DETERMINANTS OF SMALLHOLDER FARMERS' PARTICIPATION AND PERFORMANCE UNDER TOBACCO CONTRACT FARMING SYSTEM IN KAROI DISTRICT, MASHONALAND WEST PROVINCE, ZIMBABWE

By

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DEDICATION

I dedicate this work to my husband, Aaron, and my son, Khaya, my daughter Nkosnat, my sources of joy and inspiration; and my parents for their love and dedication!

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ABSTRACT

The use of Contract Farming has been proposed as one of several possible solutions to the problem of market and institutional failures in many agricultural areas around the world. This study assesses the factors affecting participation and performance in smallholder tobacco contract farming system. The study was conducted in Karoi district, Mashonaland west province, Zimbabwe. Specifically, the study estimates the extent to which socio economic, resource and technological factors affect farmer participation in contract farming arrangement. The study also assessed the effect of contract farming and other socioeconomic factors on farmer's incomes. A cross sectional survey was conducted on randomly selected 150 tobacco farmers from three wards, 10, 11 and 12. A pre-tested questionnaire was used to capture both qualitative and quantitative data on smallholder tobacco production and marketing. The attributes and characteristics of contracted and non contracted farmers were compared using one way analysis of variance (ANOVA), ratios and interactive bar graphs. Heckman's two stage models which incorporates probit model in first stage and OLS in the second stage was used to determine the factors affecting participating in contract farming and the effect of contract farming on tobacco net income. Results from the study showed that 66% of the sampled smallholder farmers were contracted farmers against 34 percent of non contracted farmers. Contracted and non contracted farmers were statistically different in terms of farming experience, tobacco farming experience, use of hired labour, ownership of other agricultural assets beyond manual tools as well as total household. Age, number of year's informal education and cattle ownership were not statistically different among farmers. However marital status, family size, number of years in growing tobacco and number of farm groups were found to positively influence farmer participation in tobacco contract in Karoi. Farmers' age and availability of off/non farm income had significant negative influence on participation in contract farming. Use of hired labour and fertiliser, tobacco farming experience and cattle ownership were found to positively influence farmers' net incomes. Contract farming increased farmer incomes by 28 percent even after controlling for unobservable characteristics. On the other hand maize income negatively impact on tobacco farmer's net income. The study recommends the government to continue promoting private sector involvement in contract farming. To promote growth in contract farming field days and training of farmers is recommended. Targeting of farmers for contract faming should consider least endowed farmers to reduce inequality in rural areas

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ANOVA   Analysis of Variance

BLUE   Best Linear Unbiased Estimator

CDF   Cumulative Distribution Function

CV   Coefficient of variance

FAO   Food and Agricultural Organisation

FTLRP   Fast Track Land Reform Program

GDP   Gross Domestic Product

IMR   Inverse Mills Ratio

LSCF   Large Scale Commercial Farming

MTC   Mashonaland Tobacco Company

NEPAD   New Partnership for Africa's Development

NIE   New Institutional Economics (NIE)

OLS   Ordinary Least Squares

SPSS   Statistical Package for Social Sciences

TIMB   Tobacco Industry and Marketing Board

TCE   Transactional Cost Economics

ZLT   Zimbabwe Leaf Tobacco

CHAPTER 1: INTRODUCTION

1.0 BACKGROUND

The Zimbabwe government's Fast Track Land Reform Programme (FTLRP) which commenced in 2000 in the agricultural sector resulted in the dismantling of the economically important large-scale commercial farming industry (Moyo, 2014). The land reform process resulted in increased small-scale farmers' participation in cash crop production and involvement in lucrative value chains. Followed by a decade of economic recession characterized by hyperinflation, foreign currency shortages, spiralling black-market foreign currency exchange rates and political challenges, agricultural productivity decreased to a fraction of what it was at the turn of the century which has had a debilitating effect on the nation's economy (Rukuni et al, 2006). The near collapse of formal marketing channels and severing of traditional supply lines for companies involved in agro-business during this time which caused shortages and high prices of key agricultural inputs (fertilizers, seeds and chemicals), resulted in steep drops in agricultural production (Chimbwanda and Chikukwa, 2013). The service industry that once supported the large-scale commercial farming sector has been seriously compromised which resulted in hardships for the newly introduced smallholder farmers, especially in the production of cash crops like tobacco, who also depended and relied on these services.

The decline in economic activity had resulted in small holder farmers facing challenges at almost every step in farming preparations, production and marketing. This made it almost impossible for smallholders to source finance to purchase inputs. Before dollarization of the economy in 2009, inputs became very scarce in a shrinking formal marketplace and were diverted to black markets where they were sold for prices high above official gazetted prices (Musara et al; 2011). Even after dollarization liquidity challenges accompanied with limited access to credit also affected cash constrained farmers to finance their production and marketing (Parirenyatwa and Mago, 2012). Government policies prior to 2004 which include a single-channel tobacco marketing system and price controls on all commodities had also an adverse effect on productivity (Matibiri; 2014). These factors combined adversely affected smallholder productivity compromising on farmers' livelihoods.

Responding to these challenges in agricultural management (production and marketing), the Zimbabwean government has pursued an array of policy measures. Among those measures, promotion of private sector participation in contract farming has emerged as an interesting alternative. This was one of the possible interventions of developing agricultural sector and which in turn would address some of the above identified constraints expected to contribute to agricultural growth and attainment of poverty reduction. According to Setboonsarng (2008), contract farming compels farmers to commit themselves to provide a specific commodity in quantities and at quality standards determined by the purchaser while the company commits itself to purchase the commodity at agreed prices and to support its production through provision of inputs (seed, fertilizers and pesticides) on credit and technical advice (extension services).

Contract farming has been identified as a system capable of addressing market failures in developing countries as well as stimulating agricultural production in Africa through integration of small farmers into commercial agriculture. Several studies conducted on contract farming suggest that contract farming arrangements do allow small farmers to achieve higher yields, diversify into new crops, and to increase income (Miyata et al, 2009; Minot, 2011; Mercy et al, 2013; Sambuo, 2014; Moyo, 2014). On the contrary others note a number of disadvantages related to limits to the inclusivity of contract farming schemes (often restricted to the top tier of highly resource endowed smallholder producers), unequal relations between contractors and farmers, farmers bearing high risks resulting in low incomes left available for farmers (Baumann, 2000; Cheng and Kuyvenhoven; 2006). Despite the critics contract farming is increasingly becoming a popular system in addressing market failures, risks and high transaction costs that were and are still present in Zimbabwe and other developing countries (Chimbwanda and Chikukwa; 2013). Where complete factor and output markets exist, it offers both the farmer and firms involved greater commercial returns and reduced transaction costs than open or spot market operations (Gabre-Mardhin, 2011). In the absence of complete input markets as is the case in Zimbabwe, contract farming is potentially a win-win strategy for farmers, agribusiness processors and exporters of high value commodities such as tobacco, (Chimbwanda and Chikukwa; 2013).

The tobacco sector is an example of Zimbabwe's failure in agricultural production which has improved as a result of contract farming. Contract farming has been practised in Zimbabwe for a long time for such crops as tea and cotton (Moyo, 2014). When the fast-track land

reform started in 2000, the government attempted to spearhead various contract farming arrangements but with little success (Woodend, 2003). Tobacco contract farming started in 2004 with the aim of encouraging competition and increase production through provision of farm inputs (Dawes, 2011). Tobacco is an important cash crop grown by the smallholder sub-sector and demanded by a large-scale processing/trading sector with important links to external markets (TIMB, 2014). Its production has plunged from a record level of 267 million kg in 2000 to a 73 million kg in 2007 which however has increased to 237 million kg in 2014 (TIMB, 2014). The crop is very demanding in terms of input and factor use, particularly chemical inputs and labour in its field practice requirements. Given the current stage of development of rural agricultural input and credit markets in the country, farmers have little access to improved seed and chemical inputs in rural areas (Matibiri; 2014). These market failures have resulted in a heavy reliance on contract farming as the dominant mode of sub-sector organization. The arrangement has allowed tobacco growers to find a way of overcoming some of these obstacles (FAO, 2011). With a diminished commercial farming production base, the smallholders have become very important for many agro processing companies and contractors have mainly targeted them. Smallholder tobacco production under contract is on the increase. Currently more than 60 percent of the crop is produced under contracts (TIMB, 2014).

While contracting has become the dominant feature of subsector organisation in the tobacco industry there is need to understand the characteristics of farmers taking part in contract farming. Research on the socioeconomic characteristics of smallholder farmers in Zimbabwe that affect their participation in contracts is lacking. Ilembo (2011) stated that there are five important factors which motivate tobacco farmers to participate in contract farming, namely, market stability, access to marketing information and technology, transfer of technology to improve farm practices, access to inputs and indirect benefit. In the Zimbabwean context and tobacco crop in particular most research has looked at the effects of efficiency of factor policies and institutional innovations in determining farmer participation (Chimbwanda and Chikukwa, 2013; Moyo, 2014). Little emphasis has been put on socioeconomic characteristics of contracted households. The objective of this study is to determine the factors influencing smallholder farmers' participation in contract farming and the effect of participation on farmer's performance in tobacco contract farming system.

With regard to the effect of contract farming on farmer incomes in tobacco and other crops, the welfare maximisation effect of contract farming, both locally and regionally is well documented. However in the Zimbabwean context most research has focussed on smallholder cotton contract farming with little research on tobacco. Despite the efforts made to estimate effects of contract farming on crops like cotton, the methodologies that have been employed mainly compared gross margins of contracted and non contracted farmers using gross margin analysis, linear programming, and simple regression (Masvongo et al 2012). These methods do not take into account that contract farmers are not a random sample of the population. They may differ in observable characteristics, such as farm size or education, and/or in unobservable characteristics, such as industriousness or intelligence that also affect income (Rugimbana, 2011; Moyo, 2014). Using two stage-Heckman's selections model this study analyses the socioeconomic characteristics of contracted farmers against non contracted farmers and the effect of contract farming on farmer incomes simultaneously.

