY BOARD OF EXAMINERS

As member of board of examiners of the MSC thesis open defense we certify that we have read and evaluated the thesis prepared by Addisu Gebrehana, we recommended that the thesis be accepted since it fulfills the thesis requirement for the degree of Master of Science in Agricultural economics.

Dean, Graduate Studies

Signature

Advisor

Signature

External Examiner

Signature

Internal Examiner

Signature

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This thesis has been submitted to Saint Mary's University, School of Graduate Studies for examination with my approval as a university advisor.

Advisor

Signature and Date

DEDICATION

I dedicate this thesis to my adored parents, especially for my mother, Mehegiash Nesibu, for tending me with affection and love in all steps of my life.

ACKNOWLEDGEMENTS

To God be the glory for its neither by my power nor my might but by His grace that is superfluous and more than sufficient. I thank Him for making this a reality.

Several individuals and organizations deserve acknowledgement for their contributions to the study. My foremost appreciation and thanks goes to my major advisor, Gemoraw Adinew for his close supervision and professional advice and encouragement during the research work. My heart-felt thanks also go to my co-advisor, Dr. Wendimagegn Chekol for his valuable comments and professional advice throughout the course of the research work.

I acknowledge the immense support I received from large number of individuals in one way or another. However, it is worth mentioning those without their support it was unthinkable for the study to be real. I have no phrase to express the deep support and love my friend Dawit Amare who gave me during the times that I never thought has been pass when I encountered devastating challenges during the period of the program.

The hosting, encouragement and love of my relatives in Hawassa town, Atnafseged Alemayehu was unexpressive during my stay there at data collection period and Ato Mulugeta Kebede for his valuable comment and good wishes for the accomplishment of the Thesis . It gives me pleasure to thank Ato Kefyalew and Ato Mohammed, who were with me facing all the challenges of rural travel to assist me in gathering data.

My special thanks are given to my sister, Fikerte Gebrehana and my colleagues Yedirework Beyene and Yeshimebet Yitayew for their assistance in typing and editing part of my Thesis and for her valuable encouragement throughout the study period. Finally, I would like to acknowledge all individuals who assisted me in the course of my study.

ACRONYMS AND ABBREVIATIONS

AIPW	Augmented Inverse Probability weighting
ATE	Average Treatment Effect
ATET	Average Treatment Effect on the Treated
CMC	Coffee Marketing Cooperatives
CSA	Central Statistical Authority
DFID	Department for International Development
GDP	Gross Domestic Product
ENMA	Ethiopian National Metrology Agency
FDRE	Federal Democratic and Republic of Ethiopia
ICA	International Cooperative Alliance
ILO	International Labour Organization
OSAMCA	Ogun State Agricultural Multi-purpose Credit Agency
PSM	Propensity Score Matching
SACCO's	Saving and Credit Cooperative societies
SNNP	Southern Nation, Nationalities and peoples Region
SZFEDS	Sidama Zone Finance and Economic Development Sector
TLU	Tropical Livestock Unit

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ABSTRACT

The development of agriculture sector in the country is constrained by lack of sufficient knowledge, different support and access of market and its facilities. Cooperatives provide alternative resources to support the poor. The overall objective of this study is to analyze welfare implication of coffee cooperative on small holder farmers' production, income and coffee sold in Sidama zone. Cross-sectional survey data was conducted with 121 small holders (68 treatments and 53 controls) farmers using two stage simple random sampling techniques. The researcher used both Primary and secondary data. Descriptive statistics and econometric model were applied for analyzing quantitative data. Propensity score matching were employed to analyze the impact of coffee cooperatives on production, income and market of member small holders. The average coffee production, total income and coffee sold of cooperative members are greater by 187 kilogram, Birr 204 and 181 kilogram respectively than non-member coffee cooperatives. Except income the effect is also significant at 95% level of significance. When we apply the average treatment effect on the treated estimator the average coffee production, income and coffee sold of members cooperative are 352 kilogram, Birr 3274 and 335 kilogram respectively.

Key words: coffee cooperative, coffee productivity, coffee sold, coffee income, Propensity Score matching, Sidama zone,

CHAPTER ONE

INTRODUCTION

1.1. Background of the study

Agriculture is the primary activity in Ethiopia, where about 84% of the country's population engaged in various agricultural activities and generates its income for small holder consumption to sustain livelihood. Moreover, the country generates the lion share of its foreign currency earnings from the sales/export of agricultural commodities abroad and in 2013 the sector contributes about 43 percent to the country's GDP, and above all, the sector is believed to be the main source of capital to be accumulated for the process of establishing the future industrialized Ethiopia, which again shows the determinant role played by the sector to bring about sustainable economic development for the country in the years to come (CSA, 2011).

The coffee subsector of Ethiopia has been and continues to be the foundation for the country's agricultural and economic development. The importance of the subsector in the country and the world market cannot be overemphasized. For instance, the subsector accounts not only for over 35% of agricultural foreign exchange earnings and about 4% of agricultural Gross Domestic Product, it also provides income to over 15 million people in the country (Ministry of Trade, 2012)

Ethiopia stands in respect not only as the origin of Coffee Arabica (Arabica coffee), an important producer and exporter, but it are also the highest consumer of the crop (variety) in Africa. By virtue of the importance of the crop in diets and culture of the populace, contribution to poverty reduction and importance in earning of foreign exchange, several policy measures under different regimes have been devised and implemented towards developing the subsector. Each of such measures has contributed in part to the dramatic changes undergone by the coffee subsector over the past five decades. Adverse influences from past policy measures and changes in global and local prices of coffee have over the past years hindered achievement of most poverty reduction and subsector development goals, and worsened conditions of most producers and other players in the supply chain,

leading mostly to distress sales of assets (Oxfam, 2002), default in payment of loans, drifting of farmers from coffee production, and increasing unemployment among others.

The coffee value chain in Ethiopia is composed of a large number of actors. It includes coffee farmers, collectors, different buyers, processors, primary cooperatives, cooperative unions, exporters and various government institutions (Gemech and Struthers, 2007). Ethiopian coffee is sold both at local level and at the international market, the latter mainly through the newly established commodity exchange market and directly to international buyers through specialty market channels by coffee cooperative unions. Normally, all Ethiopian coffee should pass through Commodity Exchange Market. Since 2001, however, cooperatives have been granted permission to by-pass coffee auction opening the way for direct export sales (Dempsey 2006).

In many rural areas of developing countries, a large share of the population lives below poverty standards. Improvement in their levels of income and welfare strongly depend on possibilities for generating productive employment and value added opportunities from agricultural production (World Bank 2008, Anr'iquez 2007). Smallholder-based agricultural development played an important role in East-Asian poverty reduction strategies that focus sedmainly on technological options for improving input use, output and yields. In addition, important efforts were made to enhance the market orientation of smallholders (Hazell et al. 2007). Far less attention has been devoted, however, to the competitive conditions for smallholder involvement in local and (inter)national markets, and the role played by rural institutions and collective action to enhance their competitiveness and bargaining power (Hellin et al. 2006).

In line with these realities, the research is designed to make an analysis of the welfare implication of coffee cooperatives for improving the living and working conditions of their members and the community through evaluating their productivity, marketing activity and income.

1.2. Statement of the problem

It is believed that the characteristics of modern cooperative businesses have mostly been developed in the past 160 years. People form cooperatives to do something better than they

could do individually or through a non-cooperative form of business. Acting together, say, in bringing agricultural produce (e.g. coffee) collectively, members can develop bargaining power, enjoy the benefits of a larger business and can access information, which has important impact in the process of marketing. Sometimes people believe that forming a cooperative automatically has been solving business problems faced by individual farm small holders. In reality, cooperatives are subject to the same economic forces, legal restrictions and international relations that other businesses face (Krisiinaswami and Kulandaiswamy, 2000).

Moreover, there should be clear understanding on the bottlenecks in implementing the agricultural marketing activities by cooperative societies. With the tremendous growth in size and operations and complexity of agricultural marketing, cooperatives are facing a big challenge from both their members and management, and the competitors. It is found that agricultural cooperatives have had limitations by meeting efficiently the needs of their farmer members. Thus, the major challenge facing the agricultural cooperatives is how to operate and meet the needs of the members efficiently and effectively keeping in mind the basic principles of cooperation (Jemal, 2008).

The productivity of farmers not that much significant, this is due to backward technology utilization, lack of information access and lack of infrastructural facilities is the main one. Because of these and other reasons their productivity is low and then they earn low income.

The supply of Ethiopian coffee (both wet-processed and sun-dried) is local and international market faces some basic quality problems. This quality problem makes the Ethiopian coffee unable to adequately compete in the international coffee market and earn reasonable price. The major quality problems that have observed on Ethiopia coffee include problems related to:

- Coffee harvesting,
- Coffee
- Processing and warehousing,
- Inability to take care of the coffee plantation properly,
- Inability to control the moisture content of the coffee,

- Mixing high quality coffee with low quality, or coffee of one origin with or coffee with relatively better quality; this is usually done by coffee collectors or assemblers and whole sellers

Agricultural cooperatives established in developing countries frequently face problems since many of them are established on the basis of political criteria by external agents, as a part of public investment strategies or rural development programs launched by international agencies, rather than by farmers themselves. Bernard et al. (2007) argue that – due to such governmental policies – most cooperative in Ethiopia have a high level of distrust among members, and face major constraints to become effective for improving market commercialization and farmers’ welfare. Francesconi (2008) outlined that Ethiopian cooperatives have been created in response to governmental plans and only aim to attract public subsidies rather than to become competitive in the marketplace. Such top-down cooperation is likely to induce limited real solidarity amongst members and tends to decrease their interest in substantive efforts for enhancing production and yields.

Farmers involved in global supply chains tend to face high transaction costs, have limited access to finance and input markets, and can thus individually hardly overcome binding commercial and technical constraints. They are easily hit by price fluctuations and meet major difficulties to find remunerative market outlets. For these reasons, the creation of agricultural marketing cooperatives is commonly advanced as an attractive strategy to generate economies of scale and scope and to reinforce the bargaining position of smallholder producers (Blokland and Gouet 2007). Agricultural cooperatives represent a hybrid combination of a voluntary association and a business firm. They are established for overcoming market failures, reducing transaction costs and addressing problems of asymmetry information (Levi and Davis 2008, Bijman and Hendrikse 2003). Cooperative members expect to obtain advantages from the coordination of production decisions, shared access to inputs, enhanced market power and more effective bargaining capacity (Di Falco et al. 2008).

Actually, there is no empirical information supported with scientific research that shows the welfare implication of primary cooperative societies on their member’s: productivity,

coffee sold and their income. This research will, therefore, attempt to empirically investigate the above issues and bridge information gaps.

In line with the above reality, the research/study attempted to come up with possible solutions and recommendations after having clear understanding upon the situation by giving due emphasis to answer the research questions:

1.3 Objectives of the Study

1.3.1 General objective

The overall objective of the study has been to analyze welfare implication of coffee cooperatives on small holder farmers.

1.3.2. Specific objectives

The study has proposed the following specific objectives:

1. To analyze the contribution of coffee cooperatives on small holders' coffee production in the study area.
2. To analyze the impact of coffee cooperatives on small holders' income ;
3. To examine the effect of coffee cooperatives on small holder coffee market

1.4. Research Questions

1. What is the contribution of coffee cooperatives on small holders' income?
2. To what extent have coffee cooperatives have improved their Members' productivity? and
3. To what extent the coffee cooperatives improve the small holder coffee marketing in terms of coffee sold.

1.5. Significance of the study

The study on welfare implication of coffee cooperatives on small holder farmers in Ethiopia provides some new empirical evidences that may help us to understand the conditions under which agricultural marketing cooperatives are promoting the production of coffee, facilitates marketing accessibility, standard of living to the rural poor and generating rural welfare improvements in study area in particular and SNNPR, Ethiopia in general. The researcher also hopes that this study provides new insight for policymakers, researchers, and development practitioners.

Besides, it would be a useful reference for other similar researcher on the area. Therefore, it was hoped that, results from this study would have practical use mainly to the study area and similar other areas, and can serve as a base for any further studies to be conducted in other areas.

1.6. Scope and limitations of the study

This study has been contribute to the understanding of welfare implication of coffee cooperatives on small holder's coffee production, income, marketing system and major problems and constraints on the smooth performance of coffee marketing cooperatives and the small holder farmers. This study has been focus on coffee production with particular reference to primary coffee farmers and the cooperatives activities in Sidama zone, assessment of their performance, identification of problems encountered in their operations and the contribution of coffee marketing cooperatives on welfare implication of smallholder farmers in the economy. The researcher encountered numerous problems which affected the smooth running of the work. There were a lot of constraints as to getting information and materials for developing concepts in the thesis. Most of the data used were very difficult to come by, as the case areas where far apart, rural areas having no transportation facilities in addition to the difficulty to get the target respondents. A lot of time was wasted as the researcher visited the organizations and individuals together with government agencies to obtain valuable information for the thesis.

1.7. Organization of the thesis

This thesis is divided into five chapters. Chapter one constitutes background and rationale, statement of the problem, research questions, objectives, research methodology, scope, significance, and limitations of the study. The second chapter presents literature review that provides theoretical and empirical framework to the research. The Third chapter constitutes the discussion of the methodology used in the research. The fourth chapter is the main body of the research that comprises data analysis, interpretation and findings. Finally, the fifth chapter presents conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1. Theoretical literature

2.1.1. History of coffee and the foundation of cooperatives.

Ethiopia is the origin of coffee Arabica, and it grows wide variety of exemplary coffee, highly differentiated, most of which are shade-grown by small farmers without chemical inputs (Dempsey 2006). Ethiopia is the largest producer of coffee and ranks fifth in the world and first in Africa by annual coffee production. For the past three to four decades, coffee has been and remains the leading cash crop and major export commodity of the country. Coffee accounts on average for about 10% of total agricultural production, 5% of Gross Domestic Product, and constitutes about 41% of total export earnings of the country (Worako 2008).

The number of coffee growers has been estimated in about one million smallholder farmers. Most of them hold less than half a hectare of land, and grow 95 per cent of the coffee output (Oxfam, 2008). Total annual coffee production is of approximately 280,000 metric tons (Dempsey 2006). According to Worako (2008), Less than 40% of total national production of coffee is directed to official export markets. The same study (Worako 2008) indicated that, annual domestic coffee consumption per small holder in the country is 24.5 kg and the per capita consumption is 4.5 kg. About 15% of coffee produced in the South-Western and Western Zones is smuggled via Sudan. In Ethiopia, the livelihoods of approximately one quarter of the population depend on the coffee sub-sector (Petit 2007). However, smallholder coffee growers in Ethiopia face high transaction cost, lack of market information, poor infrastructure, and weak capital markets.

The coffee value chain in Ethiopia is composed of a large number of factors. It includes coffee farmers, collectors, different buyers, processors, primary cooperatives, cooperative unions, exporters and various government institutions (Gemech and Struthers, 2007). Ethiopian coffee is sold both at local level and at the international market, the latter mainly through the newly established commodity exchange market and directly to international buyers through specialty market channels by coffee cooperative unions. Normally, all

Ethiopian coffee should pass through Commodity Exchange Market. Since 2001, however, cooperatives have been granted permission to by-pass coffee auction opening the way for direct export sales (Dempsey 2006).

In order to overcome market failures and to cope with changes in the market environment many developing countries, including Ethiopia, are returning to agricultural cooperatives (Nicola, 2009). This is due to the fact that cooperatives can reduce transaction costs and improve the bargaining power of smallholder farmers' visa-a-vis increasingly integrated markets (as cited by Nicola, 2009). In line with this, agricultural cooperatives particularly marketing cooperatives are advocated by the Government of Ethiopia as the main pillars of development and key market institutions in its Agricultural Development Led Industrialization Strategy. This plan aims to unlock Ethiopia's agricultural growth potential by providing a better institutional environment for integrating smallholder farmers into international market (FDRE, 2001).

Despite the negative experience of farmers with cooperatives during the socialist regime in the country, recently a new generation of cooperatives is emerging. With the aim of securing better price in coffee market and entering into export marketing, Ethiopian government promulgated proclamation no 147/1998. The proclamation outlines the layered organizational structure of the cooperatives, which was not permitted by the previous regimes. According to this proclamation an organization can have four layers, i.e., primary cooperatives, unions, federations, and cooperative leagues, although only primary and union levels have been formed to date in the country (Dorsey & Tesfaye, 2005: 9, 20). Cooperative union is defined as an organization composed of more than one primary cooperative society that has similar objective.

Since primary coffee cooperatives lack required human resources and logistical capacity the Ethiopian government took the initiative to establish Coffee Farmers Cooperative Unions to manage coffee export business on behalf of primary coffee marketing cooperatives. Coffee Marketing Cooperatives (CMC) are among the most known and largest cooperatives in the country. Currently there are six Farmers Coffee Marketing Cooperative Unions in the country, housing around 227 primary coffee marketing cooperatives with a total number of 275,485 members (FCA, 2008, cited in Anteneh *et al.*,

2011). Sidama union is one of the six coffee marketing cooperative unions established in the country comprising 46 primary farmer coffee cooperatives.

2.1.2. Cooperative Values and Principles

The cooperative values compass-common values on which all cooperatives are based; but they may be interpreted by different traditions of cooperatives according to their operating conditions and specific environments. But still, it is possible to identify certain common characteristics and features of cooperative organizations though there are distinctive traits for every type of cooperative. Cooperatives are private sector enterprises set up to meet their members' needs. They are owned and democratically controlled by their members - a governance model distinguishing them from private firms. In principle, they are based on values of self-help, self-responsibility, democracy, equality, equity and solidarity. They cover a wide range of activities including: agriculture, financial services, manufacturing, transport, utilities, health care and funerals (DFID, 2010).

The cooperative principles are guidelines by which cooperatives put their values into practice. Cooperative societies have certain distinguishing principles or characteristics, which set them apart from other forms of business organizations. According to literatures, there are seven principles generally agreed upon by theoreticians and practitioners in the area. International Cooperative Alliance (ICA) (1995) stated the principles as follows:

1. **Voluntary and Open Membership:** Co-operatives are voluntary organizations, open to all persons able to use their services and has been ing to accept the responsibilities of membership, without gender, social, racial, political or religious discrimination.
2. **Democratic Member Control:** Cooperatives are democratic organizations controlled by their members, who actively participate in setting their policies and making decisions. Men and women serving as elected representatives are accountable to the membership. In primary cooperatives members have equal voting rights (one member, one vote) and cooperatives at other levels are also organized in a democratic manner.
3. **Member Economic Participation:** Members contribute equitably to, and democratically control, the capital of their cooperative. At least part of that capital

is usually the common property of the cooperative. Members usually receive limited compensation, if any, on capital subscribed as a condition of membership. Members allocate surpluses for any or all of the following purposes: developing their cooperative, possibly by setting up reserves, part of which at least would be indivisible; benefiting members in proportion to their transactions with the cooperative; and supporting other activities approved by the membership.