1.1 PROBLEM STATEMENT

Tobacco is the main export crop in Zimbabwe which accounts for 21.8 percent of the country's foreign currency earnings. Tobacco industry caters for the livelihood of about 17 percent of the population and its contribution to the government revenues is substantial (TIMB, 2014). Mashonaland West province produces over 30.5 percent of the country's total flue-cured tobacco output with Karoi district accounting over 50 percent of the province's total output (ibid). About 75.5 percent of Karoi's population depends directly or indirectly on tobacco (Chivuraise, 2011). This suggests that tobacco production is an important economic undertaking for the rural people in Zimbabwe and Karoi district in particular. Thus, increasing agricultural productivity of tobacco through contract farming is central in reducing income poverty and enhancing food security status in rural areas (Dawes, 2009). As such contract farming by private sector is advocated by government as one of the intervention to overcoming market imperfections present in the country thereby improving productivity of agricultural crops tobacco inclusive in Zimbabwe (Rukuni et al, 2006). The practice is on the increase and has improved smallholder tobacco production through provision of inputs (seed, fertilizers and pesticides) on credit, technical advice (extension services) and money to finance its labour intensive requirements (TIMB, 2014). Despite the continued growth in contract production, the characteristic nature of households that determines their participation in contract farming is not known and the degree to which participating smallholders benefit

from contract faming remains somewhat uncertain. Research suggests that it is very unlikely that farmers choose to participate, arguing that farmer's participation in contract farming depends largely on firm's criteria rather than farmer's choice since firms are the ones that initiate the contract (Kirstern et al, 2003). On contrary, Benfica (2006) argues that the choice to participate remains in the hands of the farmer and resource and technology endowments are major determinants of farmer participation in contract farming. Musara et al (2011) also assert that farmer's perceived benefits about a contract largely affect farmers' decision to participate in contracting.

Although some studies in tobacco outside Zimbabwe reveal that contract farming is not profitable for example gross margin analysis of tobacco farming under contract in Tanzania by Rugimbana in 2008, other studies carried out on the impact of contract farming on livelihoods of farmers prove that contract farming raises tobacco farmers' incomes (Sambuo, 2014; Benfica, 2006). Apart from tobacco Birthal et al (2009) showed that the coefficient of variation (CV) of the profits of contract poultry farmers in Tanzania was lower than the CV of profits of noncontract farmers due to price volatility in other markets.

1.2 RESEARCH OBJECTIVES, QUESTIONS AND HYPOTHESES

The main objective of this study is to determine the factors influencing smallholder farmers' participation and performance in tobacco contract farming system in Karoi district. The specific objectives are to:

a) Determine the main socio-economic characteristics of contracted against non-contracted tobacco farmers in Karoi district.

b) Estimate the extent to which socioeconomic factors and resource endowments affect farmer participation in tobacco contract farming schemes in Karoi district of Mash West region of Zimbabwe.

c) To assess the effects of participation in contract and non-contract farming and other factors on tobacco net incomes.

To achieve these specific objectives the following research questions are asked respective of the above objectives.

a) What are the main socioeconomic characteristics of contracted and non contracted farmers in the tobacco sector?

b) To what extent does participation in contract farming influenced by smallholders' socio-economic characteristics factors and resource endowments?

c) To what extent do participation in contract farming and other factors affect farmer's tobacco net incomes?

To answer the above three questions the following tentative answers are hypothesised respectively.

a) Contracted and non contracted farmers differ in terms of age, gender, educational level, farming experience, labour availability, cattle ownership, other asset ownership and income diversification options.

b) Socioeconomic characteristics factors and resource endowments positively influence farmer's participation in contract farming.

c) Participation in contract farming, household demographic characteristics, and resource and technology factors positively influence tobacco farmers' incomes.

1.3 JUSTIFICATION AND EXPECTED CONTRIBUTION OF THE STUDY

Contract farming is an institutional response to widespread failure in input, credit and output markets and the absence of a functional market based service provision network (Dawes; 2009). Contracts are relatively efficient in introducing new production techniques, giving farmers inputs at lower prices and hence leading to higher farmer incomes per unit output (Kirstern et al; 2004). Local, regional and worldwide studies on the nature of contract farming operations and the extent to which it can generate income growth and poverty reduction as well as factors affecting farmer's choice of crop contracts, have been done (Benfica; 2006). However in the Zimbabwean context, most of the studies carried so far have dwelt much on policy and institutional factors affecting farmers' marketing and production decisions (Chimbwanda and Chikukwa, 2013). The characteristics of participating farmers have been ignored. Particularly looking at farmer's socioeconomic characteristics, this study

investigates the determinants of farmer participation and performance in tobacco contract farming schemes.

In analysing the impact of participation in contract farming on smallholder farmers' incomes most local research has concentrated on cotton, tobacco as a crop has been sorely neglected and the methodologies employed have compared gross margin of contracted against non contracted farmers overlooking the possibility of influence of other unobservable factors. By employing the treatment effects model also known as Heckman's two stage models which overcome this selection bias, the study determined factors influencing the probability of participating in contract farming and the impact of contract farming on smallholder tobacco farmers simultaneously. Understanding what type of farmer participate and benefits from contract farming is crucial for designing effective policy for the sectors, and can also be useful in advising companies on effective expansion paths. Also, what impact contract farming practice may have on the farmer's returns are issues worth investigating. This will improve the life and welfare of the poor communal farmers while at the same time will shed light on policy development to aid in increasing production of tobacco. This study has chosen Mashonaland West Province, Karoi district in particular which has become the top producing district in Zimbabwe since 2010, (TIMB, 2014).

1.4 ORGANISATION OF STUDY

The thesis is organized into 5 Chapters. Chapter 1 presented the background to the study and study problem, research objectives, questions and hypotheses. The chapter also justified the study. Chapter 2 presents a review of literature. It starts by giving an overview of the Zimbabwean agricultural sector as well as the production and marketing system in the tobacco subsector. The chapter then zoom in on the discussion of several definitions of contract farming, types and models as well as outlining several theories that attempt to explain why contract farming exists and why it is increasing in frequency. It then further presents practices of contract farming in both developed and developing countries as well as contract farming practices and smallholder production. Specific literature dwells on the reasons why farmers participate in contract farming and adoption considerations. Thereafter empirical results of determinants of participation and welfare effects of participating in contract farming are discussed. The chapter then outlines the different methods that are used to estimate determinants effect before concluding with insights from literature. Chapter 3 provides the framework used to conceptualize the study. The chapter presents research

methods, including a description of the study area, Karoi district, sampling methods, data analysis and collection approaches. The chapter further provides an analytical framework in which the specification and estimation of Heckman's two step model used in this study is presented. It ends by giving expected output of the theoretical model. Chapter 4 is the first chapter presenting survey results. The chapter gives a descriptive comparison of characteristics of contracted and non contracted farmers, farmers' sources of inputs as well as their differences in incomes and profits per hectare of tobacco. Chapter 5 summarises and discusses the results of Heckman's two stage estimation. The chapter begins by presenting probit regression results from the selection equation that identifies the factors that affect the probability of participating in contract farming. The chapter further present results from the outcome equation (using OLS) that estimate tobacco income as a function of various household characteristics, the contract dummy variable, and the Inverse Mills ratio (IMR) (from the selection equation). The chapter then discuses and draw conclusions from the results presented. Based on the probit and linear regression results, policy recommendations are proposed and conclusions drawn in the sixth chapter which ends by providing areas of further research.

CHAPTER 2: LITERATURE REVIEW

2.0 INTRODUCTION

This section starts by giving an overview of the Zimbabwean agricultural sector and tobacco industry. This is followed by precise definitions of contract farming, the different typologies and models of contract farming before outlining the theoretical basis of contract farming practices. The chapter then provides a review of contract-farming practices in both developed and developing countries. Subsequent section presents an empirical review of contract farming practices and small scale production. Specific literature dwells on why farmers choose contract farming and a theoretical perspective of adoption. The chapter will zoom in on the factors that determine farmer's choice to participate in contract farming and the impact of contract farming on livelihoods and general welfare of farmers before the chapter concludes with insights and lessons learned from literature.

2.1 OVERVIEW OF THE ZIMBABWE AGRICULTURAL SECTOR

Zimbabwe's agricultural sector plays a central role in the country's economy, contributing significantly towards the rural economy as well as the manufacturing sector. According to FAO (2013), agriculture contributes 16-20 percent to GDP, absorbs more than 70 percent of total employment, contributes 40-43 percent of total exports and provides about 65 percent of raw material to the manufacturing sector. Traditionally Zimbabwe's agricultural sector was split between large-scale commercial farms covering more than 15million arable land, which grew cash crops such as tobacco, alongside a subsistence- based rural sector cultivating mainly food crops especially maize which is the national staple (Leaver, 2006). Commercial farmers dominated cash crop production until about 2000 when the fast-track land reform programme started. In the past three decades, there has been gradual transformation of the agricultural sector in terms of land redistribution exercises from its dual nature in 1980 to a situation where production is now dominated by the previously marginalised black populace (Rukuni et al, 2006).

The transformation has resulted in changing land ownership structure consequently resulting in changes in on-farm investment and productivity, production patterns of cash crops and livestock issues. The transformations involved willing buyer willing seller from 1980 to 1990 which were implemented successfully but did not bring much change in terms of distribution of land although agriculture grew by 3.5 percent (Leaver, 2006). This was followed by

compulsory acquisitions from 1990 (New Land Reform Policy 1991-1998). These acquisitions (of 1990s) were not successful compared to the successes in the 1980s due to budgetary constraints (Moyo, 2014). Reduced support for agriculture and exposure of the then newly resettled farmers to the vagaries of imperfect markets reduced agricultural production by 2.5 percent (Rukuni et al, 2006).

Under pressure from a declining economy, labour unrest and pressure from the opposition, the Zimbabwean government embarked on a Fast Track Land Reform program in 2000 which acquired more than 1, 471 farms from large scale commercial farming sector (Moyo, 2014). As shown in Table 1 below, in years before 2000 most of the fertile arable land was in the hands of 4 500 white commercial farmers occupying 39 percent of arable land, while smallholder farmers occupied 41 percent of land with little commercial potential. While most smallholder farmers were allocated land under the programme, poor infrastructure, extension services and lack of finance constrained the capacity of land beneficiaries to increase production (Rukuni 2006). For example from 2000 to 2008, agricultural production dropped to less than half of 1990s average.

Table 1: Changes in the distribution of agricultural land

| Farmer category | 1980 | | | 2000 | | 2010 | | |
	Million hectares	%	Number of farmers	Million hectares	%	Million hectares	%	Number of farmers
Communal	16.4	41.9	1,250,000	16.4	41.9	16.4	41.9	1,100,000
Old resettlement	0.0		0.0	3.5	9.0	3.5	9	72,000
New A1 resettlement	0.0		0.0	0.0		4.1	10.5	141,656
New A2 resettlement	0.0		0.0	0.0		3.5	9	8,000
SSC farms	1.4	3.6	14, 000	1.4	3.6	1.4	3.6	14, 072
LSC farms	15.5	39.6	4,500	11.7	29.9	3.4	8.7	4,317

Source: Moyo, 2014

By 2010 more than 8 million hectares of land had been transferred to over 160 000 households (see Table 1). According to FAO (2014) small-scale farmers have become significant players in agricultural production occupying vast tracts of land and also involved in cash crop production. The Poverty, Income, Consumption and Expenditure Survey (PICES) in 2011 showed that the communal farmers produced nearly two thirds of the share of the value of output of Zimbabwean agriculture (Chimbwanda and Chikukwa, 2013). Musara et al (2011) emphasised the need for supporting these small- scale agriculture beyond mere market reforms through effective institutions that create opportunities for the farmers. Currently the agricultural sector is comprised of four main subsectors namely communal, A1, A2, small-scale commercial farmers and a negligible large scale commercial farming sector.

2.2 TOBACCO PRODUCTION AND MARKETING

2.2.1 Tobacco production and contribution to the Zimbabwe economy

According to the FAO (2011), about 100 countries produce tobacco. Of these countries, over 80% of the world's tobacco is produced in China, India, Brazil, the United States, Turkey, Zimbabwe and Malawi. Of these countries, China is the top producer worldwide with an amount of some 3.2 million metric tons of tobacco (FAO, 2014).

Production of tobacco in Zimbabwe (formerly Rhodesia) started in the late 1800s. With the increase in global demand, tobacco production grew steadily over the years mainly coming from large scale commercial farms. By 2000, Zimbabwe was the sixth biggest producer of tobacco in the world with 204, 900 tonnes for the year (Leaver, 2006). This production level dropped to 68,300 tonnes in 2007 after the fast-track land reform when most inexperienced small-scale producers took up tobacco production which however has increased to 201,350 tonnes in 2014 (TIMB, 2014). The trends in tobacco production since 1991 are shown in Figure 1.
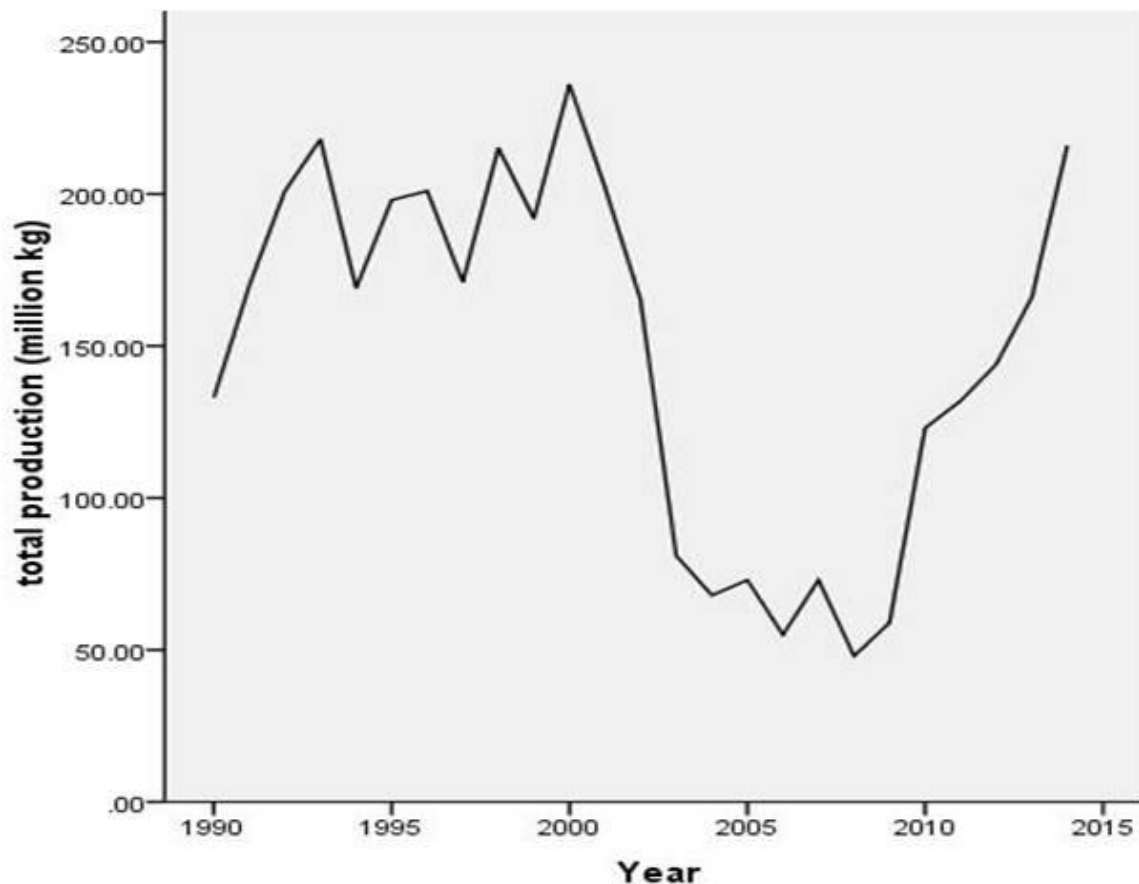
Figure 1: Graph showing tobacco production trends since 1991

Source: TIMB, 2014

According to Chimbwanda and Chikukwa (2013) a drop in tobacco production between 2000 and 2009 was a result of transfer of land to inexperienced farmers and failure by government to provide public goods and a supportive environment. Most smallholder and small scale commercial producers had limited access to productive resources. FAO (2013) attributed subsequent increase in tobacco production to the introduction of multicurrency in 2009 onwards which reduced losses attributed to foreign currency shortages, firming in international tobacco prices and the continued promotion of contract farming since 2004. By 2013, contract farming accounted for 72% of tobacco sales through the provision of farm inputs to farmers in a market with limited access to bank loans (TIMB, 2014). The increase in number of tobacco farmers also pushed production upwards (Matibiri, 2014). As shown in Table 2 below, the number of tobacco producers increased from below 4,000 in 2000

(including about 700 LSCF farmers who produced over 80% of the crop) to about 51,465 producers in 2010, across all the other subsectors such that the large-scale commercial now contributes only 20% of total output (TIMB, 2014). By 2014 over 50% of total production came from the smallholder farming sector comprising of A1 and communal farmers (Matibiri, 2014) (see Figure 2). Statistics by TIMB in Table 2 below show that, the number of tobacco growers registered in 2013 had increased by 22,000 from 64,775 in 2012 (TIMB, 2014). More than 80% of these registered tobacco farmers coming from the smallholder sector, where each farmer had an average of 1.3 hectares (TIMB, 2014). Tobacco is grown on approximately 3 percent of arable land (TIMB, 2014).
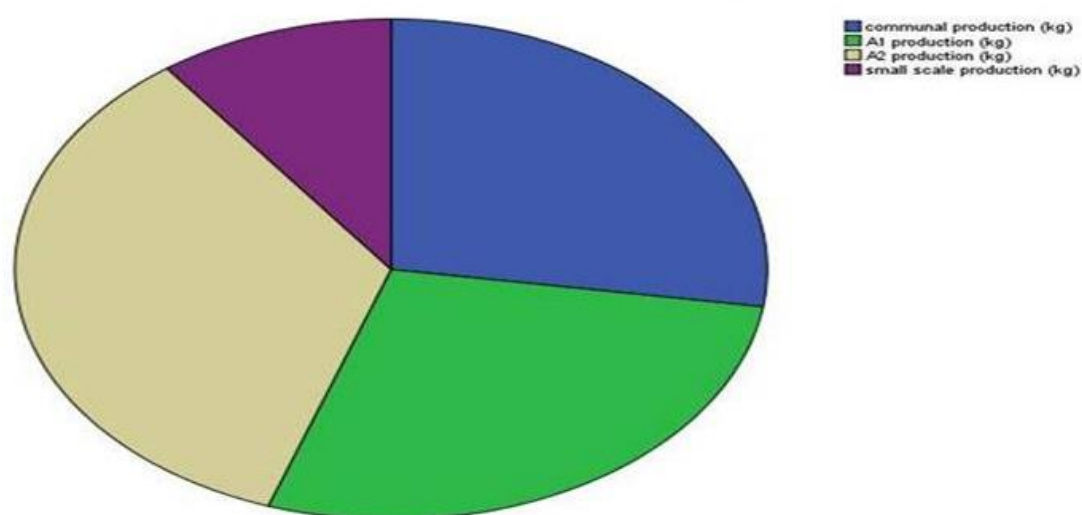
Figure 2 Chart showing tobacco production by sector in 2013/2014

Source: TIMB, 2014

Tobacco industry contributes in the world for the economic growth and played an important role in provision of income, employment, government revenue, food expenses and adding foreign currency (FAO, 2011). The contribution of tobacco to the Zimbabwean economy is substantial. Tobacco is a major export earner for Zimbabwe, contributing 15-20 percent (50 % of agricultural exports). About 8.2 to 10 percent is contributed to GDP with 33 percent of people employed in the agricultural sector (TIMB, 2014). The government also earns revenue

through taxes and levies on the product. In Zimbabwe, levies of tobacco produced are approximately US$132 per hectare (FAO, 2013). Table 2 below is a summary of economic benefits accruing from tobacco production.