4. **Autonomy and Independence:** Cooperatives are autonomous, self-help organizations controlled by their members. If they enter to agreements with other organizations, including governments, or raise capital from external sources, they do so on terms that ensure democratic control by their members and maintain their cooperative autonomy.
5. **Education, Training and Information:** Cooperatives provide education and training for their members, elected representatives, managers, and employees so they can contribute effectively to the development of their cooperatives. They inform the general public - particularly young people and opinion leaders - about the nature and benefits of cooperation.
6. **Cooperation among Cooperatives:** Cooperatives serve their members most effectively and strengthen the cooperative movement by working together through local, national, regional and international structures.
7. **Concern for Community:** Cooperatives work for the sustainable development of their communities through policies approved by their members.

2.1.3. The Role of Cooperatives in Economic Development

Cooperatives are community-based, rooted in democracy, flexible, and have participatory involvement, which makes them well suited for economic development (Gertler, 2001). The process of developing and sustaining a cooperative involves the processes of developing and promoting community spirit, identity and social organization as cooperatives play an increasingly important role worldwide in poverty reduction, facilitating job creation, economic growth and social development (Gibson, 2005).

Cooperatives are viewed as important tools for improving the living and working conditions of both women and men. Since the users of the services they provide owned

them, cooperatives make decisions that balance the need for profitability with the welfare of their members and the community, which they serve. As cooperatives foster economies of scope and scale, they increase the bargaining power of their members providing them, among others benefits, higher income and social protection.

Hence, cooperatives accord members opportunity, protection and empowerment essential elements in uplifting them from degradation and poverty (Somavia, 2002).

In a number of ways, cooperatives play important role in global and national economic and social development. With regard to economic and social development, cooperatives promote the “fullest participation of all people” and facilitate a more equitable distribution of the benefits of globalization. They contribute to sustainable human development and have an important role to play in combating social exclusion.

Thus the promotion of cooperatives should be considered as one of the pillars of national and international economic and social development (Levin, 2002).

In addition to the direct benefits they provide to members, cooperatives strengthen the communities in which they operate. According to Somavia (2002) cooperatives are specifically seen as significant tools for the creation of decent jobs and for the mobilization of resources for income generation. Many cooperatives provide jobs and pay local taxes because they operate in specific geographical regions. According to Levin (2002) it is estimated that cooperatives employ more than 100 million men and women worldwide.

2.1.4. Modern Cooperative Movement in Ethiopia

Modern forms of cooperatives were first introduced in Ethiopia in 1960. The new cooperative movement in Ethiopia was triggered by reforms made to the socio-political system. During the socialist government (the Derg regime), cooperatives were formed to assist in the implementation of the Government’s policy of collective ownership of properties. Under this system, cooperatives were forced to operate in line with socialist principles, which meant that production and marketing of produce were undertaken through collective mechanisms. Membership to a cooperative was also compulsory, which contravened the basic cooperative principle of voluntarily participation (Bezabih, 2009).

2.1.4.1. Pre-revolutionary Cooperative Movement

In the 1960s, two cooperative acts were adopted for the first time in Ethiopia. The first was during the imperial government of Ethiopia that the first decree No. 44/ 1960 was declared in order to form the modern “Farm Workers Co-operatives”. This co-operative legislation was enacted three years later than the creation of the Ministry of National Community Development in January 1957 in order to achieve the objectives of the following Departments: Community Department, Co-operative, Social Welfare and Labour (Alemayehu, cited in Redie and Hinrichsen, 2002).

The second decree was the decree No 44/1960 was replaced by “Co-operative Society Proclamation No. 241 of 1966”. The main objective of this proclamation was improving the standard of living of the farmers, better business performance and improving methods of production. In reality, this proclamation benefited the wealthy commercial farmers who resided in the most potential areas. The cooperatives were not easily accessible to the ordinary and poor peasants. Despite its limitations, Alemayehu (2002) describes that proclamation No. 241/1966 created a favorable situation for the expansion and development of co-operatives in Ethiopia. The objectives of these cooperatives include: reducing the cost of credit, reducing the cost of goods and services for production and consumption; minimizing and reducing the individual impact of risks and uncertainties, spreading knowledge of practical technical improvements; and other related activities (Hailu, 2007).

However, another argument states that during the imperial era, cooperatives were primarily created to support the production of high-value agricultural exports, such as coffee. Membership consisted of farmers with large landholdings and tended to exclude smallholders. By 1974, the end of the imperial era, only 149 cooperatives existed in the entire country, including 94 multipurpose, 19 savings and credit, 19 consumer, and 17 handicraft cooperatives (Bernard et al, 2010).

2.1.4.2. Derg Regime

2.1.4.2.1. Peasant Associations

During the early years of the Derg, peasants associations were relatively autonomous and the leaders were freely elected. However, the government progressively started to control the peasant associations and converted them in extensions of state power. Agricultural cooperatives were created through governmental favoritism towards those who decided to be members. Cooperatives received the most fertile lands, displacing those who did not want to belong to the cooperative. The best land was allotted to them, evicting ordinary peasants who might receive inferior land in exchange (Hussein 2004).

2.1.4.2.2. Service Cooperatives

The proclamation on land reform and cooperative organization proclamation stipulated that service cooperatives were to be formed by 2 to 10 peasant associations. The objectives of the service cooperatives were mainly to provide the following services to the members.

1. Provide political education with a view to establish agricultural producers' cooperative societies,
2. Provide extension services,
3. Provide marketing services for the produce of members at fair prices,
4. Arrange loans for members at fair interest rates,
5. Provide storage and savings services,
6. Supply consumer goods to members according to needs, and
7. Supply improved agricultural implements and provide tractor services

2.1.4.2.3. Producers' Cooperatives

The Derg regime considered service cooperatives just as a first step of a massive "corporatization" programmed, which ultimately aimed at transforming the rural economy into the socialist mode of production. Therefore, the individual farmers were encouraged to form producers' cooperatives with collective ownership of production. The organization and stage-by-stage development of producers' cooperatives was elaborated in the 1979 directives of agricultural producers' cooperatives.

2.1.4.3. Cooperative Movement in Post – 1991 Ethiopia

Following the 1991 collapse of the military government, many radical changes have been observed in socio-economic and political atmosphere of the country. For one thing, the country has changed from centrally planned command economic policy to free market economy (Hailu, 2007). It has also undergone various political and economic reforms such as decentralization, democratizations, privatization, currency devaluation and economic liberalization (Hailu, 2007). In line with these measures, the government acknowledged the decisive role of peasant associations such as cooperative, and made some positive policy statements towards cooperatives. Accordingly, the transitional government of Ethiopian has enacted its first agricultural co-operative law (i.e. Proc. No. 85/1994), which provided for the establishment and reorganization of autonomous and genuine primary level agricultural cooperatives that are supposed to operate in accordance with the rule of free market economy (ibid).

Moreover, The Ethiopian Government in 1996/97 prepared a draft cooperative law with the mission to enable the rural and urban working people solving their socio-economic problems based on their local resource basis. To this end, the new law proposed for the pooling of the responsibilities of organizing and promoting all types of cooperative societies under a single administrative agency (i.e. a commission at federal level and bureau at regional levels); unlike Proc.No.138/1987 of the previous government that segregates such responsibilities to different government organs (Hailu, 2007). Accordingly, Federal Cooperative Commission is established by “Cooperative Commission” Establishment Proclamation No., 274/2002, which latter on renamed as Federal cooperative Agency in 2006. It is established as autonomous federal government organ, which is accountable to the Ministry of Agricultural and Rural Development (ibid).

According to Hailu (2007), legal and policy defects of the 1994 proclamation and related cooperative laws have given an impetus to the formulation and issuance of the “Cooperative

Societies Proc.No.147/1998 which provides a detailed policy rules with respect to issues such as: the formation and registration of cooperative societies; the rights and duties of

members of a society; management of cooperative societies; and their special privileges. Moreover, it proclaimed for the issues of asset and funds of cooperative societies; their audit and inspection; dissolution and winding up of societies; settlement of disputes, and other miscellaneous provisions. Accordingly, with some amendments made latter on to Proc. No 147/1998 by “Cooperative Societies (Amendment) Proc. No 402/2004, which, the Council of Minster has provided for its implementation by “Councils of Ministers Regulation No. 106/2004 (Federal Negarit Gazeta, No 27/1998; and No. 43 and No. 47/2004).

2.2. Empirical studies on cooperatives

The cooperative movement is significant both in terms of membership and impact. The United Nations estimated in 1994 that the livelihoods of nearly 3 billion people, or half of the world’s population, were made secure by cooperative enterprises. Nearly 800 million individuals are members of cooperatives. They provide an estimated 100 million jobs. They are economically significant in a large number of countries providing foodstuffs, financial services as well as the provision of services to consumers (ILO, 2005). Cooperatives have created over 13.8 million jobs in India, with 92 per cent of the jobs created through self-employment in the members’ cooperatives. In Japan, the consumer cooperative movement provided 58,281 full-time and 95,374 part-time jobs in 1997 (ICA, 2005).

However, as of the ICA’s survey report in 2005, cooperatives, like other enterprises have seen their operations significantly affected by external challenges in the political and economic environment. Despite these, the cooperative movement is promising to a growing potential for cooperative development, and for cooperative renewal, in light of the limitations of the free market in regard to social responsibility and equity, the advantages of decentralization of power, the importance of stakeholder and community involvement in economic and social life, and the growing role of the civil society (ICA, 2005).

2.2.1. Socio – economic Characteristics of Respondents

Olaoye, et al., 2012 analyzed on their study of socio-economic determinant of the demand for ogun state agricultural multipurpose credits agency (osamca) loan amongst fish farmers in remo zone of ogun state, Nigeria. Based on the analysis they found, majority of

OSAMCA loan beneficiaries and non-beneficiaries falls within the age categories of 25- 60 years with a percentage of 85 and 67.5 and a mean age of 46.12 and 43.6 years, respectively. This implies that most of the farmers are still within their productive and active working age range, hence their ability to participate or produce to earn some revenue and repay loan in the OSAMCA project area is eminent. The implication is that many of the respondents were matured and could efficiently carry out both domestic, business and community responsibilities. It was gathered that most (80%) of the OSAMCA loan beneficiaries and non-beneficiaries were males, respectively, while 20% each were females. This shows the extent of gender sensitivity on occupation like farming. This could be attributed to the fact that agricultural production is faced with a lot of risk and uncertainties and women are risk averted, so also is the result of drudgery that aquaculture business is involved in (Agboola, 2011). Majority (80% and 70%) of the respondents belonged to cooperative society. This implies that the fish farmers can pulled their resources together and collectively accessed credit to increase productivity. Most (97.5% and 95.0%) of the OSAMCA loan beneficiaries and non-beneficiaries were married, respectively. The implication was that more family labour will be available and enhanced production as well as will be more responsible in loan repayment. Many (47.5% & 45%) of the OSAMCA loan beneficiaries and non-beneficiaries had secondary school education, respectively. This implies that information on sources of loan, aquaculture and knowledge will be acquired with ease. It showed that fish farming required high technical know-how and skills thus, people who were literate can really cope very well with fish farming and this was in line with the work of Jinadu, (1997) that literacy rate was quite high (about 70%) among the fisher folks and fish traders. This is in agreement with a similar study conducted by (Yusuf *et al.*, 2002) in Ibadan metropolis, and is an indication of high literacy level which may be required for effective management of fish farms. Majority (77.5% and 67.5%) of the respondents of the OSAMCA loan beneficiaries and non-beneficiaries practiced Christianity, while 22.5% and 32.5% practiced Islam, respectively. Majority (70% and 77.5%) of the OSAMCA loan beneficiaries and non-beneficiaries had mean small holder size of 6 and 5 persons, respectively. This implies that aquaculture enterprise is family business and cost of hired labour will be diverted to other economic recourse for boosting families' welfare (Olaoye, 2010). The implication is that the relative large small holder size may likely enhance labour supply on the farm hence supporting the favorable

productive capacities of the farmers already enhanced by their ages. This corroborates (Adegbite and Oluwalana, 2004) that the larger small holder size, the more the likelihood of sustainable loan efficiency on farmers' farm given the constant labour supply. Mean annual income of OSAMCA loan beneficiaries was N3,324,750.00 while that of non-beneficiaries was N2,196,450.00.

Gomina, et al., 2015 analyzed their study on the Impact of Savings and Credit Cooperative Societies on Poverty Status of Crop Farmers in Niger State, Nigeria. The study majorly found that, about 40% of the beneficiaries and 38% of the non-beneficiaries had secondary education. About 36% of the beneficiaries and 46% of the non-beneficiaries had primary education. About 11% of the beneficiaries and 6% of the non-beneficiaries had tertiary education. Majority about 76% of the beneficiaries and 84% of the non-beneficiaries had some form of educational level of qualification. This might be because most of those who understand the value of cooperative societies and join them were those who had a certain level of education and some civil servants. The educational background would no doubt help in decision making especially in terms of meaningful managerial decisions, leadership and investments. The study also analyzed that, majority about 62% of beneficiaries and 78% of non-beneficiaries had between 2-13 small holder sizes. The mean small holder size for farmer's beneficiaries and non-beneficiaries of SACCO's credit were 11 and 10 respectively. The implication is that the relatively large small holder size may likely enhance the family labour supply on the farms, hence supporting favorably, productive capacities of the farmers already enhanced by their age. Furthermore, the study analyzed the farm size of the beneficiaries and non-beneficiaries as it was found that majority about 67% of the beneficiaries and 71% of non-beneficiaries had between 3.0-4.9 hectare of the same farmland while about 19% of the beneficiaries and 1% of non-beneficiaries had 5.0 and above hectare of farmland. The mean farm size for beneficiaries and non-beneficiaries were 4 and 3 hectares respectively.

Adegbite and Oluwalana (2004) analyzed their study on Revolving loan Scheme as a Poverty Alleviation Strategy. Particularly they found that, Majority (70% and 77.5%) of the OSAMCA loan members and non-members had mean small holder size of 6 and 5 persons, respectively. This implies that aquaculture enterprise is family business and cost

of hired labour will be diverted to other economic recourse for boosting families' welfare (Olaoye, 2010). The implication is that the relative large small holder size may likely enhance labour supply on the farm hence supporting the favourable productive capacities of the farmers already enhanced by their ages. This collaborates (Adegbite and Oluwalana, 2004) that the larger small holder size, the more the likelihood of sustainable loan efficiency on farmers' farm given the constant labour supply. Mean annual income of OSAMCA loan members was N 3, 324,750.00 while that of non-members were N 2,196,450.00.

2.2.2. Cooperative members and non-members

Verhofstadt E. & Martens M. (2013) analyzed their study on Cooperative membership and agricultural performance. Based on the analysis they found that, Before turning to an econometric analysis of the impact of cooperative membership on farm performance, it is useful to compare small holder and farm characteristics between member and non-member farm-small holders and between maize and horticulture cooperative members. This comparison shows that cooperative member small holders have a relatively older small holder head and more small holder members that work in agriculture but there are no significant differences between member and non-member small holders with regard to the small holder size, the composition of the small holder, the gender composition of the labor force, the education of the small holder head, and the number of siblings close by (as a measure of social capital). When comparing maize and horticulture cooperative members, there is not much difference in demographic characteristics, apart from horticulture cooperative members having a higher share of female workers. Land- and livestock holdings are quite small in the sample, on average small holders only own 0,27 ha of agricultural land and 1,1 tropical livestock units. Cooperative members own significantly more land and livestock than non-cooperative members while there is no difference in land and livestock ownership between members of maize and horticulture cooperatives. Small holders differ substantially with respect to total and per capita small holder income. The small holder income of cooperative members is 60% larger than that of non-14 members, and the income of maize cooperative members 52% larger than that of horticultural cooperative members. The income from farming makes up on average 50% of total small

holder income, and is a lot higher for cooperative members – 380.593 RWF compared to 169.693 RWF for non-members. Also farm income per worker and gross farm revenue are higher among cooperative members. There are no differences in farm income and revenue between maize and horticulture cooperative members. When looking at farm practices, we observe that cooperative members in general and maize cooperative members in specific, sell a larger share of farm produce, spend more on inputs and use more modern technologies such as improved seeds, mineral fertilizer, pesticides and irrigation. Whether these observed differences in farm income, farm revenue, share of produce sold and use of modern inputs is the result of cooperative membership has to be revealed through a more in-depth econometric analysis

Verhofstadt E. & Martens M. (2013) also analyzed that; cooperative membership in general has a strong positive effect on farm performance. We find that participation in a cooperative improves market orientation; resulting in an increase in the share of farm produce sold of 10 to 16 percentage points. In addition, cooperative membership results in increased agricultural intensification. We find large and significant positive effects on the value of inputs – effects range between 6 and 8.6 thousand RWF and are significant at the 5 or 1% level – and on the likelihood of using improved seeds, mineral fertilizer, pesticides and irrigation – marginal effects are between 21 and 31%, except for pesticides where effects are somewhat lower, and are all significant at the 5 or 1% level. Cooperative membership also has a positive effect on gross farm revenue, net farm income and farm income per worker. Taking the most conservative results, participation in cooperatives increases gross farm revenue with 37%, net farm income with 25% and farm income per worker with 27%, which are large effects.

Verhofstadt E. & Martens M. (2013), Analyzed that, horticultural cooperatives are less successful in creating gains for their members. The results indicate that membership in horticulture cooperatives significantly increases intensification and commercialization but have no effect on returns and farm income. We find that participation in horticulture cooperatives increases the value of inputs with 3.6 thousand 20 RWF and the share of produce sold with 7,7 percentage points. These effects are substantially smaller than the effects found for maize cooperatives. In addition, based on model 2 which gives the most

conservative results, we find that there is no effect on the likelihood of using modern inputs, on gross farm revenue and farm income.

CHAPTER THREE

RESEARCH METHODOLOGY

The objective of the present chapter is to discuss the choice and interpretation of appropriate methodology to understand the physical and socio economic features of the study area.

3.1. Description of the study area

3.1.1. Geography and location

Sidama is a zone in the Southern Nations, Nationalities, and Peoples' Region (SNNPR) of Ethiopia. It is named for the Sidama people, whose homeland is in the zone. Sidama is bordered on the south by the Oromia Region (except for a short stretch in the middle where it shares a border with Gedeo zone), on the west by the Bilate River, which separates it from Wolayita zone, and on the north and east by the Oromia Region. Towns in Sidama include Yirgalem and Wendo. Sidama surrounds the city of Awasa, capital of the SNNPR. Sidama has a population of around 3.5 million, who speak the Cushitic language Sidamo (also known as Sidamigna).