Table 2: Tobacco contribution to the Zimbabwe economy

Year	1990s	2000	2008	2010	2013	2014
Percent of total exports	25	28	5.3	13.1	19.6	18.4
Percent to GDP	8.5	8.2	3.8	5.6	9.8	10.2
Production (million kg)	177	198	49	123	166	216
Number of farmers	2,525	3537	35,094	51,685	91,278	106,456
Hectarage	74,550	84857	61.622	67054	78,756	87,166

Source: Moyo, 2014

Tobacco crop grow well on loam soils in high rainfall areas or in low rainfall areas under irrigation. In Zimbabwe most of the crop is grown in natural regions 1, and 2 which cover most of Mashonaland and Manicaland provinces which are the main growing provinces (TIMB, 2014). According to TIMB (2014), the highest number of growers, area under crop and total production for the past five years came from Mashonaland West Province where Karoi district (the district under study) lies. Prior to that most of the produce came from Mashonaland central province. Figure 4 shows the percentage contribution of growing provinces to total production realised in 2014.
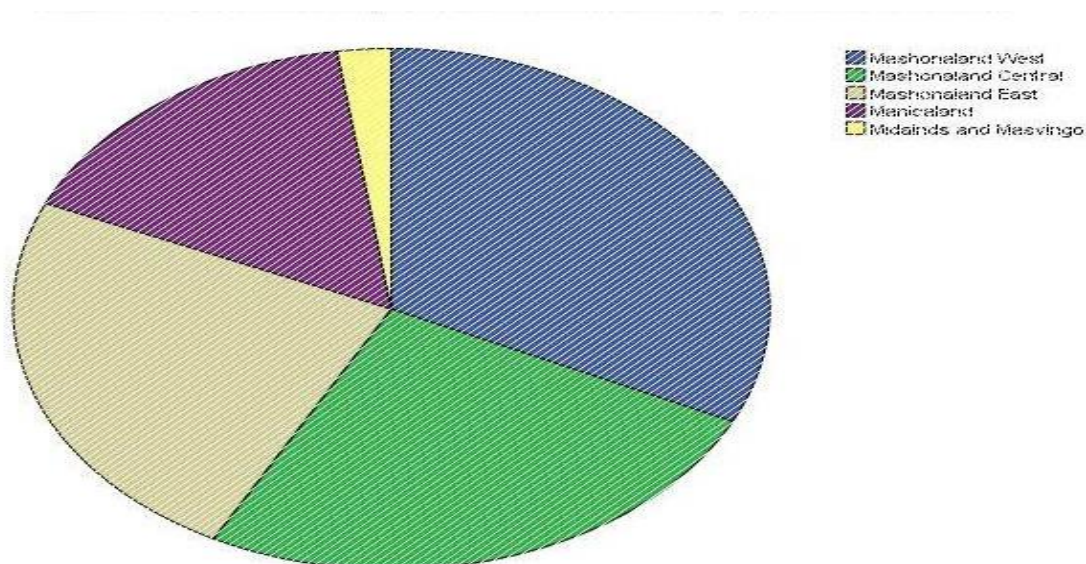
Figure 3.Chart showing tobacco production by province in 2013/2014

Source: TIMB, 2014

2.2.2 Marketing of Tobacco

Flue-cured tobacco was first produced in the then Rhodesia in 1894, and the first crop was auctioned in 1910. The first legislation to control the marketing and production was enacted in 1936 (TIMB, 2012). Since then, Tobacco Marketing Board (TMB), now TIMB emerged as the regulator and controlling board as set by an act of parliament, the Tobacco Industry and Marketing Act, Chapter 18:20 (TIMB, 2014). TIMB has remained the regulatory authority responsible for tobacco marketing in Zimbabwe controlling every aspects of production, from the sale of planting seed to the purchase of tobacco from farmers (ibid). It has been responsible for the administration of the tobacco selling calendar, the information system that supports tobacco trading and overall record keeping for the industry (Matibiri, 2014). As the regulator, TIMB registers all tobacco farmers and licenses contracting firms, auction floors, buyers and all stakeholders who buy tobacco (ibid).

Prior to the new millennium tobacco marketing was done through the auction system and Tobacco Sales Floor (TSF) was the only floor responsible for auction sales until 2004 when a dual marketing system was adopted (Leaver, 2006). Since then all tobacco were sold either through the contract system or auction. At these floors, market forces are left to determine the prices with only TIMB intervening to handle logistical issues like cancellation of sales, stop

orders and nesting (Matibiri, 2014). There are currently four auction floors namely Boka, Tobacco Sales Floor, Premier Tobacco and Millennium Tobacco operating in tobacco sales in Zimbabwe.

The tobacco sector witnessed a declining auction marketing trend to a market share of 23% due to lack of capital and price differentials in favour of contract sales (Chivuraise 2011). Contractors have grown from three in 2000 to nineteen in 2013 and contract production has grown to a market share of 72%, (TIMB, 2014). Contract production and sales versus non contract figures are shown in Figure 3. According to Matibiri (2014), contract farming has attracted new farmers to take risks and venture into tobacco farming, even without adequate knowledge, skills and other necessary resources.
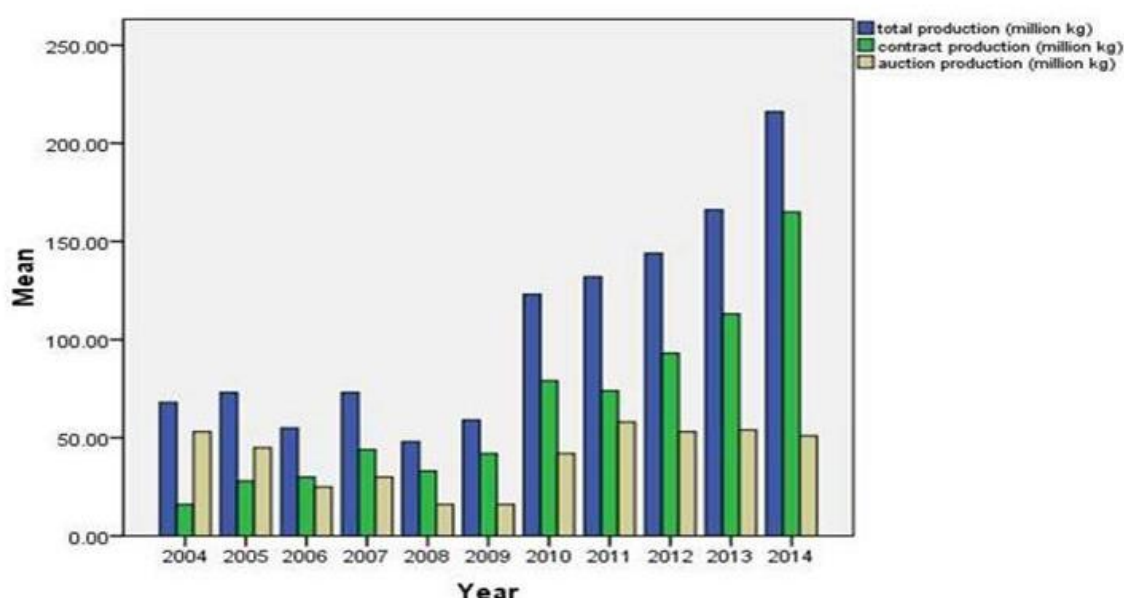
Figure 4. Graph showing contract versus non contract tobacco production

Source: TIMB, 2014

2.3 DEFINITION AND THEORETICAL BASIS OF CONTRACT FARMING

2.3.1 Contract Farming Defined

Several definitions have been made on the subject of contract farming but overall the definitions refer to the same idea. Contract farming is defined as a vertical coordination between growers of an agricultural product and buyers or processors of that product.

Basically this vertical coordination involves a central processor or several marketing firms that purchase the harvest of independent farmers and the terms of the purchases between parties are arranged in advance through contract. In such arrangements, the purchaser is committed to providing production support such as credit, inputs, farm machinery rentals, technical advice, and market services to farmers, and to purchasing the commodity. How much of the commodity will be bought and what price will be paid are specified beforehand in the terms of the contract. In return, farmers commit themselves to providing a commodity according to some quantity and quality standards also specified in the contract (Minot, 1986; Glover, 1994; Baumann, 2000; Miyata et al FAO, 2014).

Contract farming is also used as a term referring to a particular form of supply chain governance adopted by firms to secure access to agricultural products, raw materials and supplies meeting desired quality, quantity, location and timing specifications (Minot, 1986). In this context, contract farming is seen as one of the alternative forms of vertical coordination in which firms can engage, resting between spot markets, full vertical integration (Bijman, 2008). Spot market are the simplest form of vertical coordination where transactions are coordinated by prices only and there are no continuing obligations among those engaging in them. For markets where the conditions resemble perfect competition, spot markets can be efficient coordination mechanisms (Kirstern and Sartorious, 2002). In the opposite extreme of vertical coordination choice continuum, full vertical integration refers to cases where a firm exercises centralized ownership control over two or more different stages in a value chain. The type of ownership ensures complete power over decisions regarding product attributes, location and timing of deliveries (Bijman, 2008). In this context, contracting resting in between is as an intermediate mode of coordination, whereby the conditions of exchange are specifically set among transaction partners by some form of legally enforceable, binding agreement Bijman (ibid). The specifications can be more or less detailed, covering provisions regarding production technology, price discovery, risk sharing and other product and transaction attributes (Kirsten and Sartorious, 2002).

Contract farming has been defined also depending upon the nature and composition of contracts which gives rise to three different types which are contract based on market-specification, contract based on resource provision, and contract based on production management (Minot, 1986). In the market specification modality, the transaction between

growers and buyers is agreed on terms of *what* to be produced (product and quality attributes) and *what* are the commitments for future sale (timing, location and price). The second modality adds the provision of farming inputs to the former contract type. Beyond specifying what to produce and what the conditions for marketing are, in-kind credit is offered via the provision of key inputs, often with cost recovery upon farm product delivery. Finally, under production management contracts growers agree to follow precise technological guidance on *how* to produce. While this typology have been used by many authors, Hueth et al (2007) argues that the distinction does not hold in practice for understanding contemporary agricultural contracts citing that most contracts combine elements of marketing (which is the interest of the farmer) and managing or coordinating production (which is the interest of the contractor).

2.3.2 Theoretical basis of Contract Farming

There are several theories that attempt to explain why contract farming exists and why it is increasing in frequency. These are for example the life cycle theory, transaction cost economics, contract enforcement and convention theories.

The life cycle theory of vertical integration as postulated by Stigler in 1951 was based on Adam Smith's theorem: "the division of labour is limited by the extent of market." Life-cycle theory states that an industry passes through four stages of market development (Rehber, 2007). When the industry is small, the stage of facilitating market linkages, it does not pay for a firm to specialize in an activity that yields increasing return to scale. As the industry grows, some existing or incoming firms may specialize in one of the processes. That is, as the industry expands, it becomes profitable for a firm to specialize. Thus, in this second stage, disintegration occurs. During the third stage, as the markets shrinks, firms tend to reintegrate and undertake more processes than in the first stage (ibid). In addition, after an industry matures, vertical integration may also take place due to product differentiation and traceability requirements for example the new requirements witnessed from generic trade of conventional tropical exports such as coffee and cocoa (Prowse, 2012). Thus, vertical integration is predicted to be most frequent in very new and old industries (Rehber, 2007).

Adding to life cycle theory, Setboonsarng (2008) highlight the important role of transaction costs (monitoring and supervision costs) that increases the incidence of vertical coordination through the stages arguing that the industry is more vertically integrated in its early stage of

development because transaction costs (information costs) are high and the costs of coordination are high when the industry is in the final stage of development. Life cycle theory has been criticised but also extended to explain the evolution of agricultural industries (Prowse, 2012).

The theories of contract enforcement as postulated by Klein in 1996 focus on the incentives for contracting partners to honour contracts (Prowse, 2012). These incentives can be public for example legal redress or private such as the contents of the contract and market conditions at time of exchange or both. Rehber (2000) posit that at any point during contract both parties' asses the costs and benefits of dishonouring a contract. He contends that if market conditions change unexpectedly such that the benefits of breaking a contract are greater than the capital and reputation for one party, the contract will not be honoured. Conversely, if the benefits estimated from such changes do not exceed the capital and reputation losses then the contract will be fulfilled (ibid). As put by Benfica et al (2006), those benefits anticipated are not only based on short term financial interest but also include longer term reputation, credibility and income concerns. They further referred the range within which the contract will be completed as the self enforcement range. This theory has been supported for showing the relevance of preferences and utility of contracting firms and farmers before initiating a contract (Benfica, 2006).

Convention theories focus on the quality attributes that products exhibit. Rehber (2007) asserted that if markets were perfect, prices would reflect all relevant quality attributes but if quality requirements are particularly exacting, or product quality is especially uncertain, certain quality conventions help to facilitate exchange.

Observing the role of transaction costs from life cycle theory in necessitating vertical coordination decisions, Williamson (1991) considered the main purpose of vertical integration to be economizing of transaction costs. As put by Setboonsarng (2008) transactional cost economics (TCE), a branch of New Institutional Economics (NIE) provide the most theoretical frameworks for addressing contractual and vertical coordination decisions. Transaction costs are the costs incurred when a firm engages in an exchange process which include the costs occurring before a transaction takes place and the ex post costs of monitoring and enforcing the transaction terms and transactions refer to the activities that allow or constrain transformation activities (ibid).

Transaction cost economics (Williamson, 1991) suggest that an asset's degree of specialization (asset specificity) and uncertainty may strongly influence vertical coordination decisions (Jaffee and Morton, 1995). When choosing a governance mode, firms seek to minimize transaction costs and in this process they have to examine the characteristics of transactions related to asset specificity, uncertainty and frequency (Glover, 1994). Setboonsarng (2008) points out that the higher the degree of asset specificity, the higher will be the exposure of the transaction partner who holds the asset to exploitative or opportunistic behaviour from his counterparts. Hence, a high degree of asset specificity drives transactions away from spot markets, towards tighter alignments in the supply chains. As uncertainty increases, firms have more incentive to seek control over the transactions, thus moving from spot markets to more vertically coordinated governance modes (ibid). The frequency of transactions is directly correlated with the incentive to opt for spot markets (Benfica, 2006). When transactions are frequently performed, buyers and sellers tend to engage in longer term business linkages, thus reducing the scope for opportunistic behaviour (Jaffee and Morton, 1995). Transactions underlying a contract farming scheme have higher levels of uncertainty and asset specificity. Transaction cost economics has been receiving varied criticism.

It has been criticised on over emphasis of transaction costs (Rehber, 2000). Rehber (2006) further argues that transaction costs are important but they are not everything. Key and Runsten (1999) added that even though some transaction characteristics are such that contractual integration would be predicted by transaction cost theory, the actual governance structures observed are open markets because of institutional failures associated with contractual enforcement. Kirstern and Sartorious (2002) also suggested that the mix of transaction characteristics is influenced by a number of factors related to production, marketing and processing characteristics, and to factors related to the economic and political environment. As put by Kirstern (2004) asymmetries in production and marketing information, as well as the imperfection in markets for credit, inputs and agricultural support services account for increases in transaction costs and thus provide incentives to increased coordination in the transactions, leading to contracting or to full vertical integration. Despite the criticism, transaction cost economics has been generally accepted in explaining contract farming.

Complementing to transaction cost theory, Young and Hobbs (2002) added the role of the state in addressing market failures, providing public goods, such as research and development to the enabling inter firm environment, the home to the influential transaction cost. He argued that the problems of market imperfections warrant intervention by the state to protect the parties to a transaction, consumers and all stakeholders through convections, regulations and institutions that help facilitate the smooth flowing of transactions.

In recognising the effect of utility and preferences among firms and farmers in initiating contracts, the role of transaction costs and the influence of government, the theoretical framework adopted in this study combines the theory of contract enforcement, the transaction cost economics and the contributions made by Young and Hobbs (2002). Farmers participate in contract farming if contracts yield desirable benefits for them. These benefits will minimise transaction costs and the problems of market imperfection especially for crops like tobacco with specific quality attributes, where demand for chemical inputs is high and also require high set up costs (construction of barns needed for curing). The contributions of Young and Hobbs (2002) to transaction cost theory are important in the understanding of contractual relations between smallholder tobacco farmers and agribusinesses in the Zimbabwean set-up. For efficient operation of contract arrangements government needs to invest in enabling institutions, convections and regulations that reduce transaction costs (Moyo, 2014). This is critical in agriculture given increased quality demands for tobacco crop and failure of market forces to effectively handle differentiated products.

2.3.3 Contract farming models

Depending on the product, the resources supplied by the firm, country specific regulations and the interest of the relationship between farmer and contracting firm; contract farming takes one of the five models (Eaton and Shepherd; 2001). The five models include informal model intermediary model, nucleus estate model, and multipartite model and centralised models. Each of these models is discussed below as follows.

(a) Centralized model

According to Eaton and Shepherd (ibid), in a centralized model vertical coordination is high. The model is characterised by a firm contracting a large number of farmers based on strict quality requirements and quantity targets. Contracting firm's involvement in the production varies from minimal input provision to the maximum where the firm takes control of most

production aspects. Products suited to this model require substantial processing prior to retail for example sugar cane, tea and coffee.

(b) Informal model

As implied in the name, this model implies that individual entrepreneurs or small companies normally make simple, informal production contracts with farmers generally on a seasonal basis particularly for crops such as rough vegetable, watermelons and tropical fruits (Eaton and Shepherd, 2001). Material inputs are often restricted to the provision of seeds and basic fertilizers with technical advice limited to grading and quality control matters (Bijman 2008). This type of model often has a high risk of default by both parties (Glover and Kusterer; 2001).

(c) Nucleus estate model

Nuclear estate is the variation of the centralized model (Glover and Kusterer, 2010). This model is based on a buyer also being involved in farming from their own estate and contracting other small farmer mainly to supplement supply for their own processing usually close to the processing plant. This model was pioneered by the Commonwealth Development Corporation (CDC) and it is the model used in Hulett sugar production in Zimbabwe's Chiredzi district (Moyo, 2014).

(d) Intermediary model

According to Rehber (2000), intermediary model involves three parties, firm in subcontracting linkages with farmers to intermediaries. Vertical coordination problems like the supply of inputs and support services normally discriminates farmers from technology transfer. Farmers might not benefit from this also because of market related prices as the middlemen might strive to maximise his/her margins. In Thailand and Indonesia, this model is widely practiced whereby large food processing companies and fresh vegetable entrepreneurs purchase crops from individual 'collectors' or farmers committees who have their own informal arrangement with farmers (Saenger and Torero, 2012).

(e) Multipartite model

The multipartite model usually involves statutory bodies, and private companies which jointly work with farmers. These private public partnerships tend to focus on strategic crops

with national significance for example cotton in West Africa. This model sets separate organization responsible for credit provision, production, and management, processing, and marketing (Prowse, 2012).

The nature of tobacco contract farming system in Zimbabwe is that of resource providing model which combines the elements in a centralised model and multipartite model. Resource based contracts seek to provide small scale farmers with inputs, extension services and markets to enable them to increase productivity and quality of their produce which will then attract better prices thus raising farm incomes (Benfica, 2006; Miyata et al, 2009; Moyo, 2014). Given the current stage of development of rural agricultural input and credit markets in the country, farmers have little access to agricultural resources (Matibiri, 2014).

2.3.4 The extend of contract farming practices in developed and developing countries

As an organisational structure in agriculture, contract farming has a long history dating back to the 20th century (Carlos, 2005). Prior to the 20th century, spot markets were a dominant organisational structure in agriculture. Prowse (2012) cited the failure of prices in spot markets to convey important information on quality characteristics, injection of new technology and perceived market risk reduction among farmers as major drivers of contract farming. Increased global demand for high value food and cash crops has increased competition among countries and propped the expansion of contract farming practices in both developed and developing countries (Minot, 2011) .

The expansion of contract farming has taken place in all regions of the world. IMF (2011) points that 30 to 60 percent of total value of agricultural production in most developed countries is produced under contract farming. At least 30 percent of agricultural crops are grown under contract in Latin America and Asian countries (Miyata et al, 2009). In sub-Saharan Africa, and Zimbabwe in particular contract farming is also on the increase. As compared to the late 1980s when many contract-farming arrangements used to have full or partial government ownership, most projects have been initiated by the private sector since 1990 (Minot 2011). Although the private sector leads in most contract farming initiatives in sub-Saharan Africa, the state still continues to play an important role in terms of input supply, finance, extension and processing in addition to the provision of public goods, setting a legislative framework and creating an enabling policy environment (FAO, 2014). Barrett et al (2011) point out that in Mozambique almost 12 percent of the rural population is involved in

contract farming with all cotton and tobacco grown through contracts. He also added that in Zambia, 100 per cent of paprika, tobacco and cotton are produced through the system. Barrett et al (2011) reveal that, in Kenya, contracted farmers produce 60 per cent of tea and sugar, and all the country's tobacco. Further, crops with successful contract-farming operations include coffee in Uganda and tobacco in Malawi, (Shepherd, 2011). Most of these contracts are dominated by private firms.

Apart from tobacco, Zimbabwe has also witnessed a steady increase in private firm engagement in contract farming in other crops. Although being a dying crop FAO (2013) point out that 100 percent of cotton was produced under contracts engaging firms like Cargill and Quton. Successful growth in coffee and banana contract farming have been witnessed in Honde valley where coffee harvests doubled from 2009/2010 harvests to 2010/2011 harvests (FAO, ibid). In Sub Saharan Africa and elsewhere in the continent, contract farming is used to integrate smallholder farmers into commercial agriculture through market assurance supply of productive inputs and provision of technical advice thereby increasing farmer incomes (Miyata et al, 2009).