Sidama has 879 kilometers of all-weather roads and 213 kilometers of dry-weather roads, for an average road density of 161 kilometers per 1,000 square kilometers (SNNPR bureau of FED, 2009). Sidama Zone is the leading coffee producing zone in Ethiopia, which contributes greatly to the foreign exchange of the federal government. The Central Statistical Agency (CSA) reported that 63,562 tons of coffee was produced in Sidama and Gedeo combined in the year ending in 2005, based on inspection records from the Ethiopian Coffee and Tea authority. This represents 63% of the SNNPR's output and 28% of Ethiopia's total output (CSA, 2005).

The Zone is also rich in water resources, which are underutilized. The leading causes of morbidity and mortality in SNNP region are mostly attributable to lack of clean drinking water, poor sanitation, and low public awareness of environmental health and personal hygiene practices.

There is a high value attached to livestock by the Sidama, among whom a person without cattle is not regarded as a fully-grown social person, but as an outcast. Cattle numbers are good indicator of wealth, and gives chief popularity for the farmer who owns more cattle.

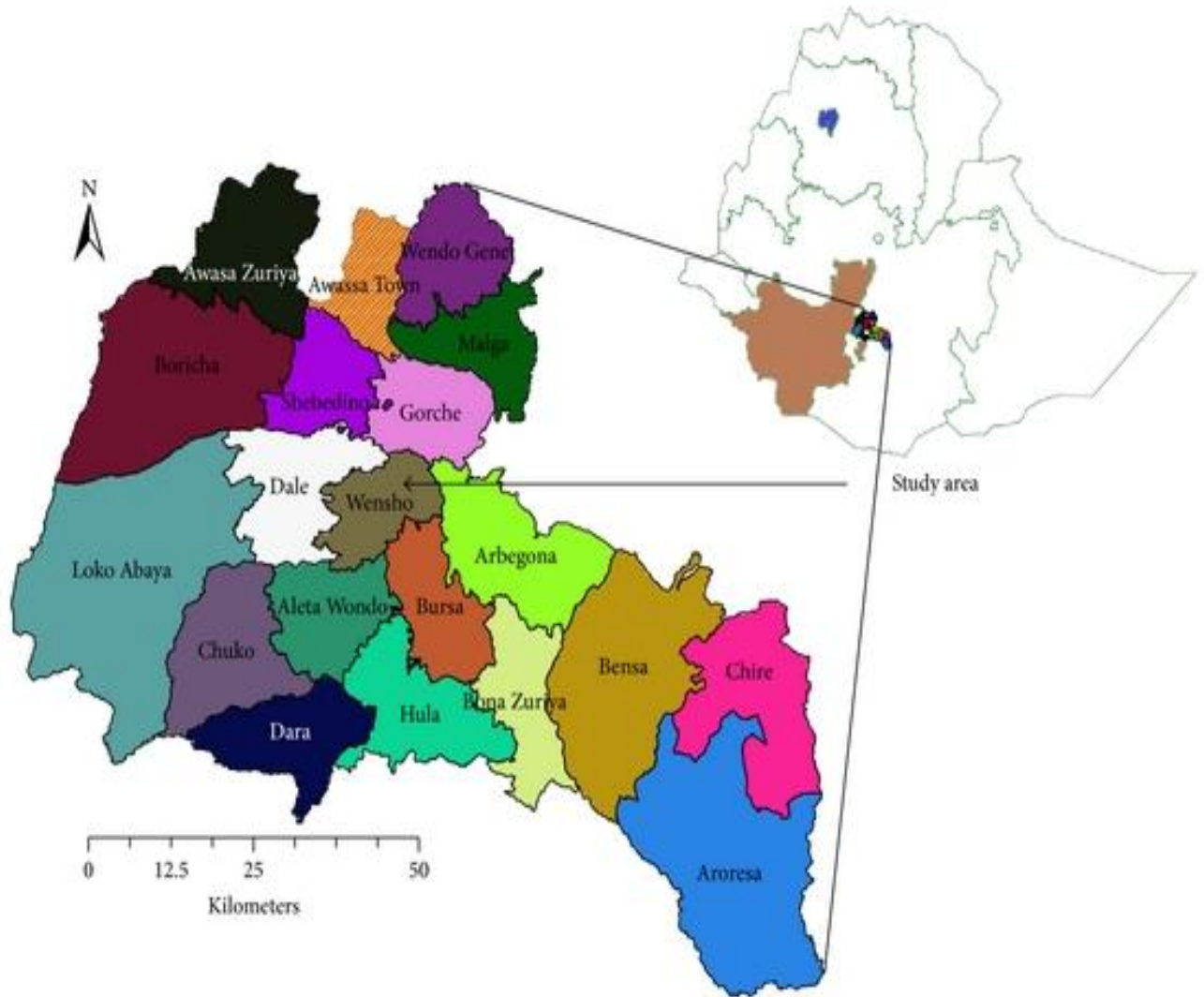


Figure 1 Map of the study Area

3.1.2. Population characteristics

Based on the 2007 Census conducted by the CSA, this Zone has a total population of 2,954,136, of whom 1,491,248 are men and 1,462,888 women; with an area of 6,538.17

square kilometers, Sidama has a population density of 451.83. While 162,632 or 5.51% are urban inhabitants, a further 5,438 or 0.18% are pastoralists. A total of 592,539 small holders were counted in this Zone, which results in an average of 4.99 persons to a small holder, and 566,926 housing units. The three largest ethnic groups reported in this Zone were the Sidama (93.01%), the Oromo (2.53%), and the Amhara (1.91%); all other ethnic groups made up 2.55% of the population. Sidamo is spoken as a first language by 94.23% of the inhabitants, 2.14% speak Amharic, and 2.07% Oromiffa; the remaining 1.56% spoke all other primary languages reported. 84.38% of the population said they were Protestants, 4.62% were Muslim, 3.35% practiced Ethiopian Orthodox Christianity, 3.01% embraced Catholicism, and 2.72% observed traditional religions (Census, 2007).

3.1.3. Farming system and land use

In the study area, agriculture is characterized by subsistence mixed crop-livestock farming. Most of the area around the homestead is covered with perennial Enset (*Ensete ventricosum*), which is a staple food and income source. Coffee (mainly *Coffea arabica*) and Chat (*Catha edulis*), and fruit trees such as papaya (*Carica papaya*), banana (*Musa* species), avocado (*Persea americana*) and mango (*Mangifera indica*) are also among the widely cultivated crops. Vegetables such as potato, cabbages, onion, carrot, pumpkins, and green pepper are grown intercropped either with Enset or coffee. Annual crops such as maize, sorghum, barley, wheat, bean, pea, and haricot bean are most commonly cultivated. The description of each land use type is presented as follow

Protected Forest Land. It is composed of various indigenous trees, shrubs, and bushes like *Podocarpus falcatus* (Zigba), *Strychnos spinosa* (Dokma), *Croton macrostachyus* (Bisana), *Arundinaria alpina* (Mountain bamboo), *Pouteria adolfi-friedericii* (or *Aningeria adolfi-friedericii*, Keraro), *Juniperus procera* (Tid), *Cordia africana* (Wanza), *Prunus africana*,

(*Tikurenchet*), *Euphorbia candelabrum* (Kulkual) *Milletia ferruginea* (Birbira) and *Vernonia amygdalina* (Grawa). In the forest, farmers have the right to use the forest for their livestock grazing. However, the culture has not allowed replanting (reforestation) and the newly germinating seedlings have been destroyed by animals browsing and trampling (Ketteema, 2013).

The predominant animals kept by farmers are the local and improved cows. Cows are main assets and savings of the people and important source of protein and energy in their diet. Cows are highly valued for their milk which is soured and converted to butter fat and partially fat extract sour milk which is essential part of the sidama diet ‘ Kocho’ made from Enset (the false banana). The milk in these rural areas comes from local/indigenous zebu cows which are kept in traditional management. On the other hand, cross breed cows concentrate around urban and peri-urban areas where farmers supply liquid milk to urban consumers. The area where predominantly milk and butter is produced from local cows is therefore, classified as the butter-fat system while the area that produce milk from the cross breed animals for commercial milk supply is classified as liquid milk system. Milk produced is sold to consumers as liquid without fat extraction or any other processing (Ketteema, 2013)

Small ruminants (Goats and sheep) are kept by people as means of asset building, insurance and quick cash generation at times of need. Sheep is very important in the highlands where there is relatively plenty of grazing land while goats thrive in the wet kola agro-ecology with some grazing and abundant brows. Most sheep and goats are kept in traditional grazing and browsing system breeding them to building up small holder assets. There is also some market orientation where farmers exercise feeding with whole grain and industrial by-products fattening sheep and goats for certain markets mainly Christian and Muslim holydays (Ketteema, 2013).

Poultry is very important agricultural activity in all the three cluster districts. Most of the chickens kept are local or indigenous types. They are kept under the range system at zero cost with little or no supplementation. Traditionally each small holder keep 3-5 chickens that produce some eggs which is partially sold and the remaining are used for hatching to raise replacement stock. In most cases, however, the replacement stock will not increase the population at any one time due to very high mortality of chicks due to diseases and perdition. Diseases also regularly keep the number of adult stocks down. Each small holder again keep 2-3 male stocks for breeding and live chicken sale. There was some effort to introduce commercial breeds through the ministry of agriculture but, the results have not been encouraging due to lack of essential inputs to sustain production. Never the less, due to very high demand for eggs and poultry meet there is huge interest by farmers, the unemployed youth both in urban and rural country sides for commercial breeds for egg and meat production (Ketteema, 2013).

Generally there is growing demand for livestock product in the zone and in the region and the government policy is highly supportive of livestock initiatives as means of alleviating food security and poverty. Livestock initiatives have been given very high mark in the government policy and strategy as means of creating employment opportunity for youth and women both in urban and rural country sides.

3.1.4. Climate, soil and topography

The study area has a mean annual rainfall and temperature ranging from 832 mm to 1658 mm and 18–21°C, respectively. The pattern of rainfall distribution is bimodal. The short rainy season lasts from mid November to February whereas the long rainy season is during summer and it extends up to October (ENMA). According to (SZFEDS) the Sidama zone can be divided in to four local climatic zones, on the basis of altitudinal and annual rainfall variations, as “Wet Dega,” “Moist Woyna Dega,” “Wet Woyna Dega,” and “Wet Kola”. Accordingly, the study site is observed to be “Wet-Woyna Dega” (Wet mid-highland). Geologically, the Precambrian rock with ages of over 600 million years forms the foundation of basement complex rocks. The Sidama district also contains a wide variety of sedimentary, volcanic, and intrusive igneous rocks which have been metamorphosed to varying degrees containing the metallic deposits (SZFEDS, 2007).

3.2. Research design

As indicated in the initial stage of this document the main focus of this research lies on assessing the analysis of the contribution of coffee cooperatives in coffee production and marketing in Ethiopia. The researcher has been used survey method and also divides all 46 cooperatives into groups based on their similar characteristics. i.e. The researcher divided the whole cooperatives into strata and collect those cooperatives who have similar characteristics in to one stratum. Then, determine the sample individuals from the given stratum by using the formula and randomly select the determined individuals from each stratum since there is homogeneity with each stratum.

3.3. Sample Size and Sampling Procedure

As per Ahmedin 2008, stated that the sampling techniques are concerned, a multistage random sampling procedure was followed in the study as indicated below. SNNPRS is one of the nine National Regional States in Ethiopia, has 13 zones and eight special woredas. From the 13 zones and eight special woredas of SNNPRS, Sidama zone had been selected purposively for the study for the following reasons.

1. It is the most unique organic coffee producing area,
2. The Zone has Great potentials for market oriented development,
3. The zone is the pioneer in the history of coffee farmers' marketing cooperatives.

From the Sidama zone which has ten woredas, namely, Shebedino, Aleta wondo, Chuko, Dale, Dara, Wonsho, Bensa, Abaya, Aroresa and Chire, four woredas (Shebedino, Dale, Aleta wondo and Chuko) were selected at random , which was 40 % of the total woredas

For the purpose of assessing the welfare implication of coffee cooperatives on the small scale farmers, Shebedino, Dale, Aleta wondo and Chuko woredas were selected randomly as mentioned above. The four woredas have 26 coffee farmers' cooperatives out of the 46 primary coffee farmers' cooperatives of the zone. From the 26 primary coffee farmers' cooperatives of the selected woredas, 8 primary coffee farmers' cooperatives were selected randomly .For the purpose of assessing the welfare implication of the members' of primary coffee farmers' cooperatives on small scale farmers, 121 individual members and non members were selected at random on the basis of proportionate to size.

3.4. Data sources and data collection method

The required primary data collected through questionnaires, personal interviews, and observation. To collect the data; a survey instrument (interview schedule) has been developed. A panel of experts has been checked the questionnaire for face and content validity. Enumerators have been recruited and training has been given to equip them with the necessary interviewing techniques. The questionnaire has been pretested and revised accordingly to evaluate enumerators and to validate the content and method. Finally

enumerators have been resume collecting data using the survey questionnaire with close supervision of the researcher.

Focus group discussions have also been conducted to collect opinions and qualitative description of the sample small holders about the research agenda. In addition secondary data was collected from diverse secondary sources including primary coffee marketing cooperatives and from cooperative union, Agricultural Bureau of the region and Sidama zone Cooperative Promotion Office, Customs Office, Federal Cooperatives Commission, National Bank of Ethiopia, Coffee, Tea and Spices Department, Coffee Liquoring Center and IPMS_ILRI. In the collection of secondary information, a well-structured schedule has been used in collecting primary data.

Most of the data related to the contribution of cooperatives was collected for ten years for each of the 46 primary coffee marketing cooperatives. An informal discussion was also conducted with the cooperatives' members, officials, and other key informants. Relevant primary data was collected through formal survey of sampled traders. Primary data required for the assessment of member's role with the services of the cooperatives has collect from sample cooperative members from the sample primary cooperatives. The data has collect using structured questionnaire. The questionnaire has pre-test and its contents has refine on the basis of the results obtain during the pre-test.

In the process, ten enumerators were used. These individuals have recruit and train on interviewing techniques and the general approach to respondents. Researcher has closely supervising them during data collection period.

3.5. Data analysis method

3.5.1 Descriptive analysis

Descriptive statistics like mean, variance, standard deviations, frequency distributions, and percentages has been used to assess the socio economic situations of the sample respondents. From the statistical tools, Chi Square test has been used for dummy variables to investigate the difference between the members and non-members.

3.5.2. Matching estimators

Matching has become a popular approach to estimate causal treatment effect. It is widely applied when evaluating labour market policies (Dehejia and Wahba (1999); Heckman, Ichimura, and Todd (1997)), but empirical examples can be found in very diverse fields of study. It applies for all situations where one has a treatment, a group of treated individuals and a group of untreated individuals. The nature of treatment may be very diverse. For example, Perkins, Tu, Underhill, Zhou, and Murray (2000) discuss the usage of matching in pharmacoepidemiologic research. Hitt and Frei (2002) analyse the effect of online banking on the profitability of customers. Davies and Kim (2003) compare the effect on the percentage bid-ask spread of Canadian firms being inter listed on an US-Exchange, whereas Brand and Halaby (2003) analyse the effect of elite college attendance on career outcomes. Ham, Li, and Reagan (2003) study the effect of a migration decision on the wage growth of young men and Bryson (2002) analyse the effect of union membership on wages of employees. Every micro econometric evaluation study has to overcome the fundamental evaluation problem and address the possible occurrence of selection bias. The first problem arises because we would like to know the difference between the participants' outcome with and without treatment. Clearly, we cannot observe both outcomes for the same individual at the same time. Taking the mean outcome of non-participants as an approximation is not advisable, since participants and non-participants usually differ even in the absence of treatment. This problem is known as selection bias and a good example is the case, where motivated individuals have a higher probability of entering a training programme and have also a higher probability of finding a job. The matching approach is one possible solution to the selection problem. It originated from the statistical literature and shows a close link to the experimental context. Its basic idea is to find in a large group of non-participants those individuals who are similar to the participants in all relevant pre-treatment characteristics X . That being done, differences in outcomes of this well selected and thus adequate control group and of participants can be attributed to the programme. Since conditioning on all relevant covariates is limited in case of a high dimensional vector X ('curse of dimensionality'), Rosenbaum and Rubin (1983) suggest the use of so-called balancing scores $b(X)$, i.e. functions of the relevant observed covariates X such that the conditional distribution of X given $b(X)$ is independent of assignment into treatment. One

possible balancing score is the propensity score, i.e. the probability of participating in a programme given observed characteristics X .

Matching procedures based on this balancing score are known as propensity score matching (PSM) and has be the focus of this paper. Once the researcher has decided to use PSM, he is confronted with a lot of questions regarding its implementation.

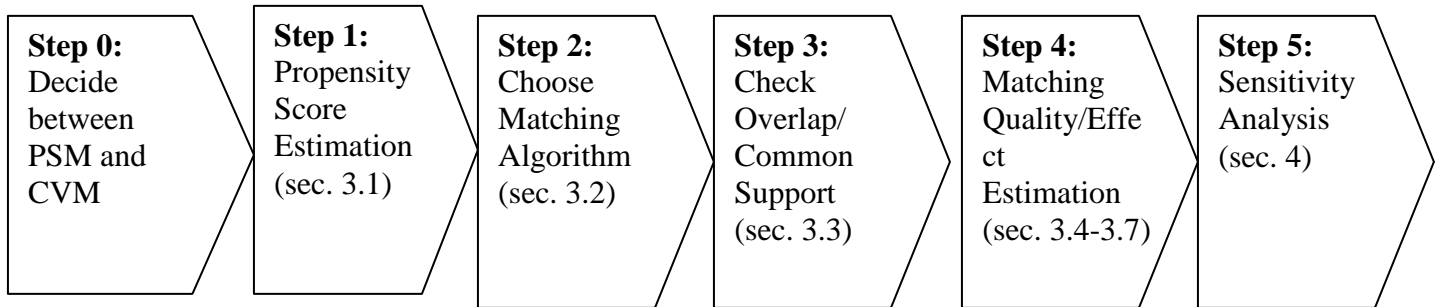


Figure 2 summarizes the necessary steps when implementing PSM

The aim of this paper is to discuss these issues and give some practical guidance to researchers who want to use PSM for evaluation purposes. The paper is organized as follows. In section 2 we have describe the basic evaluation framework and possible treatment effects of interest. Furthermore we show how propensity score matching solves the evaluation problem and highlight the implicit identifying assumptions. In section 3 we have focus on implementation steps of PSM estimators. To begin with, a first decision has to be made concerning the estimation of the propensity score (see subsection 3.1). One has not only to decide about the probability model to be used for estimation, but also about variables which should be included in this model. In subsection 3.2 we briefly evaluate the (disadvantages of different matching algorithms. Following that we discuss how to check the overlap between treatment and comparison group and how to implement the common support requirement in subsection 3.3. In subsection 3.4 we have show how to assess the matching quality. Subsequently we present the problem of choice-based sampling and discuss the question 'when to measure programme effects?' in subsections 3.5 and 3.6. Estimating standard errors for treatment effects has be briefly discussed in subsection 3.7, before we conclude this section with an overview of available software to estimate treatment effects (3.8).Section 4 has be concerned with the sensitivity of estimated treatment effects. In subsection 4.1 we describe an approach (Rosenbaum bounds) that

allows the researcher to determine how strongly an unmeasured variable must influence the selection process in order to undermine the implications of PSM. In subsection 4.2 we describe an approach proposed by Lechner (2000b). He incorporates information from those individuals who failed the common support restriction, to calculate bounds of the parameter of interest, if all individuals from the sample at hand would have been included. Finally, section 5 reviews all steps and concludes.