2.3.5 The role of contract farming
Smallholder farmers in developing countries have limited options when it comes to increasing their productivity and moving from subsistence farming towards market-oriented production methods (Minot, 1986). Several constraints ranging from lack information about production methods and market opportunities, limited access to input and credit markets as well as high levels of risk aversion behaviour limit their potential to increase agricultural production (ibid). Researches on contract farming suggest that contract farming has the potential to solve several of these constraints simultaneously (Miyata et al, 2009).

Lajili et al (1997) identifies contract farming as a response to market failures in developing countries. Markets in developing countries are characterised by low levels of trust and power imbalances between suppliers and buyers to inadequate road and market infrastructure, highly volatile prices, inconsistent produce quality and a lack of reliable harvest forecasts or market information systems (Kirstern, 2004). Markets for both inputs and outputs tend to be thin, fragmented and hence generally fail for smallholder farmers in most developing countries (Chimbwanda and Chikukwa, 2013). Contract farming can provide for the missing markets,

offers guaranteed markets, inputs, extension services and information that prevent smallholders from participating in value chains (Minot, 1986).

Development literature identifies high transaction costs and asset poverty as major drivers of market failure (Barrett, 2008). Prowse (2012) argued that contracts lower transaction costs which motivate the parties to engage in contract farming activities. In a study of tobacco contract farming system in Zimbabwe, Chimbwanda and Chikukwa (2013) found that joining the tobacco contract scheme was mainly motivated by imperfect markets at the time Zimbabwe was experiencing an acute shortage of farming inputs.

Schwarz and Scott (2003) assert that smallholders' farmers face restrictions in credit markets associated with high interest rates and lack of access due to collateral insecurity, which limit farmer's production alternatives. Using the crop grown as security, contract farming enables those smallholder farmers to undertake production of high value, non-traditional crops which often require specialty inputs and have more exacting quality requirements (Hoang, 2013). Miyata et al (2009) identified lack of finance as major limiting factor in the production of apples and green onions among smallholder farmers in China which has revived as result of contract farming. In Tanzania, tobacco growers obtain bank credit for inputs and other investments through tobacco buyers guarantee (Rugimbana, 2008) whereas in Zimbabwe, tobacco buying companies procure and distribute inputs to individual contracted farmers (Moyo, 2014).

Swinton (2007) attributes contract production as a way of hedging against risks. He further argues that unlike farmers in developed countries who have access to insurance markets such as crop insurance, forward and futures markets as well as opportunities for diversification into off farm activities, developing country smallholders have limited strategies for managing risk. As a result risk aversion is central in smallholder decision making and particularly so in adoption of new crops and technologies (ibid). Since the sponsor has an interest in the crop he/she can afford to spend in new technologies and extension services so as to remain competitive thus entering a contract may mitigate or exacerbate smallholder risk.

Information concerning quality and safety standards can be expensive to gather and is not depleted by use. With agribusiness firms gathering and disseminating information, contracts help in providing crop specific information over smallholders gathering their own

information (Adjognon, 2012). According to Minot (1986), most contracts oblige firms to pay frequent extension visits to either individual farmers or farmer groups. These visits allows information such as suggestions about management, chemical restrictions related to food safety, timing of planting and harvesting to be shared between famers and firms.

Conferring the role played by contract farming to other alternatives such as spot markets or large scale estate among contracting firms, contract farming can ease the pressures on land usage (Rugimbana, 2008). According to Adjognon (2012), contract farming offers firms access to crop production from expensive land or land that would be otherwise unavailable for a company to utilise. Singh (2000) noted that markets for fresh and processed agricultural produce require quality standards and compliance to production techniques especially on pesticide usage which are often met through contract farming. According to Miyata et al (2009), quality consistency was one of the main reasons that influenced the production of onions and green apple under contract in China. Despite the roles played by contract farming there has been varied criticism on its practices arising to both contracting firms and farmers.

2.3.6 Disadvantages of contract farming

According to World Bank (2008), farmers entering new contract ventures are likely to face a number of constraints. Where production of certain crops follows some rigid production conditions, growers face the problem of being ordered to follow or adopt technologies which could be incompatible to the existing social life of the community (World Bank, 2008). In Thailand contracts between poultry farmers and contracting firm were terminated after farmers failed to handle highly technical management operations that were proposed to reduce high chicken mortality rate (FAO, 2011).

Individual producers are often at a disadvantage in contract negotiations when common problems such as default in quantity and quality occur. Moyo (2014) points out that legal and regulatory framework should be set to handle the commercial disputes that may arise from contracts. Miyata et al (2009) point out that agricultural contracts can restrict competition, when large firms collude on prices and sales or create barriers to entry hence deterring new entrants which often leads to growers receiving low prices for their farm produce leading to severing indebtedness especially when legal and regulatory avenues are poorly designed.

Sponsors may face difficulty in recovering credits from farmers. When farmers perceive agreed prices as low, the probability of side marketing farm produce is high there by affecting contracting firms (Rugimbana, 2008). In Zimbabwe, the problem of inputs debt which accumulated from 1995/6 to 1998/99crop season, seriously affected cotton production (Tonderai et al, 2014).

2.3.7 Adoption of contract farming by smallholder farmers

Minot (1986) asserted that the possibility of self selection of smallholder farmers into contracts is indirect arguing that agribusiness firms have the power to select smallholders for contracts. In his argument contracting firms hold the power to pick and choose farmers for contracts and a number of selection factors relating to previous farming experience of the smallholder, farm size, fertility of farms and labour availability are considered. However in some situations where production of a certain crop is not restricted to contract farming, and farmers have other alternatives or capacity to finance own production, choice of contract remain in the hands of the farmer (Benfica, 2006). When a smallholder is confronted with a new option, consideration is made on various factors which limit their capacity to undertake a new technology. According to Kirstern and Sartorious (2002), a farmer considers three factors prior to undertaking a new enterprise. These are revenue implications, cost implications and any additional exposure to risk that might arise from the new activity.

According to Kirstern and Sartorious (2002), for a new enterprise to be a candidate for adoption by a smallholder it must increase total farm income. Increasing total farm income requires expected revenues to be greater than purchased input costs plus opportunity costs (ibid). Opportunity costs occur because of the need to curtail other on-farm or off-farm activities (Carlos, 2005). For example, the opportunity cost of land used in a new contractual enterprise is either equal to the gross margin of the existing on-farm activity that is curtailed to accommodate the contract or its rental value depending on whether land is constrained or not constrained respectively. The contract is rejected if the rental value or gross margin from existing on farm activity forgone is greater than the net income obtained from the contract (Kirstern and Sartorius, 2002)

In adopting a new enterprise the farmer also considers the expenses incurred in purchasing farm inputs for example hired labour, machinery, seed, chemicals, storage, marketing and rented land (Carlos, 2005). A new enterprise should also maintain or lower risk at minimum

acceptable levels (Swinton, 2007). Smallholder farmers should not be exposed to the risk where their income falls below some minimum threshold level (ibid).

Whilst adoption of contract farming depends on whether participation in contract farming will lead to an improvement in welfare in terms of increasing income, reducing risk exposure or gaining social prestige, there is evidence of various factors that determine farmers' participation (Benfica, 2006). The following section gives empirical evidence of various socio-economic and institutional factor s affecting framers' choice in contracts and the extent to which contract farming affect farmers' incomes.

2.4 EMPIRICAL REVIEW

2.4.1 Factors determining farmers' choice to participate in contract farming

According to Dawes (2009), land ownership is one of the main factors limit smallholder farmers' participation in contract farming schemes. Having a piece of land that fulfils some precise characteristics related to size, quality, geography, and topography is crucial for participation in contract farming schemes (ibid). Although in Zimbabwe access to land by smallholders has improved, land is very unequally distributed in most countries in SSA, and security over ownership of land is very weak. In South Africa, about 86 percent of agricultural land is controlled by 46 000 commercial farmers, while the remaining 14 percent is occupied by 3 million small-scale subsistence farmers (Bijman, 2008). Therefore, many very poor and needy small-scale farmers are excluded from contract farming schemes (Minot, 2011).

Access to land also affects women participation in contract farming since their access to land is limited. According to (FAO, 2014) women across all developing regions are less likely to own or operate land; they are less likely to have access to rented land, and the land they do have access to is often of poorer quality and in smaller plot. Participation in contract farming is also compromised by poorer education and literacy, which can create a barrier to joining formal contract farming (Eze et al, 2010). Women in SSA are also adversely affected in most cases when they rely on their literate husband to be their representative when it comes to signing formal contracts that require a minimum level of literacy thus making it easier for agribusiness firms to deal only with men, amongst whom the literacy rate is higher FAO, (2014).

Arumugam et al (2011) also hypothesised households with large head size participate in development programs like contract farming. Household size serves as a form of family labour and complements the effort of the household heads on the farm. The availability of family labour provides the household head the opportunity to share responsibility and save time for other development activities. Also, larger households spend more on food and other household needs. The higher expenditure associated with larger households sizes tend to make them more resource constrained and hence the need for external support.

A number of studies have been carried out to determine factors that affect farmer's participation in contract farming. The methodologies employed and results are variable. Benfica (2006) investigated the rationale for persistence and the determinants of farmer participation and performance in cotton and tobacco schemes in Mozambique. His findings indicated that in both areas participation in the schemes was driven by factor endowments, asset ownership and alternative income opportunities, and very little by demographic factors. In the study of groundnuts in Senegal, Barrette et al (2011) compared contract and independent farmers by various measures of assets. They found that participation in CF was determined by farmer s attitudes as well as the efficiency of credit markets and indicators of asset ownership were not significant predictors of participation in the contract farming scheme. Adjognon (2012) used data from farm-level surveys in China to estimate the likelihood of participating in a contract farming scheme as a function of household characteristics, crop mix, and farm size. The results showed that small farmers in terms of land size were less likely to participate in contract farming than larger farmers. Musara et al (2011) carried out an examination of the determinants of farmer participation in cotton contract farming and challenges faced by smallholder farmers in Kadoma district, Zimbabwe. All household demographics parameters used significantly influenced participation.