3.5.2.1. Evaluation Framework and Matching Basics

Roy-Rubin Model: Inference about the impact of a treatment on the outcome of an individual involves speculation about how this individual would have performed had he not received the treatment. The standard framework in evaluation analysis to formalize this problem is the potential outcome approach or Roy-Rubin-model (Roy (1951), Rubin (1974)). The main pillars of this model are individuals, treatment and potential outcomes. In the case of a binary treatment the treatment indicator D_i equals one if individual i receives treatment and zero otherwise. The potential outcomes are then defined as $Y_i(D_i)$ for each individual i , where $i = 1; \dots; N$ and N denotes the total population. The treatment effect for an individual i can be written as:

$$T_i = Y_i(1) - Y_i(0): \tag{1}$$

The fundamental evaluation problem arises because only one of the potential outcomes is observed for each individual i . The unobserved outcome is called counterfactual outcome. Hence, estimating the individual treatment effect T_i is not possible and one has to concentrate on (population) average treatment effects.³ Parameter of Interest: The parameter that received the most attention in evaluation literature is the 'average treatment effect on the treated' (ATT), which is defined as:

$$T_{ATT} = E(T | D = 1) = E[Y(1) | D = 1] - E[Y(0) | D = 1]: \tag{2}$$

As the counterfactual mean for those being treated - $E[Y(0) | D = 1]$ - is not observed, one has to choose a proper substitute for it in order to estimate ATT. Using the mean outcome of untreated individuals $E[Y(0) | D = 0]$ is in non-experimental studies usually not a good idea, because it is most likely that components which determine the treatment decision also

determine the outcome variable of interest. Thus, the outcomes of individuals from treatment and comparison group would differ even in the absence of treatment leading to a 'self-selection bias'. For ATT it can be noted as:

$$E[Y(1)|D = 1] - E[Y(0)|D = 0] = T_{ATT} + E[Y(0)|D = 1] - E[Y(0)|D = 0]. \quad (3)$$

The difference between the left hand side of equation (3) and T_{ATT} is the so-called self-selection biases. The true parameter T_{ATT} is only identified, if:

$$E[Y(0) |D = 1] - E[Y(0) |D = 0] = 0: \quad (4)$$

In social experiments where assignment to treatment is random this is ensured and the treatment effect is identified.⁴ In non-experimental studies one has to invoke some identifying assumptions to solve the selection problem stated in equation (3). Another parameter of interest is the 'average treatment effect' (ATE), which is defined as:

$$T_{ATE} = E[Y(1) - Y(0)]: \quad (5)$$

The additional challenge when estimating ATE is that both counterfactual outcomes $E[Y(1)|D = 0]$ and $E[Y(0)|D = 1]$ have to be constructed.

3.5.2.2. Conditional Independence Assumption.

One possible identification strategy is to assume, that given a set of observable covariates X which are not affected by treatment, potential outcomes are independent of treatment assignment:

$$(\text{Unconfoundedness}) Y(0), Y(1) \perp\!\!\!\perp D | X, \quad \forall X. \quad (6)$$

This implies, that selection is solely based on observable characteristics and that all variables that influence treatment assignment and potential outcomes simultaneously are observed by the researcher. Clearly, this is a strong assumption and has to be justified by the data quality at hand. For the rest of the paper we have assumed that this condition holds.⁵ It should also be clear, that conditioning on all relevant covariates is limited in case of a high dimensional vector X . For instance, if X contains s covariates which are all

dichotomous, the number of possible matches has been $2s$. To deal with this dimensionality problem, Rosenbaum and Rubin (1983) suggest using so-called balancing scores. They show that if potential outcomes are independent of treatment conditional on covariates X , they are also independent of treatment conditional on a balancing score $b(X)$. The propensity score $P(D = 1|X) = P(X)$, i.e. the probability for an individual to participate in a treatment given his observed covariates X , is one possible balancing score. The conditional independence assumption (CIA) based on the propensity score (PS) can be written as:

$$\text{(Unconfoundedness given the PS)} \quad Y(0), Y(1) \perp\!\!\!\perp D | P(X), \quad \forall X. \quad (7)$$

3.5.2.3. Common Support:

A further requirement besides independence is the common support or overlap condition. It rules out the phenomenon of perfect predictability of D given X :

$$\text{(Overlap)} \quad 0 < P(D = 1|X) < 1 \quad (8)$$

It ensures that persons with the same X values have a positive probability of being both participants and non-participants (Heckman, LaLonde, and Smith, 1999). Estimation Strategy: Given that CIA holds and assuming additionally that there is overlap between both groups (called 'strong ignorability' by Rosenbaum and Rubin (1983)), the PSM estimator for ATT can be written in general as:

$$T_{\text{PSM}} = E_{P(X)|D=1} \{E[Y(1) | D = 1, P(X)] - E[Y(0) | D = 0, P(X)]\}. \quad (9)$$

ATT

To put it in words, the PSM estimator is simply the mean difference in outcomes over the common support, appropriately weighted by the propensity score distribution of participants. Based on this brief outline of the matching estimator in the general evaluation framework, we are now going to discuss the implementation of PSM in detail.

3.5.3. Implementation of Propensity Score Matching

3.5.3.1 Estimating the Propensity Score

When estimating the propensity score, two choices have to be made. The first one concerns the model to be used for the estimation, and the second one the variables to be included in this model. We have start with the model choice before we discuss which variables to include in the model.

3.5.3.2. Model Choice:

Little advice is available regarding which functional form to use (see e.g. the discussion in Smith (1997)). In principle any discrete choice model can be used. Preference for logit or probit models (compared to linear probability models) derives from the well-known shortcomings of the linear probability model, especially the unlikeliness of the functional form when the response variable is highly skewed and predictions that are outside the [0; 1] bounds of probabilities.

However, when the purpose of a model is classification rather than estimation of structural coefficients, it is less clear that these criticisms apply (Smith, 1997). For the binary treatment case, where we estimate the probability of participation vs. non-participation, logit and probit models usually yield similar results. Hence, the choice is not too critical, even though the logit distribution has more density mass in the bounds. However, when leaving the binary treatment case, the choice of the model becomes more important. The multiple treatment case (as discussed in Imbens (2000) and Lechner (2001)) constitutes of more than two alternatives, e.g. when an individual is faced with the choice to participate in job-creation schemes, vocational training or wage subsidy programmes or do not participate at all. For that case it is well known that the multinomial logit is based on stronger assumptions than the multinomial probit model, making the latter one the preferable option.⁷ However, since the multinomial probit is computational more burdensome, a practical alternative is to estimate a series of binomial models like suggested by Lechner (2001). Bryson, Dorsett, and Purdon (2002) note that there are two shortcomings regarding this approach. First, as the number of options increases, the number of models to be estimated increases disproportionately (for L options we need $0.5(L(L - 1))$

models). Second, in each model only two options at a time are considered and consequently the choice is conditional on being in one of the two selected groups. On the other hand, Lechner (2001) compares the performance of the multinomial probit approach and the series estimation and finds little difference in their relative performance. He suggests that the latter approach may be more robust since a mis-specification in one of the series has not compromise all others as would be the case in the multinomial probit model. Variable Choice: More advice is available regarding the inclusion (or exclusion) of covariates in the propensity score model. The matching strategy builds on the CIA, requiring that the outcome variable(s) must be independent of treatment conditional on the propensity score. Hence, implementing matching requires choosing

a set of variables X that credibly satisfy this condition. Heckman, Ichimura, and Todd (1997) show that omitting important variables can seriously increase bias in resulting estimates. Only variables that influence simultaneously the participation decision and the outcome variable should be included. Hence, economic theory, a sound knowledge of previous research and also information about the institutional settings should guide the researcher in building up the model (see e.g. Smith and Todd (2005) or Sianesi (2004)). It should also be clear that only variables that are unaffected by participation (or the anticipation of it) should be included in the model. To ensure this, variables should either be fixed over time or measured before participation. In the latter case, it must be guaranteed that the variable has not been influenced by the anticipation of participation. Heckman, LaLonde, and Smith (1999) also point out, that the data for participants and non-participants should stem from the same sources (e.g. the same questionnaire). The better and more informative the data are, the easier it is to credibly justify the CIA and the matching procedure. However, it should also be clear that 'too good' data is not helpful either. If $P(X) = 0$ or $P(X) = 1$ for some values of X , then we cannot use matching conditional on those X values to estimate a treatment effect, because persons with such characteristics either always or never receive treatment. Hence, the common support condition as stated in equation (8) fails and matches cannot be performed. Some randomness is needed that guarantees that persons with identical characteristics can be observed in both states (Heckman, Ichimura, and Todd, 1998). In cases of uncertainty of the proper specification, sometimes the question may arise if it is better to include too

many rather than too few variables. Bryson, Dorsett, and Purdon (2002) note that there are two reasons why over-parameterised models should be avoided. First, it may be the case that including extraneous variables in the participation model exacerbate the support problem. Second, although the inclusion of non-significant variables has not bias the estimates or make them inconsistent, it can increase their variance. The results from Augurzky and Schmidt (2000) point in the same direction. They run a simulation study to investigate propensity score matching when selection into treatment is remarkably strong, and treated and untreated individuals differ considerably in their observable characteristics. In their setup, explanatory variables in the selection equation are partitioned into two sets. The first set includes variables that strongly influence the participation and the outcome equation, whereas the second set does not (or only weakly) influence the outcome equation. Including the full set of covariates in small samples might cause problems in terms of higher variance, since either some treated have to be discarded from the analysis or control units have to be used more than once. They show that matching on an inconsistent estimate of the propensity score (i.e. the one without the second set of covariates) produces better estimation results of the average treatment effect. On the other hand, Rubin and Thomas (1996) recommend against 'trimming' models in the name of parsimony. They argue that a variable should only be excluded from analysis if there is consensus that the variable is either unrelated to the outcome or not a proper covariate. If there are doubts about these two points, they explicitly advise to include the relevant variables in the propensity score estimation.

By these criteria, there are both reasons for and against including all of the reasonable covariates available. Basically, the points made so far imply that the choice of variables should be based on economic theory and previous empirical findings. But clearly, there are also some formal (statistical) tests which can be used. Heckman, Ichimura, Smith, and Todd (1998) and Heckman and Smith (1999) discuss two strategies for the selection of variables to be used in estimating the propensity score.

Hit or Miss Method: The first one is the 'hit or miss' method or prediction rate metric, where variables are chosen to maximize the within-sample correct prediction rates. This method classifies an observation as '1' if the estimated propensity score is larger than the

sample proportion of persons taking treatment, i.e. $\hat{P}(X) > P$. If $\hat{P}(X) \cdot P$ observations are classifieds '0'. This method maximizes the overall classification rate for the sample assuming that the costs for the misclassification are equal for the two groups (Heckman, Ichimura, and Todd, 1997).⁸ But clearly, it has to be kept in mind that the main purpose of the propensity score estimation is not to predict selection into treatment as good as possible but to balance all covariates (Augurzky and Schmidt, 2000). Statistical Significance: The second approach relies on statistical significance and is very common in textbook econometrics. To do so, one starts with a parsimonious specification of the model, e.g. a constant, the age and some regional information, and then 'tests up' by iteratively adding variables to the specification. A new variable is kept if it is statistically significant at conventional levels. If combined with the 'hit or miss' method, variables are kept if they are statistically significant and increase the prediction rates by a substantial amount (Heckman, Ichimura, Smith, and Todd, 1998). Leave-one-out Cross-Validation: Leave-one-out cross-validation can also be used to choose the set of variables to be included in the propensity score. Black and Smith (2003) implement their model selection procedure by starting with a 'minimal' model containing only two variables. They subsequently add blocks of additional variables and compare the resulting mean squared errors. As a note of caution they stress, that this amounts to choosing the propensity score model based on goodness-of-fit considerations, rather than based on theory and evidence about the set of variables related to the participation decision and the outcomes (Black and Smith, 2003). They also point out an interesting trade-off infinite sample between the plausibility of the CIA and the variance of the estimates. When using the full specification, bias arises from selecting a wide bandwidth in response to the weakness of the common support. In contrast to that, when matching on the minimal specification, common support is not a problem but the plausibility of the CIA is. This trade-off also affects the estimated standard errors, which are smaller for the minimal specification where the common support condition poses no problem. Finally, checking the matching quality can also help to determine which variables should be included in the model.

3.5.3.3. Overweighting some Variables:

Let us assume for the moment that we have found a satisfactory specification of the model. It may sometimes be felt that some variables play a important role in determining participation and outcome (Bryson, Dorsett, and Purdon, 2002). As an example, one can think of the influence of gender and region in determining the wage of individuals. Let us take as given for the moment that men earn more than women and the wage level is higher in region A compared to region B. If we add dummy variables for gender and region in the propensity score estimation, it is still possible that women in region B are matched with men in region A, since the gender and region dummies are only a sub-set of all available variables. There are basically two ways to put greater emphasis on specific variables. One can either find variables in the comparison group who are identical with respect to these variables, or carry out matching on sub-populations. The study from Lechner (2002) is a good example for the first approach. He evaluates the effects of active labour market policies in Switzerland and uses the propensity score as a 'partial' balancing score which is complemented by an exact matching on sex, duration of unemployment and native language. Heckman, Ichimura, and Todd (1997) and Heckman, Ichimura, Smith, and Todd (1998) use the second strategy and implement matching separately for four demographic groups. That implies that the complete matching procedure (estimating the propensity score, checking the common support, etc.) has to be implemented separately for each group. This is analogous to insisting on a perfect match e.g. in terms of gender and region and then carrying out propensity score matching. This procedure is especially recommendable if one expects the effects to be heterogeneous between certain groups.

Alternatives to the Propensity Score: Finally, it should also be noted that it is possible to match on a measure other than the propensity score, namely the underlying index of the score estimation. The advantage of this is that the index differentiates more between observations in the extremes of the distribution of the propensity score (Lechner, 2000a). This is useful if there is some concentration of observations in the tails of the distribution. Additionally, in some recent papers the propensity score is estimated by duration models. This is of particular interest if the 'timing of events' plays a crucial role (see e.g. Brodaty, Crepon, and Fougere (2001) or Sianesi (2004)).

3.5.3.4. Choosing a Matching Algorithm

The PSM estimator in its general form was stated in equation (9). All matching estimators contrast the outcome of a treated individual with outcomes of comparison group members. PSM estimators differ not only in the way the neighborhood for each treated individual is defined and the common support problem is handled, but also with respect to the weights assigned to these neighbors. Figure 2 depicts different PSM estimators and the inherent choices to be made when they are used.

We have not discuss the technical details of each estimator here at depth but rather present the general ideas and the involved trade-offs with each algorithm.

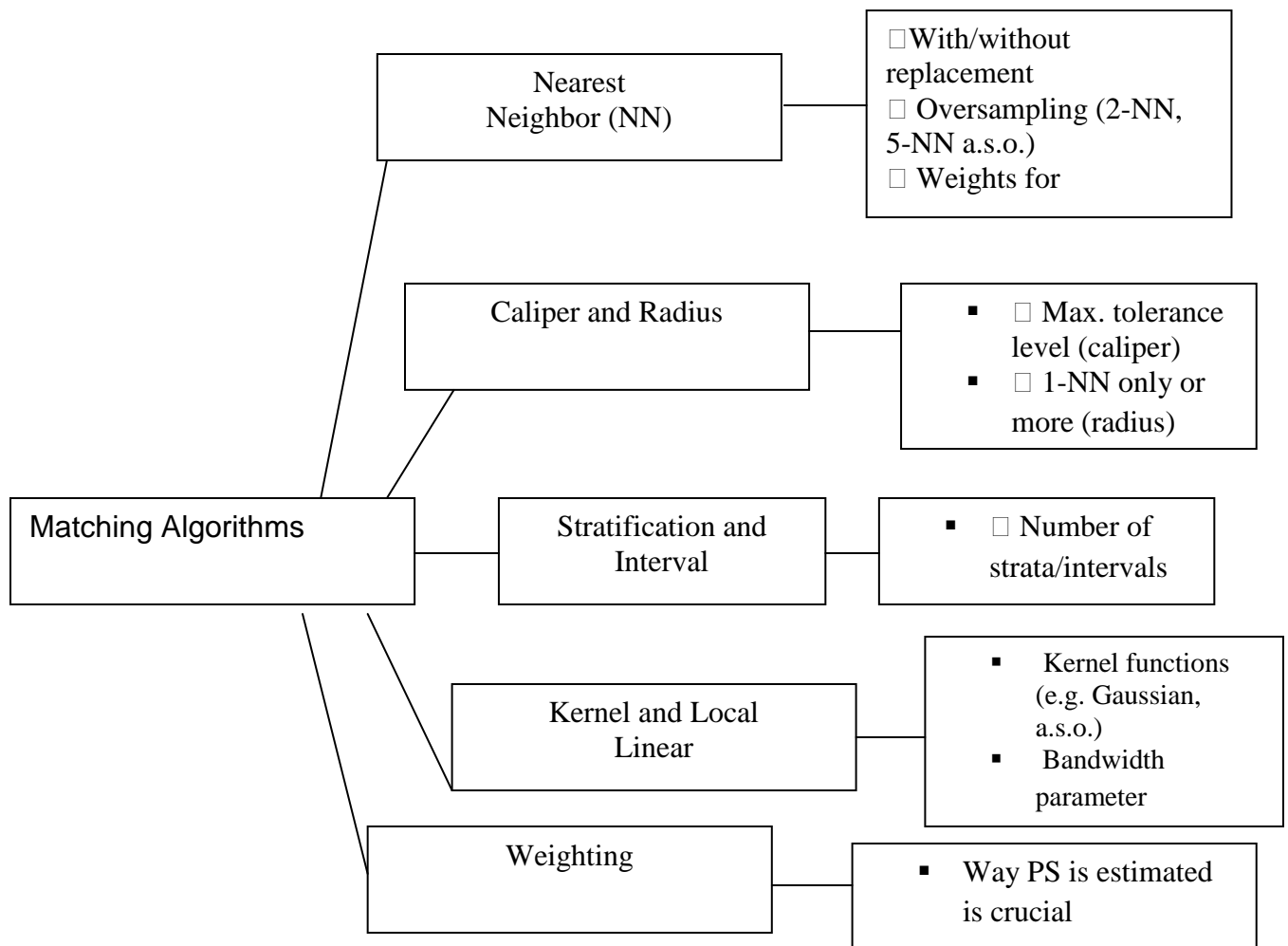


Figure 3 Different Matching Algorithms

NN: Nearest Neighbor, PS: Propensity Score

Nearest Neighbour Matching: The most straightforward matching estimator is nearest neighbor (NN) matching. The individual from the comparison group is chosen as a matching partner for a treated individual that is closest in terms of propensity score. Several variants of NN matching are proposed, e.g. NN matching 'with replacement' and 'without replacement'. In the former case, an untreated individual can be used more than once as a match, whereas in the latter case it is considered only once. Matching with replacement involves a trade-off between bias and variance. If we allow replacement, the average quality of matching has increase and the bias has decrease. This is of particular interest with data where the propensity score distribution is very different in the treatment and the control group. For example, if we have a lot of treated individuals with high propensity scores but only few comparison individuals with high propensity scores, we get bad matches as some of the high-score participants has get matched to low-score non-participants. This can be overcome by allowing replacement, which in turn reduces the number of distinct non-participants used to construct the counterfactual outcome and thereby increases the variance of the estimator (Smith and Todd, 2005). A problem which is related to NN matching without replacement is that estimates depend on the order in which observations get matched. Hence, when using this approach it should be ensured that ordering is randomly done. It is also suggested to use more than one nearest neighbor ('oversampling'). This form of matching involves a trade-off between variance and bias, too. It trades reduced variance, resulting from using more information to construct the counter-factual for each participant, with increased bias that results from on average poorer matches (see e.g. Smith (1997)). When using oversampling, one has to decide how many matching partners should be chosen for each treated individual and which weight (e.g. uniform or triangular weight) should be assigned to them. Caliper and Radius Matching: NN matching faces the risk of bad matches, if the closest neighbour is far away. This can be avoided by imposing a tolerance level on the maximum propensity score distance (caliper). Imposing a caliper works in the same direction as allowing for replacement. Bad matches are avoided and hence the matching quality rises. However, if fewer matches can be performed, the variance of the estimates increases. Applying caliper matching means that those individual from the comparison group is chosen as a matching partner for a treated individual that lies within the caliper ('propensity range') and is closest in terms of propensity score. As Smith and Todd (2005) note, a possible drawback of

caliper matching is that it is difficult to know a priori what choice for the tolerance level is reasonable.

Dehejia and Wahba (2002) suggest a variant of caliper matching which is called radius matching. The basic idea of this variant is to use not only the nearest neighbor within each caliper but all of the comparison members within the caliper.

A benefit of this approach is that it uses only as many comparison units as are available within the caliper and therefore allows for usage of extra (fewer) units when good matches are (not) available. Hence, it shares the attractive feature of oversampling mentioned above, but avoids the risk of bad matches. Stratification and Interval Matching: The idea of stratification matching is to partition the common support of the propensity score into a set of intervals (strata) and to calculate the impact within each interval by taking the mean difference in outcomes between treated and control observations. This method is also known as interval matching, blocking and sub classification (Rosenbaum and Rubin, 1983). Clearly, one question to be answered is how many strata should be used in empirical analysis. Cochran and Chambers (1965) shows that 7-8 subclasses are often enough to remove 95% of the bias associated with one single covariate. Since, as Imbens (2004) notes, all bias under unconfoundedness is associated with the propensity score, this suggests that under normality the use of 7-8 strata removes most of the bias associated with all covariates. One way to justify the choice of the number of strata is to check the balance of the propensity score (or the covariates) within each stratum (see e.g. Aakvik (2001)). Most of the algorithms can be described in the following way: First, check if within a stratum the propensity score is balanced. If not, strata are too large and need to be split. If, conditional on the propensity score being balanced, the covariates are unbalanced, the specification of the propensity score is not adequate and has to be re-specified, e.g. through the addition of higher- order terms or interactions (Dehejia and Wahba, 1999).

Kernel and Local Linear Matching: The matching algorithms discussed so far have in common that only a few observations from the comparison group are used to construct the counterfactual outcome of a treated individual. Kernel matching (KM) and local linear matching (LLM) are non-parametric matching estimators that use weighted averages of all individuals in the control group to construct the counterfactual outcome. Thus, one major

advantage of these approaches is the lower variance which is achieved because more information is used. A drawback of these methods is that possibly observations are used that are bad matches. Hence, the proper imposition of the common support condition is of major importance for KM and LLM. Heckman, Ichimura, and Todd (1998) derive the asymptotic distribution of these estimators and Heckman, Ichimura, and Todd (1997) present an application.

As Smith and Todd (2005) note, kernel matching can be seen as a weighted regression of the counterfactual outcome on an intercept with weights given by the kernel weights. Weights depend on the distance between each individual from the control group and the participant observation for which the counterfactual is estimated. It is worth noting that if weights from a symmetric, nonnegative, uni-modal kernel are used, then the average places higher weight on persons close in terms of propensity score of a treated individual and lower weight on more distant observations. The estimated intercept provides an estimate of the counterfactual mean. The difference between KM and LLM is that the latter includes in addition to the intercept a linear term in the propensity score of a treated individual. This is an advantage whenever comparison group observations are distributed asymmetrically around the treated observation, e.g. at boundary points, or when there are gaps in the propensity score distribution. When applying KM one has to choose the kernel function and the bandwidth parameter. The first point appears to be relatively unimportant in practice (Di Nardo and Tobias, 2001). What is seen as more important (see e.g. Silverman (1986) or Pagan and Ullah (1999)) is the choice of the bandwidth parameter with the following trade-off arising: High bandwidth-values yield a smoother estimated density function, therefore leading to a better fit and a decreasing variance between the estimated and the true underlying density function. On the other hand, underlying features may be smoothed away by a large bandwidth leading to a biased estimate. The bandwidth choice is therefore a compromise between a small variance and an unbiased estimate of the true density function. Weighting on Propensity Score: Imbens (2004) notes that propensity scores can also be used as weights to obtain a balanced sample of treated and untreated individuals. If the propensity score is known, the estimator can directly be implemented as the difference between a weighted average of the outcomes for the treated and untreated individuals. Unless in experimental settings the propensity score has to be estimated. As

Zhao (2004) note, the way propensity scores are estimated is crucial when implementing weighting estimators. Hirano and Imbens (2002) suggest a straightforward way to implement this weighting on propensity score estimator by combining it with regression adjustment.

3.5.3.5. Trade-offs in Terms of Bias and Efficiency:

Having presented the different possibilities, the question remains on how one should select a specific matching algorithm. Clearly, asymptotically all PSM estimators should yield the same results, because with growing sample size they all become closer to comparing only exact matches (Smith, 2000). However, in small samples the choice of the matching algorithm can be important (Heckman, Ichimura, and Todd, 1997), where usually a trade-off between bias and variance arises (see Table 1). So what advice can be given to researchers facing the problem of choosing a matching estimator? It should be clear that there is no 'winner' for all situations and that the choice of the estimator crucially depends on the situation at hand. The performance of different matching estimators varies case-by-case and depends largely on the data structure at hand (Zhao, 2000). To give an example, if there are only a few control observations, it makes no sense to match without replacement. On the other hand, if there are a lot of comparable untreated individuals it might be worth using more than one nearest neighbor (either by oversampling or kernel matching) to gain more precision in estimates. Pragmatically, it seems sensible to try a number of approaches. Should they give similar results, the choice may be unimportant. Should results differ, further investigation may be needed in order to reveal more about the source of the disparity (Bryson, Dorsett, and Purdon, 2002).

Table 1 Trade-off in Terms of Bias and Efficiency

Decision	Bias	Variance
Nearest neighbour matching:		
multiple neighbours / single neighbour	(+)/(-) (-)/(+)	(-)/(+)
with caliper / without caliper	(-)/(+) (+)/(-)	(+)/(-)
Use of control individuals:		
with replacement / without replacement	(-)/(+)	(+)/(-)
Choosing method: NN-matching / Radius-matching		
	(-)/(+)	(+)/(-)
KM or LLM / NN-methods	(+)/(-)	(-)/(+)
Bandwidth choice with KM:		
small / large	(-)/(+)	(+)/(-)

KM: Kernel Matching, LLM: Local Linear Matching

NN: Nearest Neighbour

Increase: (+), Decrease: (-)

3.5.3.6. Overlap and Common Support

Our discussion in section 2 has shown that ATT and ATE are only defined in the region of common support. Hence, an important step is to check the overlap and the region of common support between treatment and comparison group. Several ways are suggested in the literature, where the most straightforward one is a visual analysis of the density distribution of the propensity score in both groups. Lechner (2000b) argues that given that the support problem can be spotted by inspecting the propensity score distribution, there is no need to implement a complicated formal estimator. However, some formal guidelines might help the researcher to determine the region of common support more precisely. We have present two methods, where the first one is essentially based on comparing the minima and maxima of the propensity score in both groups and the second one is based on estimating the density distribution in both groups. Implementing the common support condition ensures that any combination of characteristics observed in the treatment group can also be observed among the control group (Bryson, Dorsett, and Purdon, 2002). For ATT it is sufficient to ensure the existence of potential matches in the control group,

whereas for ATE it is additionally required that the combinations of characteristics in the comparison group may also be observed in the treatment group (Bryson, Dorsett, and Purdon, 2002).

Minima and Maxima comparison: The basic criterion of this approach is to delete all observations whose propensity score is smaller than the minimum and larger than the maximum in the opposite group. To give an example let us assume for a moment that the propensity score lies within the interval [0:07; 0:94] in the treatment group and within [0:04; 0:89] in the control group. Hence, with the 'minima and maxima criterion', the common support is given by [0:07; 0:89]. Observations which lie outside this region are discarded from analysis. Clearly a two-sided test is only necessary if the parameter of interest is ATE; for ATT it is sufficient to ensure that for each participant a close non-participant can be found. It should also be clear that the common support condition is in some ways more important for the implementation of kernel matching than it is for the implementation of nearest-neighbour matching. That is, because with kernel matching all untreated observations are used to estimate the missing counterfactual outcome, whereas with NN-matching only the closest neighbour is used. Hence, NN-matching

(with the additional imposition of a maximum allowed caliper) handles the common support problem pretty well. There are some problems associated with the 'minima and maxima comparison', e.g. if there are observations at the bounds which are discarded even though they are very close to the bounds. Another problem arises if there are areas within the common support interval where there is only limited overlap between both groups, e.g. if in the region [0:51; 0:55] only treated observations can be found. Additionally problems arise, if the density in the tails of the distribution is very thin, for example when there is a substantial distance from the smallest maximum to the second smallest element. Therefore, Lechner (2002) suggests checking the sensitivity of the results when the minima and maxima are replaced by the 10th smallest and 10th largest observation.

3.5.3.7. Trimming to Determine the Common Support

A different way to overcome these possible problems is suggested by Smith and Todd (2005). They use a trimming procedure to determine the common support region and define

the region of common support as those values of P that have positive density within both the $D = 1$ and $D = 0$ distributions, that is:

$$\hat{S}P = \{P : \hat{f}(P/D = 1) > 0 \text{ and } \hat{f}(P/D = 0) > 0\}, \quad (10)$$

Where $\hat{f}(P/D = 1) > 0$ and $\hat{f}(P/D = 0) > 0$ are non-parametric density estimators. Any P points for which the estimated density is exactly zero are excluded. Additionally - to ensure that the densities are strictly positive - they require that the densities exceed zero by a threshold amount q . So not only the P points for which the estimated density is exactly zero, but also an additional q percent of the remaining P points for which the estimated density is positive but very low are excluded:

$$\hat{S}_{Pq} = \{Pq : \hat{f}(P/D = 1) > q \text{ and } \hat{f}(P/D = 0) > q\}.^{10} \quad (11)$$

3.5.3.8. Failure of the Common Support:

Once one has defined the region of common support, individuals that fall outside this region have to be disregarded and for these individuals the treatment effect cannot be estimated. Bryson, Dorsett, and Purdon (2002) note that when the proportion of lost individuals is small, this poses few problems. However, if the number is too large, there may be concerns whether the estimated effect on the remaining individuals can be viewed as representative. It may be instructive to inspect the characteristics of discarded individuals since those can provide important clues when interpreting the estimated treatment effects. Lechner (2000b) notes that both ignoring the support problem and estimating treatment effects only within the common support (subgroup effects) may be misleading. He develops an approach that can be used to derive bounds for the true treatment effect and we describe this approach in detail in subsection 4.2.

3.5.3.9 Assessing the Matching Quality

Since we do not condition on all covariates but on the propensity score, it has to be checked if the matching procedure is able to balance the distribution of the relevant variables in both the control and treatment group. Several procedures to do so has be discussed in this subsection. These procedures can also, as already mentioned, help in determining which

interactions and higher order terms to include for a given set of covariates X . The basic idea of all approaches is to compare the situation before and after matching and check if there remain any differences after conditioning on the propensity score. If there are differences, matching on the score was not (completely) successful and remedial measures have to be done, e.g. by including interaction-terms in the estimation of the propensity score. A helpful theorem in this context is suggested by Rosenbaum and Rubin (1983) and states that:

$$X \perp D | P(D = 1|X): \quad (12)$$

This means that after conditioning on $P(D = 1|X)$, additional conditioning on X should not provide new information about the treatment decision. Hence, if after conditioning on the propensity score there is still dependence on X , this suggests either mis-specification in the model used to estimate $P(D = 1|X)$ or a failure of the CIA (Smith and Todd, 2005).

Standardised Bias: One suitable indicator to assess the distance in marginal distributions of the X -variables is the standardised bias (SB) suggested by Rosenbaum and Rubin (1985). For each covariate X it is defined as the difference of sample means in the treated and matched control subsamples as a percentage of the square root of the average of sample variances in both groups. The standardised bias before matching is given by:

$$SB_{before} = 100 \frac{(\bar{X}_1 - X_0) p}{\sqrt{0.5 \cdot (V_1(X) + V_0(X))}} \quad , \quad (13)$$

The standardised bias after matching is given by:

$$SB_{after} = 100 \frac{(\bar{X}_1M - X_0M) p}{\sqrt{0.5 \cdot (V_1M(X) + V_0M(X))}} \quad , \quad (14)$$

where X_1 (V_1) is the mean (variance) in the treatment group before matching and X_0 (V_0) the analogue for the control group. X_1M (V_1M) and X_0M (V_0M) are the corresponding values for the matched samples. This is a common approach used in many evaluation studies, e.g. by Lechner (1999), Sianesi (2004) and Caliendo, Hujer, and Thomsen (2005). One possible problem with the standardised bias approach is that we do not have a clear

indication for the success of the matching procedure even though in most empirical studies a bias reduction below 3% or 5% is seen as sufficient.

3.5.3.10. t-Test:

A similar approach uses a two-sample t-test to check if there are significant differences in covariate means for both groups (Rosenbaum and Rubin, 1985). Before matching differences are expected, but after matching the covariates should be balanced in both groups and hence no significant differences should be found. The t-test might be preferred if the evaluator is concerned with the statistical significance of the results. The shortcoming here is that the bias reduction before and after matching is not clearly visible. Joint significance and Pseudo- R^2 : Additionally, Sianesi (2004) suggests to re-estimate the propensity score on the matched sample, that is only on participants and matched non-participants and compare the pseudo- R^2 's before and after matching. The pseudo- R^2 indicates how well the regressors X explain the participation probability. After matching there should be no systematic differences in the distribution of covariates between both groups and therefore, the pseudo- R^2 should be fairly low. Furthermore, one can also perform an F-test on the joint significance of all regressors. The test should not be rejected before, and should be rejected after matching. Stratification Test: Finally, Dehejia and Wahba (1999, 2002) divide observations into strata based on the estimated propensity score, such that no statistically significant difference between the mean of the estimated propensity score in both treatment and control group remain. Then they use t-tests within each strata to test if the distribution of X -variables is the same between both groups (for the first and second moments). If there are remaining differences, they add higher-order and interaction terms in the propensity score specification, until such differences no longer emerge. This makes clear that an assessment of matching quality can also be used to determine the propensity score specification. If the quality indicators are not satisfactory, one reason might be mis-specification of the propensity score model and hence it may be worth to take a step back, include e.g. interaction or higher-order terms in the score estimation and test the quality once again. If after re-specification the quality indicators are still not satisfactory, it may indicate a failure of the CIA (Smith and Todd, 2005) and alternative evaluation approaches should be considered.