In the study of Fresh Fruits and Vegetables (FFV) in Malaysia, Arumugam et al (2011) identified socio-economic characteristics that affected respondents' participation in contract farming. Regression results showed that, land ownership, land size, education background, perceived benefit, complicated process, lacking in opportunities and price risk were dominant variables influencing FFV farmers' willingness to participate in contract farming. Land

ownership, land size, education and perceived benefit positively influenced FFV farmers to participate in contract farming.

Tongchure et al (2013) looked at factors influencing contract participation among smallholder cassava producers in Thailand using logit analysis. Results from a survey showed that contract participation was significantly influenced by gender of household head, education of household members, number of agricultural groups, input costs, machinery costs, incomes and credit access. In another study carried out in Tanzania, Ilembo (2013) examined factors that influenced smallholder farmers' participation in tobacco production. Using Heckman's two stage model, his findings showed that farming experience, farm group and age of the farmers have significant negative influence on farmers' participation in contract farming. Farmers' incomes were significantly and positively influenced by the value of agricultural and non-agricultural assets and fertilizers.

2.4.2 Impact of Contract Farming on Income and rural livelihoods

While contract farming is widespread in Africa and many other developing countries, there are conflicting views on its impact on the welfare of smallholder farmers. Some authors argue that contract farming is beneficial to the small holder farmers since it enables farmers to access ready markets and also to access global markets (Minot, 1986). Musara et al (2011) add that contract farming enhances the income of farmers which they attribute to the economies of scale enjoyed in contract farming. On the other hand other authors argue that contract farming is a means of exploiting farmers by the large agribusiness firms due to the unequal bargaining power (Singh, 2002). Kirstern (2002) criticizes contract farming on the basis that most of the contractual terms are too costly for smallholder farmers to comply with and that most large firms break the contractual terms at the expense of the smallholder due to unequal market power. Adding to this Carlos, (2005) argue that contract farming is only beneficial for large scale farmers and that it only serves to push smallholder farmers out of the market and could even lead to rural inequality and entrench poverty among the rural smallholder farmers.

Several studies have been conducted on the impact of contract farming on famers' incomes and livelihoods and results have showed a positive impact. In the study of poultry farmers carried out in Tanzania, Birthal et al. (2009) showed that the coefficient of variation (CV) of the profits of contract farmers was lower than the CV of profits of noncontract farmers due to

price volatility in other markets. In identifying problems associated with contract vegetable production in India, Singh (2009) reviewed that most farmers witnessed incomes rise since joining the scheme and were satisfied with the contract arrangement despite some form of power imbalance between farmers and contracting firms.

Birthal et al. (2011) also examine contract production of vegetables and milk in Zambia and found that vegetable contract farmers received prices that were eight percent higher than those received by noncontract growers, and contract milk producers received prices that were four percent higher implying high incomes among participants. Warning and Key (2012) found that the increase in gross agricultural revenues associated with contracting is statistically significant and large, equal to about 55 percent of the average revenue of noncontract farmers. Although some research have indicated significant differences in incomes of contracted and non contracted farmers, other studies have showed no gains and losses from contracting. For example Simmons et al. (2013) examined contract growers of poultry, seed maize, and seed rice in Tanzania and found improved returns to capital among poultry and seed maize contracted farmers and no significant impact on seed rice. Musara et al. (2011) also concluded that average gross margins were similar between contract and non contract banana growers in Honde valley, Zimbabwe. Arumugam et al (2011) attributed a fall in incomes among contracted tobacco farmers in Malawi to limited access to other credit lines. Contracted farmers were more experienced and gained more from the management assistance and the credit provided by the firm (ibid).

2.4.3 Methods used to estimating determinants of participation and welfare effects of contract farming

After reviewing the factors affecting farmer's participation in crop contracts, and the impact of crop contract on crop incomes, there is also need to review methods commonly used in analysing determinants of participation in contract farming and the impact of contract farming.

Methods used to measure determinants of participation in contract farming vary from classical approaches such as the ordinary least squares, the logit and the probit models. Linear regression analysis is used for modelling and analyzing several variables, when the focus is on the relationship between a dependent real variable and one or more real independent variables (Benoit, 2009). More specifically, the linear regression analysis helps one to

understand how the typical value of the dependent variable changes when any one of the independent variables is varied, while the other independent variables are held fixed (Box, 2010). The main advantage of the linear regression model is its simplicity. However if the dependent variable is categorical for example participation in contract farming which can take two values participate and not participate, the ordinary least squares (OLS) method can no longer produce the best linear unbiased estimator (BLUE) that is, the OLS is biased and inefficient (Dev, 2003). The nonlinearity of categorical dependent variable models makes it difficult to fit the models and interpret their results (ibid). Consistent estimates can be obtained by methods such as probit or logit regression models.

The probit model introduced by Bliss in 1934 is a popular device for explaining binary choice decisions (Harn, 1984). Like many forms of regression analysis, it makes use of several predictor variables that may be either numerical or categorical (Henningsen, 1990). Similar to linear regression the probit model assumes that the error terms are independent and normally distributed (Dev, 2003). It however differs from linear regression in the sense that probit regression is used for predicting binary dependent variables rather than a continuous outcome and is also based on a latent model (Moore, 1996). The model estimate the probability that an observation with particular characteristics will fall into a specific one of the categories, if estimated probabilities greater than half are treated as classifying an observation into a predicted category (Bushway et al 2007). For example, the probability that a person participates in contract farming might be predicted from knowledge of whether a person is engaged in off farm employment or not, person's age, education and sex. Apart from participation in contract farming, the probit model has been used to describe labour force participation, travel mode, home ownership, and migration decision by persons.

Given two sets of variables, the dependent variable y which can be either a farmer is contracted or not, and can take the values 1 or 0 and a vector of regressor, x which are assumed to influence contract farming participation decision, y, the probit model takes the form;

$$y^* = \alpha + \beta x + \varepsilon$$

$$y_i = \begin{cases} 1 = contracting \\ 0 = non\ contracting \end{cases}$$

The probability that the person is contracted given a set of vector x is given by $\Pr(y = 1 \mid x) = \Phi(x^*\beta)$. Where Pr is probability and Φ is the cumulative distribution function of the standard normal distribution. Parameter β is estimated by maximum likelihood functions which differ from OLS which uses moment based methods. Interpretation of the estimated coefficients quantifies the influence of the x variables on the probability that the latent variable y^* variable takes on the value one (Harn, 1984). In order to explain the behaviour of a dichotomous dependent variable, the probit model uses the Cumulative Distribution Function (CDF) (Moore, 1996).

Analogous to the probit model is the logit model (binary logistic model). The binary logistic model is used to estimate the probability of a binary response based on one or more predictor (or independent) variables (features) (Henningsen, 1990). According to him the logistic regression measures the relationship between the categorical dependent variable and one or more independent variables by estimating probabilities using a logistic function, which is the cumulative logistic distribution. It however differs from the probit model in that it assumes a standard logistic distribution of errors whereas the probit assumes a standard normal distribution (Wainaina et al, 2012). The logit model is also commonly used for observational studies whereas the probit analysis is appropriate for designed experiments (Benoit, 2009). As cited by Bierens (2008), these models differ in that the probit analysis procedure reports estimates of effective values for various rates of response, while the logistic regression procedure reports estimates of odds ratios for independent variables. However econometricians say that the choice between the logit and probit models is largely one of convenience and convention, since the substantive results are generally indistinguishable (ibid). The logit model is used more often because it's easier to compute but in economics, assumption of standard normal distribution is more realistic, thus probit is preferred by economists (Bierens, 2008). It is this normality assumption that the probit model was preferred in this study.

When assessing the effects of contract farming participation on income between contracted and non contracted farmers, there are three kinds of impact evaluation methods that may be employed (Wainaina et al, 2012). Firstly relative costs and revenue differences within a set of gross margin budget can be calculated and compared before and after contract farming intervention often referred to as before and after impact evaluations. Secondly, gross margins of contracted and non contracted can be compared at one point using experimental, quasi-

experimental and non experimental designs which are associated with control groups, comparison groups and non participants respectively (ibid). Finally use can be made of multiple regression analysis of farm production data using information obtained from contract farming surveys employing contract farming participation as a dummy or treatment between contracted and non contracted farmers.

In experimental design individuals from within well defined set of population are randomly selected into the treatment and control group. The assumption is that individuals are different in terms of access to program i.e. whether a farmer is contracted or not contracted which is a rare case in reality especially in social sciences (Baker, 2008). According to Wainaina (2012) non-experimental design methods are used to carry out an evaluation when it is not possible to construct treatment/control and comparison between groups through experimental design. Non experimental designs involve non random selection of individuals which is often limited by selection bias in establishing the causal impacts of a technology.

As pointed by Benfica (2006) participation in contract farming is not random, firms strategically choose the farmers to whom they offer contracts. Heckman (1979) cited the difficulty in ascribing observed welfare changes to contract farming participation. He added that, a higher income per capita in contract farming may merely reflect the fact that more industrious or more skilled farmers have a greater likelihood of becoming contract farmers. These contract farmers might have relatively high incomes regardless of whether they participated in the contract farming programs or not (ibid). In this case, the calculated effect of participation in contract farming would include the effect of these unobservable characteristics in addition to the effect of contracting, thus over-estimating the effect of contracting (Benfica ,2006).

In spite of this problem various non-experimental methodologies have been used in the literature to overcome this selection bias problem among them are matching techniques, instrumental variable approach (IV) and Heckman's two step correction models (Wainaina et al, 2012). In matching methods, an individual from comparison is matched with one from the treatment group and difference in outcome variable of interest in the intervention computed (Caliendo and Kopeinig, 2005). Matching techniques especially propensity score matching although they are commonly used, they only control for observable and not observable characteristics (Wainaina et al, 2012). The instrumental variable approach suffers from a

major limitation relating to the difficulty in finding and identifying instruments in the estimation (Moore, 1996).

Heckman (1979)' approach also known as Heckman selection/correction model is also used to control for selection bias problem. According to Zone (2011) this model involves two equations: the selection equation and the outcome equation. The selection equation is a regression that helps identify the factors that affect the probability of participating in contract farming (ibid). From this first regression, a coefficient called the Inverse Mills ratio (IMR) is calculated and adjusts the outcome equation for selection bias associated with the fact that contract farmers and independent farmers may differ in unobservable characteristics such as industriousness, skills, or intelligence (Zone, 2011). The outcome equation is also a regression that estimates income as a function of various household characteristics, the contract dummy variable, and the Inverse Mills ratio (IMR). This term corrects for possible selection bias and yields unbiased and consistent estimates in the income model. The model was chosen because of its ability to incorporate the influence of unobservable characteristics. It rests on the assumption that that the correlation between the two errors terms from the selection and outcome equations is greater than zero. Again it holds the assumption that these two error terms are normally distributed.