Table 2 Implementation of Propensity Score Matching

Step	Decisions, Questions and Solutions	Chapter
1. Estimation of propensity Score		
Model Choice	<ul style="list-style-type: none"> ○ Unproblematic in the binary treatment case (logit probit) ○ In the multiple treatment case multinomial probit or series of binomial models should be preferred 	3.1 3.1
Variable Choice	<ul style="list-style-type: none"> ○ Variables should not be influenced by participation (or anticipation) and must satisfy CIA 	3.1
→Economic Issues		
→Statistical Issues	Choose variables by economic theory and previous empirical evidence	3.1
→ Key Variables	‘Hit’ or miss’- method, stepwise augmentation, leave-one-out cross validation.	3.1 3.1
	‘Overweighting’ by matching and sub-population or insisting on perfect match	
2. Choice Among Alternative Matching Algorithms		
Matching Algorithms	<ul style="list-style-type: none"> ○ The choice (e.g. NN matching with or without replacement, caliper or kernel matching) depends on the sample size, the available number of treated/control observations and the distribution of the estimated PS → Trade-offs between bias and efficiency! 	3.2
3. Check Overlap and Common Support		
Common Support	<ul style="list-style-type: none"> ○ Treatment effects can be estimated only over the CS region! 	3.3
→ Tests		3.3

Step	Decisions, Questions and Solutions	Chapter
→ Implementation	Visual analysis of propensity score distributions 'Minima and maxima comparison' or 'trimming' method Alternative: Caliper matching	3.3
<hr/> 4.1. Assessing the Matching Quality <hr/>		
Balancing property	<ul style="list-style-type: none"> ○ Is the matching procedure able to balance the distribution of relevant covariates? ○ If matching was not successful go back to step 1 and include higher order terms, interaction variables or different covariates ○ After that, if matching is still not successful →Reconsider identifying assumption and consider alternative estimators. ○ Standardised biase, t-test, stratification test, joint significance and pseudo-R^2 	3.4
→Tests		↔ Step 1
		3.4
<hr/> 4.2 Calculation of Treatment Effects <hr/>		
Choice-Based Sample	<ul style="list-style-type: none"> ○ Sample is choice-based? Match on the odds-ratio instead on the propensity score. ○ Compare from begin of the programme to avoid endogeneity Problems! 	3.5 3.6
When to Compare	→ Pay attention to the possible occurrence of locking-in effects!	3.6 3.7
Standard Errors	○ Calculate standard errors by bootstrapping or variance approximation	

Step	Decisions, Questions and Solutions	Chapter
5.Sensitivity Analysis		
Hidden Bias	<ul style="list-style-type: none"> ○ Test the sensitivity of estimated treatment effects with respect to unobserved covariates → Calculate Rosenbaum-bounds. If result are very sensitive reconsider identifying assumption and consider alternative estimators 	4.1
Common Support	<ul style="list-style-type: none"> ○ Test the sensitivity of estimated treatment effects with respect to the common support problem. → Calculate Lechner-bounds. If results are very sensitive reconsider variable choice 	4.2 ←Step 1

CS: common Support, NN: Nearest Neighbour, PS: Prppensity Score, CIA: Conditional Independence Assumption

And depends largely on the data sample. If results among different algorithms differ, further investigations may be needed to reveal the source of disparity. The discussion has also emphasized that treatment effects can only be estimated in the region of common support. To identify this region we recommend starting with a visual analysis of the propensity score distributions in the treatment and comparison group. Based on that, different strategies can be applied to implement the common support condition, e.g. by 'minima and maxima comparison' or 'trimming', where the latter approach has some advantages when observations are close to the 'minima and maxima' bounds and if the density in the tails of the distribution are very thin.

Since we do not condition on all covariates but on the propensity score we have to check in step 4 if the matching procedure is able to balance the distribution of these covariates in the treatment and comparison group. We have presented several procedures to do so, including standardized bias, t-tests, stratification, joint significance and pseudo- R^2 . If the quality indicators are not satisfactory, one should go back to step 1 of the implementation

procedure and include higher-order or interaction terms of the existing covariates or choose different covariates (if available).

If, after that, the matching quality is still not acceptable, one has to reconsider the validity of the identifying assumption and possibly consider alternatives.

However, if the matching quality is satisfactory one can move on to estimate the treatment effects. The estimation of standard errors should either be done by bootstrapping methods or by applying the variance approximation proposed in Lechner (2001). Another important decision is when to measure the effects. We argue that it is preferable to measure the effects from the beginning of the programme. Clearly, what has to be kept in mind for the interpretation is the possible occurrence of locking-in-effects. Finally, a last step of matching analysis is to test the sensitivity of results with respect to 'hidden bias'. We have presented an approach (Rosenbaum bounds) that allows a researcher to determine how strongly an unmeasured variable must influence the selection process in order to undermine implications of matching analysis. If the results are sensitive and if the researcher has doubts about the CIA he should reconsider to use alternative identifying assumptions. Furthermore, we have presented an approach (Lechner bounds) that allows the researcher to assess how sensitive treatment effects are with respect to the common support problem. To conclude, we have discussed several issues surrounding the implementation of PSM. We hope to give some guidance for researchers who believe that their data is strong enough to credibly justify CIA and who want to use PSM.

3.6. Definition and hypothesis of variables

3.6.1. Dependent Variables

- a. Coffee productivity:** in which group the productivity of coffee increases due to being member or those who have not a member of coffee cooperative.
- b. Income:** income of the farmers increases because of the increase in productivity.
- c. Coffee sold:** the amount of coffee sold to the market by both members and not members.

3.6.2. Independent variables

1. **Educational level of the Small holder (Education):** It is a dummy variable and indicating that, the educational status of farmer is educated or not.
2. **Age of the Small holder (AGEHH):** This variable is a continuous explanatory variable and refers to age of head of the small holder. The experience that the farmer accumulates about the advantage or disadvantage of the co-operative has an impact on his satisfaction. Therefore, the variable expected to influence positively.
3. **Family Size (FAMILYSIZE):** This variable is a continuous explanatory variable and refers to the number of family of the small holder. It is assumed that small holder with larger family size can have more labor for his farming activities and/or higher expenditure for consumption and other expenses. Therefore, the variable expected to have a positive correlation with satisfaction of members.
4. **Sex (SEX):** It is dummy variable that takes a value 1 if male and 0 female. The farmers satisfaction may vary based on differences in sex.
5. **Marital status (MARS):** - this is a dummy variable whether a member is engaged in marriage or not. It takes a value of 1 if a member is married and 0 otherwise. Married individuals are more responsible for their work. Married individuals more responsible to generate income for their family and are more likely than single one`s to be employed in coffee cooperatives. Therefore, in this study marital status is expected to correlate positively when the member is married.
6. **Members:** it is a dummy variable that takes a value 1 if member and 0 not member. The productivity of farmers may vary whether member or not.
7. **Total farm Size (TFARMSIZE):** This variable is a continuous variable and it refers to the total area of farmland that a farmer owned in hectare. The usage of the co-operative as marketing channel requires having participation in either selling products or purchasing of goods and services from co-operatives. The farmer needs to produce in order to sale to the cooperative or to another marketing agent. The usage of the co-operative as marketing agent requires substantial economic resources of which land is the principal one (Wadsworth, 1991). Under normal condition, if the farmer participates actively he has get benefit from the co-operatives also he has maximized his satisfaction. Therefore, this variable expected

to influence satisfaction positively. Moreover, richer farmers may also benefit more than poorer farmers.

- 8. Coffee Farm Size (COFARMSIZE):** It continuous variable and it represents the land allotted to coffee production in hectare. As the land of small holder for coffee increases the yield proportionally may increase, so that the amount of coffee sold to the cooperative increases or decreases based on the cooperatives efficiencies in handling their members. Therefore, this variable expected to influence positively.
- 9. Total Livestock holding (TLH):** This variable is a continuous variable and refers to the total number of livestock the small holder own in terms of TLU. It is assumed that the small holder with larger TLU can have a better economic strength and financial position to purchase coffee grafting tools and hire labor during peak season. The member also transports their product using pack animals to the cooperative or elsewhere. So, this variable is expected to influence members' satisfaction positively.
- 10. Means of Transport:** This is a dummy variable taking a value of 1 if they use human power for transport, taking a value of 2 if they use animal power and 0 otherwise. If the farmer utilizes animal power, it indicates the improvement of income relative to the other who has not an animal. Therefore, means of transport for farmers influence the members' satisfaction positively .The rural markets are connected with the central market by poorly paved roads. Many of the roads to the villages and rural markets are not accessible during the rainy season (Eleni Z.*et al.* 2003).
- 11.** Thus, this variable is expected to influence positively.
- 12. Price of coffee (PRICE):** This is a Continuous variable measured by the selling price that the member and not-member sold their production.
- 13. Perception of farmer about price offered by cooperatives:** This is a dummy variable taking a value 1 if the cooperative offered for the farmer's coffee a price similar or better than other marketing agents in the area and, 0 otherwise. The price effect is one form of cooperative effect that the cooperative passes on the farmer's economy. In areas where the coffee market has somewhat an oligopolistic behaviour, pricing techniques are one of the most marketing strategies in order to capture more of the market share. Therefore, if the cooperative charge competitive

price for coffee in the area, the member farmers market their coffee through the cooperative (Wilkins and Stafford, 1982; Fulton and Adamowicz 1993; Klein *et al*, 1997). Therefore, cooperative price influence the marketing of coffee through the cooperative positively.

14. Distance of the farmer's residence from the market places: It is a continuous variable measured in kilometres. It refers to the distance of the farmer (member) residence from the market places, where cooperatives and traders are buying coffee from farmers. The proximity of the market places from the member residence reduces the cost of time, and labour that the farmer spent in searching for a buyer and also reduce transportation cost for his / her coffee .In addition to this, the member mainly has not be exposed to illegal traders. Illegal traders are those traders who operate without being licensed. The other advantage is that as the farmer is close (near) to marketing centres, they has have more knowledge about the market condition and its benefit. Therefore, in this study, the distance of farmer residence from the market place is expected to influence the marketing of coffee through the cooperative negatively.

15. Distance of the farmer's residence from the cooperative office: It is a continuous variable measured in kilometres. It refers to the distance of the farmer (member) residence from the cooperative office, where farmers are often contact with the cooperatives and get several accesses. The proximity of the cooperative office from the member residence reduces the cost of time, and labour that the farmer spent in getting different facilities and also reduce transportation cost for his / her coffee .In addition to this, the member mainly has not be exposed to illegal traders. Illegal traders are those traders who operate without being licensed. Therefore, in this study, the distance of farmer residence from the cooperative office is expected to influence the marketing of coffee through the cooperative negatively.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1. Descriptive Result

Descriptive analysis is used to elaborate and helps to understand the socio-economic and institutional characteristics of the sampled household and/or members and non members of the coffee cooperatives organized in the study area.

4.1.1. Descriptive Result on Socio-Economic Analysis

A. Education

As shown on Table 3, From Pearson Chi-square it indicates that the education and coffee membership has not difference. It was found that about 28 % of the non members and 72 % of the members had illiterate. About 22 % of the non members and 78 % of the members had read and write only. About 48 % of the non members and 52 % of the members had primary education and above. Majority about 35% of the non-members and 65% of the members had some form of educational level of qualification. This might be because most of those who understand the value of cooperative societies and join them were those who had a certain level of education and some civil servants. The educational background would no doubt help in decision making especially in terms of meaningful managerial decisions, leadership and investments. This result concurred with the finding of Idrisa *et al.* (2007) reveals that Education plays important role in creating awareness in farming communities as educated people are better equipped to source information compared to those that are not educated. Minimum threshold in terms of educational qualification is necessary for understanding the scientific and technical nature of modern agriculture.

Table 3 Percentage of Educational Status by Membership

Education	Status	
	Not member	Member
Illiterate	4	10
	28.57	71.43
	7.55	14.71
Read and write only	2	7
	22.22	77.8
	3.77	10.29
Attending primary education and above	47	51
	47.96	52.04
	88.68	75.00
Pearson chi2 =3.71		Pr = 0.16

Source: own survey

B. Age

As shown from Table 4 the average age of coffee member is greater than the non member by about 13 years. Non membership is younger than membership on average. The average age of non membership of coffee cooperative is even less than the combined average age. From t-value, the average mean difference of non coffee member ship to membership is negative which mean that the average mean of non member is less than membership. The result in Table 4 revealed that majority, about 68 % of the non- members and members were found on the mean ages of 34 and 46 years respectively. This implies that majority of respondents are still within a productive and active working age range, hence their ability to participate or produce to earn some income from farming and non-farming activities. This finding concurred with the findings of (Gomina, et al 2015).Who reveal that productive and active persons participates more in agricultural and community development activities such cooperative societies.

Table 4 Mean of Small holder's age by membership Status

Group	Obs	Mean	Std. Err.	Std. Dev.	t-test	P-value
not member	53	33.78	1.48	10.76	t = -5.60	Pr(T<0) = 0.00
Member	68	46.5	1.65	13.57		

Source: own survey, 2016

C. Family size

As shown from Table 5, Majority about 60% of members and 40% of non members had between 2-12 small holder sizes. The mean small holder size for cooperatives' members and non-members were 6 and 4 respectively. The average Family size of coffee member is greater than that of the non member. Non membership is smaller than membership on a small holder. From t-value, the average mean difference of non coffee member ship to membership is negative which mean that the average mean of non member is less than membership. The implication is that the relatively large small holder size may likely enhance the family labour supply on the farms, hence supporting favorably, productive capacities of the farmers already enhanced by their age. This corroborate with the findings of Adegbite and Oluwalana (2004) that the larger the small holder size, the higher the likelihood of sustainable labour efficiency on farmers' farm, given the constant labour supply.

Table 5 Mean of Small holder's Family size by membership status

Group	Mean	Std. Err.	Std. Dev.	t-test	P-value
Not member	4.34	0.27	1.98	t= -4.65	Pr(T < t) = 0.00
Member	6.35	0.32	2.62		

Source: own survey, 2016

D. Sex

Among the respondents, male has a greater share than that of female. For female, being membership of coffee cooperative has slightly greater than that of non member of coffee cooperative. Whereas, concerning male non member is a slight increase than member of coffee cooperative which is 85% and 78% respectively. Most of the females in the area are married in the early age and the life is headed by their husbands that is why during data collection most of the time the response is given by the male. Most members are married and responsible for the children they have whereas, most of non members are single and male they do not worry about being membership or not.

Table 6 Percentage of sex by membership status

Sex	Status		Total
	not member	member	
Female	8	15	23
	34.78	65.22	100
	15.09	22.06	19.01
Male	45	53	98
	45.92	54.08	100
	84.91	77.94	80.99
Total	53	68	121
	43.8	56.2	100
	100	100	100
Pearson chi2(1)= 0.94		Pr = 0.33	

Source: own survey, 2016

E. Marital Status

From Table 4 the majorities 95.04% (115) are married of which, 55 % (67) are membership of coffee cooperative and 40% (48) are non-members of coffee cooperative. Marital status and membership has difference at 95% level of significance. Married persons have responsible for different burdens and that leads a better result. This corroborate with the findings of Olaoye et al., (2012). Which reveals that, Most (97.5% and 95.0%) of the OSAMCA loan beneficiaries and non-beneficiaries were married, respectively. The implication was that more family labor will be available and enhanced production as well as will be more responsible in loan repayment.

Table 7 Percentage of Small holder Martial status by membership

Martial	Status	
	Not Member	Member
Single	5	1
	83.33	16.67
	9.43	1.47
Married	48	67
	41.74	58.26
	90.57	98.53
	Pearson chi2 (1) =	Pr = 0.045
	4.0079	

Source: own survey, 2016

F. Members

Of the total respondents the majority are member with 56.2 % whereas, the remaining are not member with 43.8%. For both members have greater than that of the non member.

G. Total Land Size

As shown from Table 9 the average total land size of coffee member is greater than that of the non member by about 0.37 hectares. Non membership has small land holder than membership. The average total land size of non membership of coffee cooperative is even less than the combined total land size. From t-value, the average mean difference of non coffee member ship to membership is negative which mean that the average mean of non member is less than membership. The mean farm size for members and non-members were 1.8 and 1.45 hectares respectively. This may be most non members are younger than members and obtained a piece of land given from their families.

Table 8 Mean of Small holder's Total land size by membership status

Group	Obs	Mean	Std. Err.	Std. Dev.	t-test	P-value
not member	53	1.45	0.07	0.53	t = -2.73	Pr(T < t) = 0.00
Member	68	1.82	0.10	0.86		

Source: own survey, 2016

H. Coffee farm size

As shown from Table 9 the average coffee land size of coffee member is greater than that of the non member by about 0.13 hectares. Non membership has small land holder than membership. The average coffee land size of non membership of coffee cooperative is even less than the combined coffee land size. From t-value, the average mean difference of non coffee member ship to membership is negative which mean that the average mean of non member is less than membership. This may be most non members are younger than members and obtained a piece of land given from their families.

Table 9 Mean of Small holder's Coffee farm size by membership status

Group	Obs	Mean	Std. Err.	Std. Dev.	t-test	P-value
not member	53	0.28	0.02	0.17	t = -2.98	Pr(T < t) = 0.00
Member	67	0.42	0.04	0.29		

Source: own survey, 2016

I. Total livestock holding

This is the total number of livestock holding of the small holder measured in Tropical Livestock Unit (TLU). Livestock are farmers' important sources of income, food and drought power for crop cultivation and transportation. As shown from Table 10, Among 108 sampled small holders, the average livestock holding for members and non-members were 2.4 and 1.7 TLU respectively. The average total livestock holding of coffee member is greater than that of the non member by about 0.7 units. From t-value, the average mean difference of non coffee member ship to membership is negative which mean that the average mean of non member is less than membership. Cooperative members own significantly more livestock than non-cooperative members. This finding is in concurring with the findings of Verhofstadt E. & Maertens M. (2013). This may be most non members are younger than members so they do not have enough capital to purchase livestock as much as membership.

Table 10 Mean of Small holder's Total livestock holding by membership status

Group	Obs	Mean	Std. Err.	Std. Dev.	t-test	P-value
not member	48	1.71	0.14	1.02	t = -2.90	Pr(T < t) = 0.00
Member	60	2.41	0.18	1.39		

Source: own survey, 2016

J. Transportation

As shown in the following Table 11 of the total respondents the majorities are used human power as mean of transportation of their farm output or coffee and followed by a mixing of both human and animal power with 95.04% and 3.31% respectively. Similarly both member and non-member are used human power as mean of transportation in their day to day operation. Means of transportation and status of the farmer have no difference. In the area farmers used human power and sometimes animal power no other means of transport access in the farm area and the market and the cooperative office is not very far.

Table 11 Percentage of Means of transport by membership status

Transport	Status	
	Not-member	Member
Animal power	1	1
	50.00	50.00
	1.89	1.47
Human power	51	64
	44.35	55.65
	96.23	94.12
Both	1	3
	25.00	75.00
	1.89	4.41
	Pearson chi2 (2) = 0.62	Pr = 0.73

Source: own survey, 2016

K. Price of Coffee

As shown from Table 12 the average are of non coffee cooperative member has obtain more price advantage than the coffee cooperative member by about 0.50 Birr per kilogram. From the t-value, the difference is not the statistical significance as such in carrying great weight. Being non membership has some difference but not as such higher in amount. This may be due to the price setting by private traders based on the price setted by cooperative. The private traders set the price after the cooperative put the price and set their price a little bit increase from that of the cooperative.

Table 12 Mean of Small holder's coffee price by membership status

Group	Obs	Mean	Std. Err.	Std. Dev.	t-test	P-value
not member	51	9.93	0.25	1.76	t = 1.52	Pr(T > t) = 0.06
Member	68	9.46	0.19	1.55		

Source: Own survey, 2016

L. Fair Price

As shown in the following Table 14, of the total respondents the majority say that they have get fair price during they supply coffee for market with 52.89%. When analysis the case from member and non-member category, of the total member of coffee cooperative they respond that they are not obtained fair price for their product with 54.41%, whereas, non-member respond that they are obtained fair price for their product with 62.26%. This indicates that non member of coffee cooperative has advantages in price than member coffee cooperative. Price and membership have no association at 95% confidence interval. Both member and non member responded the price is not fair. This may be the cost they incur and the price they obtained is not that much good. And still they couldn't improve their livelihood.

Table 13 Percentage of Coffee fair Price by membership status

Price fair	Status	
	Not-member	Member
No	20	37
	35.09	64.91
	37.74	54.41
Yes	33	31
	51.56	48.44
	62.26	45.59
Pearson $\chi^2(1) = 3.32$		Pr = 0.06

Source: own survey, 2016

N. Distance from residence to market place

As shown from Table 14, the average distance from home to market place of non coffee cooperative member is shorter than that of coffee cooperative member by about 0.42 kilo meter. From the t-value, the difference is not statistically significance as such in carrying great weight. Being non membership has some difference in kilo meters but not as such higher in amount. Members have responsibilities to their family that is why they decided to be a member because of reducing the worrying about who purchase our product but, non members have not responsible as much as that of members since they have a small family size.

Table 14 Mean of Small holder's distance from residence to market place by membership status

Group	Obs	Mean	Std. Err.	Std. Dev.	t-test	P-value
not member	52	1.61	0.24	1.73	t = -1.17	Pr(T < t) = 0.12
Member	67	2.03	0.26	2.11		

Source: own survey, 2016

O. Distance from residence to Cooperative office

As shown from Table 16 the average distance from home to cooperative office of non coffee cooperative member is shorter than that of coffee cooperative member, by about 0.03 kilo meter. From the t-value, the difference is not statistically significance as such in carrying great weight. Being non membership has some difference in kilo meters but not as such higher in amount. Both members and non members are living around the cooperative office especially non members are very near relative to members. But non members have young and not have large families as much as members so they do not want to be a member because of removing any burden that comes from the cooperatives.

Table 15 Mean of Small holder's distance from residence to cooperative office

Group	Obs	Mean	Std. Err.	Std. Dev.	t-test	P-value
not member	52	1.61	0.25	1.78	t = -0.08	Pr(T < t) = 0.46
Member	67	1.64	0.23	1.84		

Source: own survey, 2016

4.1.2. Descriptive result on basic dependent Variables

A dependent variable is what you measure in the experiment and what is affected during the experiment. The dependent variable responds to the independent variable. It is called dependent because it "depends" on the independent variable. In a scientific experiment, you cannot have a dependent variable without an independent variable. The descriptive results of dependent variables of the study are as follows:

**Table 16 Mean of Small holder Production
Coffee Production**

Group	Obs	Mean	Std.Err.	t-value	p-value
not member	53	400.94	38.38	t = -2.85	Pr(T < t) = 0.00
Member	68	694.79	85.75		

Source: own survey, 2016

From Table 16, the mean of coffee production for non-member of coffee cooperative are 400.94 Kilo gram. Similarly the mean for coffee cooperative member for coffee production is 694.79 kilo gram. In this case, member of coffee cooperative members have registered greater amount than non-member of coffee cooperative in the region. As shown on Table above the average income earned by coffee membership has greater in figure and statistically significant at 95% level of confident. This might be members have a responsible to their families and also have get a premium based on the size of coffee production they produce the more produce the more premium they get. And members give priority to their land and the coffee but non members have given priority for anything that gives them a higher income.

Table 17 Mean of Small holder Income

Group	Obs	Mean	Std. Err.	Std. Dev.	t-value	p-value
not member	53	9130.82	1138.16	8285.99	t = -0.92	Pr(T < t) = 0.18
Member	68	10788.07	1325.37	10929.29		

Source: own survey, 2016

From Table 18, the mean of income earned for non-members of coffee cooperative is Birr 9,130. Similarly the mean for coffee cooperative members for income earned is Birr 10,788. In this case, member of coffee cooperative members have registered greater amount than non-member of coffee cooperative in the region. As shown on Table above the average income earned by coffee membership has greater in figure but it is not statistically significant at 95 level of confident. This may be the non members are highly participate on other income rather than coffee production. Compare to other income the non members obtained a greater than that of members and the price of coffee members have got is a little bit smaller than that of non members.

Table 18 Mean of Small holder Coffee Sold

Group	Obs	Mean	Std.Err.	Std.Dev.	t-value	p-value
Not member	53	365.98	37.29	271.54	t = -2.86	Pr(T < t) = 0.00
Member	68	654.49	83.79	690.93		

Source: own survey, 2016

From Table 18, the mean of coffee sold for non-member of coffee cooperative are 365.98 Kilo gram. Similarly the mean for coffee cooperative member for coffee production is 654.48 kilo gram. In this case, member of coffee cooperative members have registered greater amount than non-member of coffee cooperative in the region. As shown on Table above the average coffee sold by coffee membership has greater in figure and statistically

significant at 99% level of confident. Since members have greater production relatively from non members, their sold amount is also greater than non members.

4.2. Empirical Analysis

Treatment effects can be estimated using regression adjustment, inverse-probability weights, and "doubly robust" methods, including inverse-probability-weighted regression adjustment and augmented inverse-probability weights, and via matching on the propensity score or nearest neighbors. For this study treatment effect via propensity-score matching method is applied.

4.2.1. Estimation for Coffee Production and sold

4.2.1.1. Propensity-Score Matching for Coffee production

Table 19 Propensity-score matching for coffee production when using the Average treatment Effect (ATE)

Production coffee	Coef.	Std. Err.	z	P>z
ATE				
Status				
(member vs not member)	186.95	81.01	2.31	0.02

Source: own survey, 2016

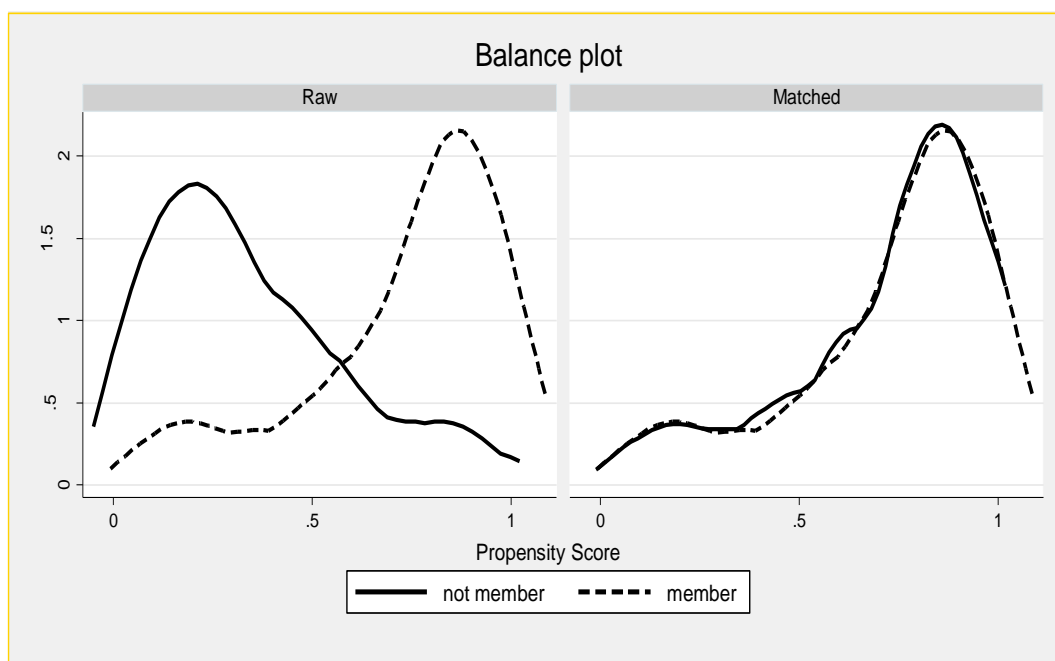
From Table 19 the average coffee produced by cooperative members is greater by 187 kilogram than the average coffee produced by the non members' cooperative when using the estimate average treatment effect in population (ATE). But the effect is significant at 95% level of significant. When we apply the average treatment effect on the treated (ATET) estimator the average coffee produced by member of coffee cooperative is 352 kilogram. The effect is significant at 99 % level of significant. As indicated in Table 20, it is shown that cooperative membership in general has a strong positive effect on farm

performance. We also find that participation in a cooperative improves market production; resulting in an increase in the share of farm produce percentage points. This result concurred with the finding of Verhofstadt E. & Martens M (2013), which also confirmed that the cooperative membership in general has a strong positive effect on farm performance.

Table 20 Propensity-score matching for production of coffee ATET

Production coffee	Coef.	Std. Err.	z	P>z
ATET				
Status				
(member vs not member)	351.86	119.89	2.93	0.00

Source: own survey, 2016



Source: own survey, 2016

Figure 4 Graphical representation of Production of Coffee

As shown on the above graph, most of the non-member are concentrated on the left which indicate they are producing small amount of coffee, whereas, most of members are producing high amount of coffee relative to not –member and concentrated to the right part of the graph. But the matched graph indicates most parts of over lapping and but finally the members dominated when go further to the right.

4.2.1.2. Propensity-Score Matching for Coffee sold

Both members and non members have sold the coffee after deducted some portion of coffee for house consumption .As shown below Table 21 the average coffee sold by cooperative members for the considered variables it is greater by 181 kilogram than the average coffee produced by the non members’ cooperative when using the estimate average treatment effect in population (ATE). The effect is significant at 95% level of significant.

Table 21 Propensity-score matching for Coffee sold when using ATE

Coffee sold	Coef.	Std. Err.	z	P>z
ATE				
Status				
(member vs not member)	181.09	77.45	2.34	0.02

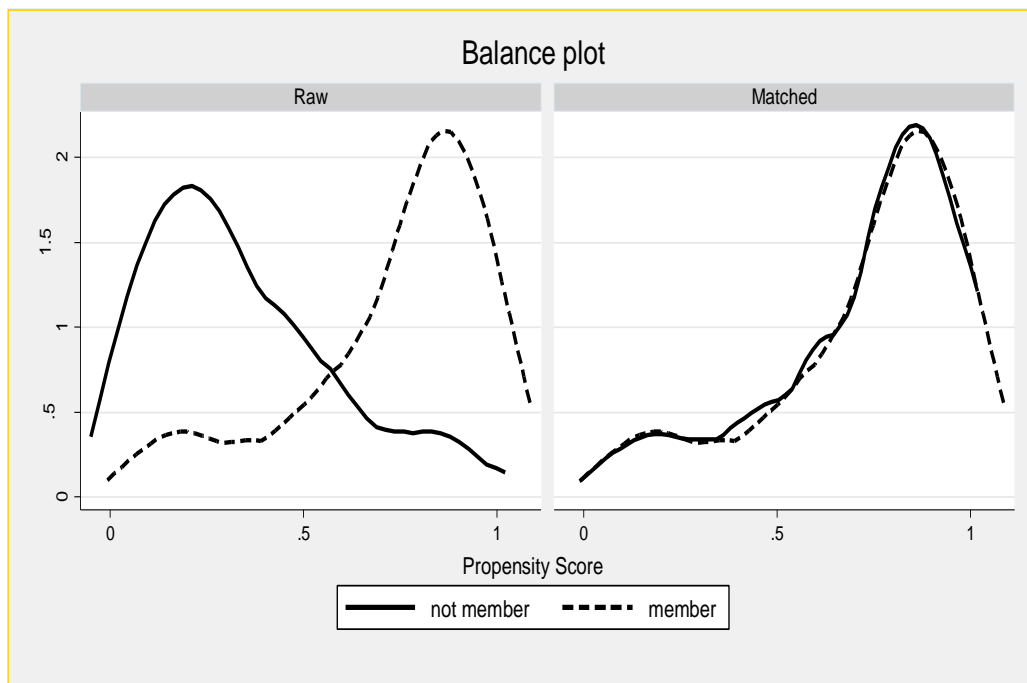
Source: own survey, 2016

When we apply the average treatment effect on the treated (ATET) estimator as below in Table 22, the average coffee sold by member of coffee cooperative is 335 kilogram. The effect is significant at 99% level of significant. This result concurred with the finding of Verhofstadt Ellen & Martens Miet (2013) which reveals that, taking the most conservative results, participation in cooperatives increases gross farm revenue with 37%.

Table 22 Propensity-score matching for Coffee sold when using ATET

Coffee sold	Coef.	Std. Err.	z	P>z
ATET				
Status				
(member vs not member)	335.20	115.29	2.91	0.00

Source: own survey, 2016



Source: own survey, 2016

Figure 5 Graphical representation of Coffee sold

As shown on the above graph, most of the non-member are concentrated on the left which indicate they have sold small amount of coffee, whereas, most of members have sold high amount of coffee relative to not –member and concentrated to the right part of the graph. But the matched graph indicates most parts of over lapping and but finally the members dominated when go further to the right.

4.2.2. Estimations for Income

4.2.2.1. Propensity-Score Matching for Income

From Table 23 the average income by cooperative members is greater by Birr 204 than the average income by the non members' cooperative when using the estimate average treatment effect in population (ATE). The effect is not significant. This is shown that memberships of the coffee cooperatives do not have an effect on total income.

Table 23 Propensity-score matching for total income when using ATE

Total income	Coef.	Std. Err.	z	P>z
ATE				
Status				
(member vs not member)	204.08	1250.55	0.16	0.87

Source: own survey, 2016

When we apply the average treatment effect on the treated (ATET) estimator, the average income of member of coffee cooperative is Birr 3275. The effect is significant at 90% level of significant. See Table 24. But, when we compare the total income, which is the sum of incomes that both members and nonmembers earned from different sources, (i.e. Coffee income and other incomes) there is no significance difference between members and nonmembers. This result is opposite with the finding of Verhofstadt Ellen & Martens Miet (2013)

Table 24 Propensity-score matching for total income when using ATET

Total income	Coef.	Std. Err.	z	P>z
Status				
(member vs not member)	3274.54	1896.56	1.73	0.08

Source: own survey, 2016

Table 25 Propensity score matching for coffee income when using ATE

Coffee income	Coef.	Std. Err.	z	P>z
ATE				
Status				
(member VS not member)	1694.02	661.95	2.56	0.01

Source: own survey, 2016

From Table 25 above, the average coffee income by cooperative members is greater by Birr 1694 than the average income by the non members' cooperative when using the estimate average treatment effect in population (ATE). The effect is significant at 95% significant level. This is shown that memberships of the coffee cooperatives have greater effect on coffee income.

Even if the product price of cooperatives is not favored for members, they sold high amount of coffee since they produce greater amount compared to non members, and then obtain greater sales revenue.

Table 26 Propensity-score matching for coffee income when using ATET

Coffee income	Coef.	Std. Err.	z	P>z
ATET				
Status				
(member VS not member)	3137.29	1063.74	2.95	0.00

Source: Own survey

When we apply the average treatment effect on the treated (ATET) estimator, the average coffee income of member of coffee cooperative is Birr 3137. The effect is significant at 99% level of significant. See Table 24. This result concurred with the finding of Verhofstadt Ellen & Martens Miet (2013) which reveals that, taking the most conservative

results, participation in cooperatives increases gross farm revenue with 37%, net farm income with 25% and farm income per worker with 27%, which are large effects.

Table 27 Propensity-score matching for total other income when using ATE

Total other income	Coef.	Std. Err.	z	P>z
ATE				
Status				
(member VS not member)	-1649.94	1511.84	-1.09	0.28

Source: Own survey

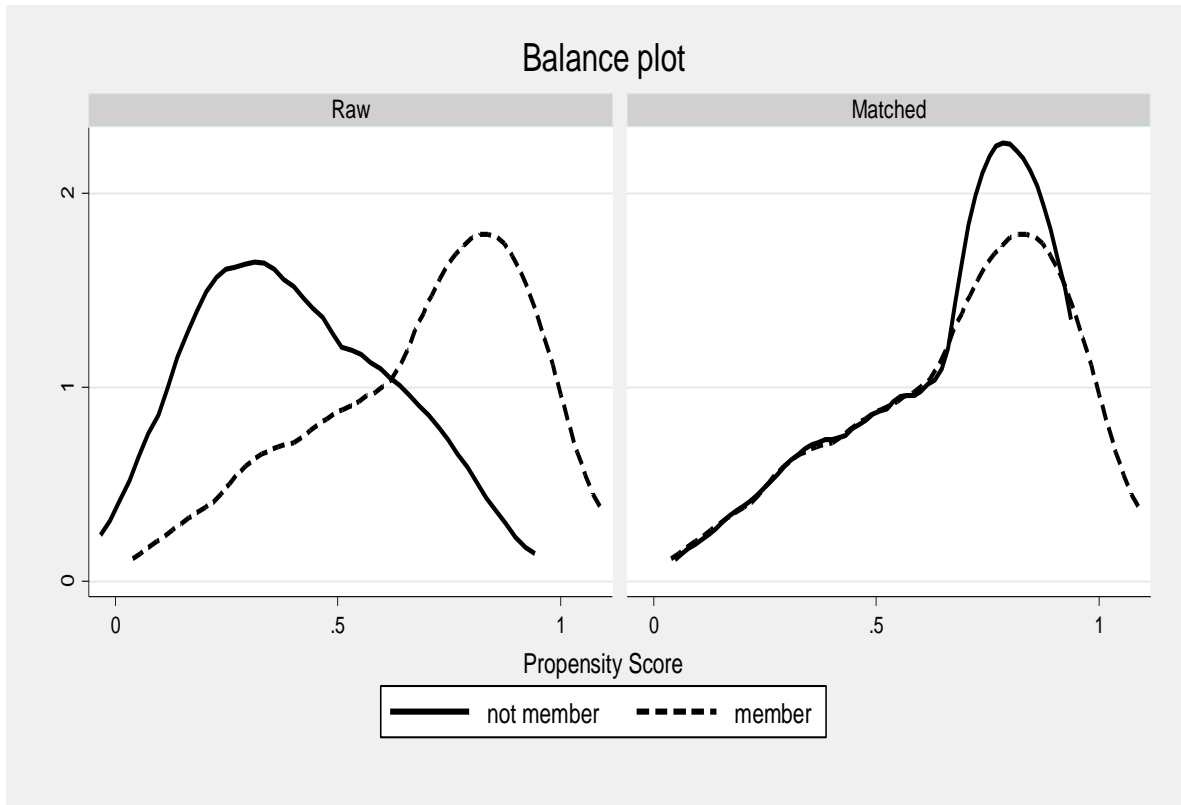
From the above in Table 27, the effect is insignificant at 95% significant level. This is shown that memberships of the coffee cooperatives have no effect on other income.

Table 28 Propensity-score matching for total other income when using ATET

Total other income	Coef.	Std. Err.	z	P>z
ATET				
Status				
(member VS not member)	-26.98	1963.89	-0.01	0.99

Source: Own survey

From the above in Table 28, the effect is insignificant at 95% significant level. This is shown that memberships of the coffee cooperatives have no effect on other income.



Source: own survey, 2016

Figure 6 Graphical representation of Income

As shown on the above raw graph, most of the non-member are concentrated on the left which indicate they are earned small amount, whereas, most of members have been earned high amount relative to not –member and concentrated to the right part of the graph. But the matched graph indicates some parts of over lapping and some parts are dominated by non-member but finally the members dominated when go further to the right.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Summary and Conclusion

In this study, the survey analyzed the impact of coffee cooperative in Sidama zone coffee farmers' production, income and market activities conducted on 121 small holders using the technique of propensity score matching. The study applied recent advances in propensity score matching methods to assess the impact of coffee cooperatives on small holder production, income and selling activities.

The average coffee produced by cooperative members is greater by 187 kilograms than the average coffee produced by the non members' cooperative when using the estimate average treatment effect in population (ATE). Similarly the average coffee production within the members is 352 kilograms when we apply the average treatment effect on the treated (ATET). The effect is also significant at 95% level of significant. The average coffee sold by cooperative members is greater by 181 kilograms than the average coffee sold by the non members' cooperative when using the estimate average treatment effect in population. Similarly when we apply the average treatment effect on the treated estimator the average coffee sold by member of coffee cooperative is 335 kilograms. The effect is also significant at 95% level of significant. The average income by cooperative members is greater by Birr 204 than the average income by the non members' cooperative when using the estimate average treatment effect in population (ATE). But the effect is insignificant at 95% level of significant. When we apply the average treatment effect on the treated estimator the average income by member of coffee cooperative is Birr 3,274. The effect is significant at 90% level of significant. The average coffee income by cooperative members is greater by Birr 1694 than the average income by the non members' cooperative when using the estimate average treatment effect in population. The effect is significant at 95% level of significant. When we apply the average treatment effect on the treated estimator the average coffee income by member of coffee cooperative is Birr 3,137. The effect is significant at 99% level of significant. Furthermore, cooperative stabilize the price and always search a better price for members and indirectly benefit others.

To summarize, small holder's production, sold amount and coffee income were positively related to membership in cooperative indicating that the probability of improvement in production, sold amount and income increases if a small holder be a member of the cooperatives. Therefore, any cooperatives should consider those neglected and resource poor small holders in order to make impact on living standards of individual small holders.

5.2. Recommendation

Based on the findings of the study, the following recommendations are forwarded.

1. Government and concerned stake holders should encourage members to use the income they generated from their cooperatives not only just to meet their small holder consumption needs but also to enhance potential income generating capacity together with investing on education and health care requirements. For this, there should be continuous awareness creation schemes through education, training and other means so as to enable them diversify income generation.
2. Cooperatives and other concerned stakeholder should provide training to build the capacity of members in the cooperative and also introduce new crop seeds and technologies to increase productivity, acquisition of operational facilities and initiating active participation of members should be given due attention.
3. Creating good governance and loyalty among officials of the cooperatives are crucial for the smooth functioning and the development of the cooperatives and the society. Coffee cooperatives operate through apex organizations such as Unions and Federations take a unified negotiating position in dealing with the market actors. However, most of the time these actors seen less concerned to the basic aim of the cooperatives, to improve their members living condition. To address this issue, due enforcement of regulations through effective supervision, members training, and ethics guidelines for management is very essential to guarantee that the benefits of cooperation has reach the poor rather than being captured by the elite/appointee or officials at local. Cooperatives must work to prevent corruption at the local level.

4. Government and other concerned stake holders should provide regular meeting to farmers to express the problems they faced without fearing and worrying.
5. The government should create conducive environment for those who do not a member of coffee cooperative to make them beneficiary.
6. Cooperatives need the support of all stakeholders such as government, NGOs, think tanks and the private sector in terms of capacity building in the form of education, research, extension and marketing.
7. Government and other concerned stake holders should provide other means of income besides coffee income in the area.
8. Finally, coffee Cooperatives can play a remarkable role to stabilize the price, upgrade rural living and improve rural economies. However, their success requires a great deal of promotional effort, close follow-ups and investment in human and physical capital

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APPENDIX

Questionnaire

Instructions to the Interviewer

- I. Read out the introductory statement to the respondents
- II. During interview put ‘_’ mark in the boxes provided or in proper cell and fill responses in the space provided otherwise
- III. Ticking in more than one box is possible when it is necessary
- IV. When the question is put in rating, put the number corresponding to each weight in appropriate box.

Identifications

Questionnaire code No. _____

Zone _____

District _____

PA _____

Name of Union _____

Name of Cooperative _____

Type of Cooperative _____

Name of Interviewer _____

Date of Interview _____

DEAR RESPONDENT, THIS STUDY IS INTENDED TO EVALUATE WELFARE IMPLICATION OF COFFEE COOPERATIVES ON SMALL HOLDER FARMERS IN ETHIOPIA. INFORMATION YOU PROVIDED WILL BE KEPT CONFIDENTIAL AND WILL ONLY BE USED FOR ACADEMIC PURPOSES. YOUR CO-OPERATION IN PROVIDING YOUR HONEST VIEW IS VERY MUCH APPRECIATED.

Thank you!!

1. Village characteristics

1.1. Is there clean drinking water availability to the small holder? Yes No

1.1.1. If yes, how far it is? _____minutes walk from home.

1.1.2. If your answer to Q No. 2.4 is yes, who delivered the facility?

1. Government

2. Cooperative

3. NGOs

4. Others (specify) _____

1.2. The main material used for flooring of house: dirt sand dung

Others (specify) _____

1.3. The type of fuel used for cooking: wood charcoal dung

Others (specify) _____

1.4. What assets does the small holder have? (more than one answer is possible)

Nothing Radio Television telephone bike motor bike
 refrigerator car or tractor others(specify)_____

2. General Background of Respondents

2.1. Sex 1. Male 2. Female

2.2. Age

2.3. Educational level:

1. Illiterate	<input type="checkbox"/>	5. Preparatory (11-12)	<input type="checkbox"/>
2. Read and write only	<input type="checkbox"/>	6. 1st Degree	<input type="checkbox"/>
3. Elementary (1-8)	<input type="checkbox"/>	7. MA/MSc	<input type="checkbox"/>
4. High school (9-10)	<input type="checkbox"/>	8. Others (specify)_____	<input type="checkbox"/>

2.4. Marital status

1. Married 2. Single 3. Divorced
 5. Widowed

2.5. Occupational Background of the Respondent:

1. Farmer
 2. Crafts person
 3. Trader

4. Government employee

5. Private Co. employee

6. NGO employee

7. Others (specify) _____

1.6. Small holder size _____

3. Membership in the Cooperative

3.1. Are you member of coffee cooperatives?

1. Yes

2. No

3.1.1. If your answer is No for question number 3.1 what is/or are the reason not to be a member?

1. It requires payment to be a member

2. You believe that cooperatives is not trustful

3. You believe that you do not fulfill the criteria that cooperative require to be a member

4. Other specify -----

3.2. If your answer for question number 3.1. is yes , How did you become member of the cooperative?

1. Willingly

3. Forced by government department

2. Forced by law

4. Forced by ` the society

5. Others (specify) _____

3.3. Relation of the respondent with the cooperative:

1. Member only

2. Member and employee

3.4. What was your purpose/objective of joining the cooperative? (Put the '√' mark in

Appropriate cell)

1. Not important

4. Highly important

2. Slightly important

5. Critically important

3. Moderately important

No	Reasons	Degree of importance				
		1	2	3	4	5
1	To get periodic dividend					
2	To get access to employment					
3	To get access to credit / loan service					
4	To get access to input market					
5	To get access to output/ produce market					
6	To get access to consumer goods					
7	To get access to training					
8	For other reasons (specify & rate)					

3.4. What are the criteria to get the cooperative's membership status?

1. Not important

4. Highly important

2. Less important 5. Critically important
3. Moderately important

No	Criteria	Degree of importance				
1	Ability to contribute the initial capital					
2	Ability to pay periodic payment					
3	Promise to buy goods /services from the cooperative					
4	Promise to sell production output to/ through the cooperative					
5	Others (specify & rate)					

3.5. Affordability of membership contribution to the cooperative (NA means not applicable)

0 = NA 1 = Very low 2= Low 3 = Moderate, 4 = High 5 = Very high

1. Amount of registration fee

2. Amount of share price

3. Amount of periodic contribution

4. Length of time interval for periodic contribution

3.6. In your opinion, which group of the community becomes member of the cooperative most of the time (multiple answer is possible)

1. Low income groups

4. From all income groups

2. Middle income groups

5. Others (specify) _____

3. High income groups

4. Services of the Cooperative

4.1. What services does the cooperative render to its members? (More than one answer is possible)

1. Marketing agricultural inputs

2. Marketing agricultural produce

3. Marketing consumer goods

4. Credit/loan facility

5. Training, guidance and advice

6. Others (specify) _____

4.2. For those inputs or services the cooperative provides, how do you rate access to and quality of goods/or services relative to other currently available options?

1. No other option

4. Slightly better

2. Lower

5. Highly better

3. Similar

4.3. Can you access the goods/services of the cooperative on credit?

1. Yes

2. No

4.3.1. If your answer to the question 4.3 is yes, how do you rate the suitability of the credit repayment arrangement?

1. Very unsuitable

3. Suitable

2. Unsuitable

4. Very suitable

4.5. Does the cooperative provide you timely and sufficient return (fund) to your produce?

1. Yes

2. No

4.6. What type of post-harvest services does the cooperative deliver?

1. Warehousing

4. Shipment/transportation

2. Grading

5. Market information

3. Packaging

6. Others (specify) _____

4.7.1. If your answer to Q. No 4.7 is yes, what was the focus?

1. Political issues

2. Cooperative nature and benefits

3. How to apply new technologies

4. How to generate income from different sources

5. Others (specify) _____

4.8. For those goods that the cooperative currently markets/trades, please rate the accessibility and quality of market service provided relative to other/previous options.

(Use 1 = highly deteriorated, 2= Deteriorated, 3= Similar, 4= somehow improved, 5 = highly improved)

No	Access to and quality of market provided by the cooperative	Rating				
		1	2	3	4	5
1	Adequacy of market service					
2	Availability of market at any time					
3	Availability of market at short distance (Market proximity)					
4	Fairness of market price					
5	Others (specify and rate)					

4.9. How do you evaluate the cooperative's achievement in introducing new agricultural technologies?

1. Very poor

3. Good

2. Poor

4. Very good

5. Production and marketing activities

5.1. What means do you use to transport your produce to the market? Multiple answers are possible.

1. Truck 2. Animal power 3. Human power 4. Other specify

5.2. When do you sell most part of your produce ? During _____ months.

5.3. Do you get reasonable price for red cherry?

1. Yes 2. No

5.4. If no to No 5.3. What are the reasons? (Multiple answers are possible)

No demand for the produce 2. More supply for the same produce

3. Lack of access to potential market

4. The cooperative forced to sell to it, if you are member.

5. Other (specify)

5.5. Do you get reasonable price for dried cherry?

1. Yes

2. No

5.6. If no to No 5.4. What are the reasons? (Multiple answers are possible)

1. No demand for the produce 2. More supply for the same produce

3. Lack of access to potential market

4. The cooperative forced to sell to it, if you are member.

5. Other (specify)

5.7. Is there coffee cooperative office in your area?

1. Yes

2. No

5.8. If yes to No 5.7. How far is it from your house?

1. one hour walking or around 4-5 km

2. Two hours walking or 8 -9 km

3. Three hours walking or 10-11 km

4. Other (specify)

5.9. How far the market area from the farm / house?

1. one hour walking or around 4-5 km

2. Two hours walking or 8 -9 km

3. Three hours walking or 10-11 km 4. Other (specify)

5.10. Do you own livestock? 1. Yes 2. No

5.11. If yes, to question 5.10. Indicate the livestock owned.

No	Types of livestock	Number owned	Number held
1	cows		
2	oxen		
3	Bulls		
4	Heifers		
5	Calves		
6	Sheep		
7	Goats		
8	Horses		
9	Mules		
10	Donkeys		
11	Camels		
12	Poultry		
13	Others (specify)		

5.12. Do you use oxen for your farm operation? 1. Yes 2. No

5.13. If yes to no 5.12, are your oxen enough for your farm operation?

1. Yes No

5.14. If you don't have enough oxen, how do you get additional oxen you need?

1. Hire from someone 2. Coupling with other farmer

3. Borrow from friends

4. By contributing labor to a person who has oxen you need

5. Other (specify)

5.15. How much land you cultivated in (ha)/or others? _____

5.1.6 Types of production produced in the year 2014

Sr. No	Major crops	Area (cultivated)	Production (kg/ tone)
1	coffee		
2	maize		
3	chat		
4	False banana		
5			
6			
	others		

5.17. How much income earned in the year 2014?

Sr. No	Kinds of other Income	Income earned
1	Remittances	
2	Gifts	
3	Off-season activities	
4		
5		
	others	

5.18. Marketing Activities

Sr. No	Major crops	Production	Consumed	Sold
1	coffee			
2	maize			
3	chat			
4	False banana			
5				
6				
7				
8				
9	others			

6. Economic Benefits

6.1. Does the cooperative pay you a regular dividend?

1. Yes

2. No

6.1.1. If your answer to Q. No. 5.1 is No, what do you think is the reason? (Multiple answers is possible)

1. The cooperative use the total surplus for investment purpose

2. No surplus is generated by the cooperative so far

3. The cooperative put the surplus in a bank for reserve

4. For some other reason (please specify) _____

5. I do not know the reason

6.1.2. If your answer to Q. No. 5.1 is yes, how frequent is the dividend payment?

1. Monthly

3. Annually

2. Semi-annually

4. Other (specify) _____

5.1.3. If your answer to Q. No. 5.1 is yes, the dividend payment is sufficient to fulfill the basic requirements of your small holder.

1. Strongly disagree

3. Agree

2. Disagree

4. Strongly agree

6.1.4. If your answer to Q. No. 5.1 is yes, what purpose did you spend the income received as dividend (multiple answers is possible)

1. for personal and family consumption

2. for repayment of debt/loan

3. Deposited in a bank

4. Purchase/building of fixed/capital assets

5. Others (specify) _____

6.2. Do you think that being a member of the cooperative improved your expenditure?

1. Yes

2. No

6.2.1. If your answer to Q. No. 5.2 above is yes, how did it improve your expenditure (multiple answers is possible)

1. by increasing saving

2. by increasing asset building (investment in long term items)

3. by smoothing consumption

4. Others (specify) _____

6.2.2. If your answer to Q No. 5.2.1 above is asset building, what are the basic assets you built or bought after you become member of the cooperative? (Multiple answers is possible)

1. Built House

2. Purchased farm aids such as machineries and oxen

3. Purchased home equipments such as TV and refrigerator

4. Others (specify) _____

6.2.3. If your answer to Q. No. 5.2 is yes, which of your expenditure became better? (More than one answer is possible)

1. Expenditure on daily consumption items

2. Expenditure on children schooling

3. Expenditure on family health care

4. Expenditure on long term assets

5. Others (specify) _____

6.3. Does the cooperative created additional income?

Yes

No

6.3.1. If your answer to Q. No. 5.3 above is No, what do you think is the problem?

6.3.2. If your answer to Q. No. 5.3 above is yes, in what way the cooperative created additional income? (Multiple answers is possible)

1. By securing higher price for my produce

2. By lowering input costs

3. By creating employment opportunities

4. By introducing new and efficient technologies

5. By providing training to increase productivity

6. Others (specify) _____

6.3.3. Type of off-farm activities you are involved in?

1. Casual work

2. Business (Trade)

3. Other (spec.)-----

7. Overall views of respondents

7.1. The cooperative promotes access to credit service for the local community

1. Strongly disagree

3. Agree

2. Disagree

4. Strongly agree

7.2. The cooperative promotes access to input for the local community

1. Strongly disagree

3. Agree

2. Disagree

4. Strongly agree

7.2.1. Are there major problems you encountered so far with respect to access to inputs?

7.2.2. What do you think should be the remedial action to overcome the problem/s?

7.3. The cooperative promotes access to market for output/produce for the local community?

1. Strongly disagree

3. Agree

2. Disagree

4. Strongly agree

7.3.1. Are there major problems you encountered so far with respect to access to market for output?

7.3.2. What do you think should be the remedial action to overcome the problem/s?

7.4. The cooperative promotes capital accumulation/asset building by the local people?

1. Strongly disagree 3. Agree

2. Disagree 4. Strongly agree

7.4.1 What should the co-operatives do to promote local capital accumulation/asset building/?

7.5. Do you think that there is improvement in your livelihood after being a member of the cooperative?

1. No change at all 3. To some extent

2. Insignificant change 4. To large extent

7.6. Do you suggest a cooperative business should continue?

1. Yes 2. No

7.7. Do you think that a cooperative business brought improvements in the living condition of the community? Yes No

7.8. Would you please state the major strengths and weaknesses of the cooperative?

Strengthes _____

Weaknesses _____

7.9. What should the cooperative do to promote the improvement of quality of living in rural areas?

Appendix 2

Official's Interview guiding questions

1. What are the criteria to be a member of the cooperative?
2. What are the rights and duties of the cooperative's members?
3. How is the dividend distribution system?
4. How is the cooperative controlled?
5. To whom audit report is presented?
6. In what type of community development activities does the cooperative participated so far?
7. To what extent have coffee cooperatives have improved their Members' productivity
8. what about future plan?
9. What is the contribution of coffee cooperatives on small holders' income?
10. Are there major factors that constrain efficiency and goal achievement of the cooperative?
11. What remedial action do you suggest to solve these problems?
12. What are the partner organizations to the cooperative?
13. To what extent the coffee cooperatives improves the small holder coffee marketing

Appendix 3

Guiding issues for Focus Group Discussions

Welfare implication of coffee cooperatives on small holder farmers

- _ The economic benefits of the cooperative
- _ Social development promotion role of the cooperative
- _ Problems related to the contribution of the cooperatives' role in socio-economic development of the locality
- _ Remedial actions needed

- Why the farmers not become a member of cooperatives?