2.5 LESSON LEARNED AND INSIGHTS FROM LITERATURE

Zimbabwe's agricultural sector has undergone several transformations in the redistribution of land. The redistribution exercise which started in 1980 to the late 2000 has resulted in changing land ownership structures and production patterns of cash crops particularly tobacco. Smallholder farmers have become important players in agriculture producing nearly two thirds of the value of agricultural produce and more than 60 percent of the country's tobacco. Due to shortage of chemical inputs in the production of tobacco smallholder farmers are highly dependent on contract farming. Contract farming is defined as an arrangement between farmers and processing firms, for the farmer to produce a specified quantity and quality of the produce at pre determined prices, and for firms to supply inputs and provide technical support as well as purchasing the whole crop.

Several theories that attempt to explain why contract farming exists and why it is increasing in frequency were reviewed. These include the life cycle theory, transaction cost economics, contract enforcement and convention theories. Of these theories the transaction cost

economics and contract enforcement theories provided a conceptual framework for understanding the nature of tobacco contract farming system in Zimbabwe and the reasons why smallholder farmers participate in contract farming. The theories also observe the role of government in setting legal avenues for contract farming practices. Five contract farming models which include nuclear estate, informal, centralised, multipartite and intermediary models were also reviewed. The nature of tobacco contract farming system in Zimbabwe falls between centralised model and multipartite models described by Moyo (2014) as resource providing contracts. These contracts consist in the firms supplying seeds and chemical inputs on credit, along with technical assistance on specific areas of land.

Contract farming plays an important role in the commercialisation of subsistence agriculture by providing access to input and output markets, credit and reduction of marketing and production risks amongst smallholder farmers. It also offers firms access to meet quality standards required by the market. It can be noted from literature that contract farming also result in poor bargaining power among producers and some elements of side marketing disadvantaging firms.

Whilst adoption of contract farming depends on whether participation in contract farming will lead to an improvement in welfare in terms of increasing income, reducing risk exposure or gaining social prestige there is evidence of various factors that determine farmers' participation (Benfica, 2006). From the literature reviewed various socioeconomic factors such as access to land, level of education, off farm employment opportunities affect smallholder farmers participation in contract farming. Several studies reviewed on the impact of contract farming on famers' incomes and livelihoods have showed positive results.

To estimate the determinants of participation, the linear regression, the probit, the logit have been reviewed. Of the three models, the Probit and the Logit models have been widely used by other authors. These models use a series of characteristics of the farm or farmer which may be dichotomous or continuous variables to predict the probability of participation. The difference between the two models is that the dependent variable follows a logistic distribution (S-shaped curve) while the probit assumes a cumulative normal distribution, but the interpretation of the results is the same. Despite its complex nature the probit model is estimated because the error term of this model is normally distributed which is one of the assumptions underlying the Heckman model employed in this study.

Although most studies reviewed have shown that farmer characteristics significantly influence the participation in contract farming and that most of the farmers, who are participants in contract farming experience changes on income earned as they access inputs packages from firms, it is not sufficient to infer these results for tobacco in Zimbabwe. There is still a gap in literature on participation studies in Zimbabwe and this study seeks to bridge this gap. Given the lessons learnt from literature, the broad objective would be achieved by using several research methods. The next chapter will specifically concentrate on the research methods that will be used to answer the research questions raised in chapter one.

CHAPTER 3: RESEARCH METHODS

3.0 INTRODUCTION

This chapter provides a description of the methods that were used to conduct the research. It starts by providing a description of the study area, and then develops frameworks that were used to conceptualize and analyse the study. The chapter then cover sources of data, data sampling and collection approaches as well as analytical techniques employed in the study. Here the empirical models which were used are discussed in detail. Expected outputs of the theoretical model are also presented later in the chapter.

3.1 DESCRIPTION OF THE STUDY AREA

The study was conducted in three wards (10, 11 and 12) of Karoi district. Karoi district falls under Mashonaland West province of Zimbabwe. It is located in the northern part of Zimbabwe and is approximately 210 km West of Harare, the capital city of Zimbabwe. The study area was chosen because Karoi district is the highest tobacco producing district (producing about 17 percent of total crop among 41 growing districts countrywide), with three quarters of the produce coming from the smallholder subsector having an average of 2,161kg/ha (TIMB; 2014). These three wards chosen are also situated proximity to Karoi town. This made it easier for the researcher to access transport and accommodation facilities.

Karoi district falls under natural region IIb characterised by an annual rainfall ranging from 900 to 1200mm which is adequate for tobacco production and other varieties of tropical crops. Rainfall is more reliable in the district compared to other parts of the country. The climate is generally mild to warm with temperatures reaching their peak in September and October, just before the onset of the rainy season which lasts from November to April. The soil types in this district vary from clay loam to black clay soils where the production of crops like maize, soya beans, groundnuts, and cotton, tobacco and sugar beans is also suitable.

According to the population census of 2012 (ZimStat, 2012), Karoi district had a population of 324,675 which is 11.2 percent of the country's total population. Wards 10, 11 and 12 constitute 10 percent of the total district population of 26 wards. The population density in the district was 22 persons per square kilometre, which was lower than the average national population density of 33, with an average of 4 people per household. There were 70,059

households in the district with Ward 10, 11 and 12 again constituting 10 percent of total number of households.

Crop production is the main occupations in the study area. Maize as the staple crop is tobacco's competing crop grown in the area. Other crops grown in the area are sugar beans, soya beans and groundnuts. On the other hand livestock keeping is also an important economic activity where farmers keep cattle which are used for cultivation as well as poultry. The family is the major source of labour for crop production and hiring in during peak periods is done within the wards. Land is individually owned with an average land size of four hectares per household among smallholder farmers.

Karoi district comprise mainly of smallholder farmers A1 (newly resettled farmers) and communal farmers and some large scale farms who are actively participating in tobacco production. There are 22, 432 registered tobacco growers in the district (TIMB, 2014) and also five contractors in tobacco farming namely Tianze from China, Mashonaland Tobacco Company (MTC), Tribac, Zimbabwe Leaf Tobacco (ZLT) and Curverid each having at least one extension agent responsible for crop management. More than 60% of farmers are contracted to Mashonaland Tobacco Company (MTC).

3.2 CONCEPTUAL FRAMEWORK: WELFARE UTILITY FUNCTION

In this section the relevance of choice variables that were used in modelling farmers' decisions to participate in contract farming as well as the effects of contract farming and other factors on farmer income are discussed more formally. From transaction cost economics, it can be understood tobacco crop has high degree of quality attributes requiring more transactions that drives it from spot markets to contract farming. Parties which include the firm and the farmer want to reduce transactions costs and increase benefits arising from contracting. Participation in contract farming depends on its ability to raise farm incomes, reduce cost and risk at minimum accepted levels which is implied in the contract enforcement theory.

From farmer' perspective, once presented with a contract, smallholders choose whether to accept or reject the offer. In this regard, it is possible to find some farmers deciding to participate in contract farming while other farmers may not, possibly because (i) a contract offer will be strictly inferior to a smallholder's opportunity cost from entering into such

contract, which may lead to renegotiation of contract terms or an outright rejection of the contract on the part of the smallholder; or (ii) the contract terms will yield expected welfare gains to the smallholder well in excess of the smallholder's reservation utility. This is mainly due to the fact that farmers do not have the same resource endowment; they have strictly different objectives and moreover different utility preferences. Such farmers may also have different levels of literacy and even social backgrounds. As such smallholder accepts a firm's contract offer when his subjective perception regarding his expected welfare (in terms of costs, revenue and risk reduction) level from participating in contract farming is at least as high as that of not doing so. A smallholder's participation in the contract farming does not imply, however, that he perceives the contract as fair. It merely implies that the smallholder expects to be better off with, than without the contract. In summary the decision of a farmer to enter into contract is subject to its profitability and the degree of risk and uncertainty associated with contract farming, and is highly influenced by the resource and technology requirements, the socio-economic characteristics of farmers, farmer skills and intelligence.

Therefore the probability of farmers' choice between the two mutually exclusive choices; being contracted and not contracted basing on their evaluation of utilities, as put by Umouh (2006) is given by the utility function of farmer i as $U_i(Y_i/X_{i)})$ where Y_i is a dichotomous variable denoting whether a farmer participates in contract farming. The binary choices would therefore be; 1 if farmer chooses to be contracted and zero otherwise. X_i is a vector of the explanatory variables which include resource and technology endowments, the socio-economic characteristics and unobserved skills and intelligence. The farmer will choose to participate in contract farming if such a choice implies a higher utility level compared to not participating that is when

$\{U_i(Y_i = 1; X_i) > U_i(Y_i = 0; X_i)\}$ or $\{U_i(Y_i = 1; X_i) - U_i(Y_i = 0; X_i) > 0$

Consequently, the probability that a farmer i choose to participate in contract farming is given as:

$Prob(Y_i = 1) = Prob(U_i > U_o) = Prob\{U_i(Y_i = 1; X_i) > U_i(Y_i = 0; X_i)\}$

If the farmer decides to participate or takes part in contract farming, the subjective level of welfare expected or realised by the smallholder is expected to be: First, contracting may resolve market failures by providing insurance against price risk, access to credit, access to the inputs necessary to produce cash crops and offers available information particularly the uncertainties associated with the marketing and production of high-value crops well as the

provision of agricultural extension service. Secondly farmers benefit from efficiency gains shared between them and contractors due to logistical capacity of contracting firms which may generate economies of scale or economies of scope which reduce costs. Thirdly, if the contract reduces farmer exposure to risk, it can provide smallholders with incentives to increase crop production or to invest in yield stabilizing technologies such as irrigation or yield-increasing inputs such as fertilizer or improved varieties (Liu 2010; Michelson 2010). Consequently this results in farmers' improvement in income levels, livelihoods and general welfare. Given the services provided by sponsors, perceived and accruing benefits to farmers from contracting and the legal framework within which contract farming operates, tobacco contract farming conceptual framework is presented in Figure 5 below.
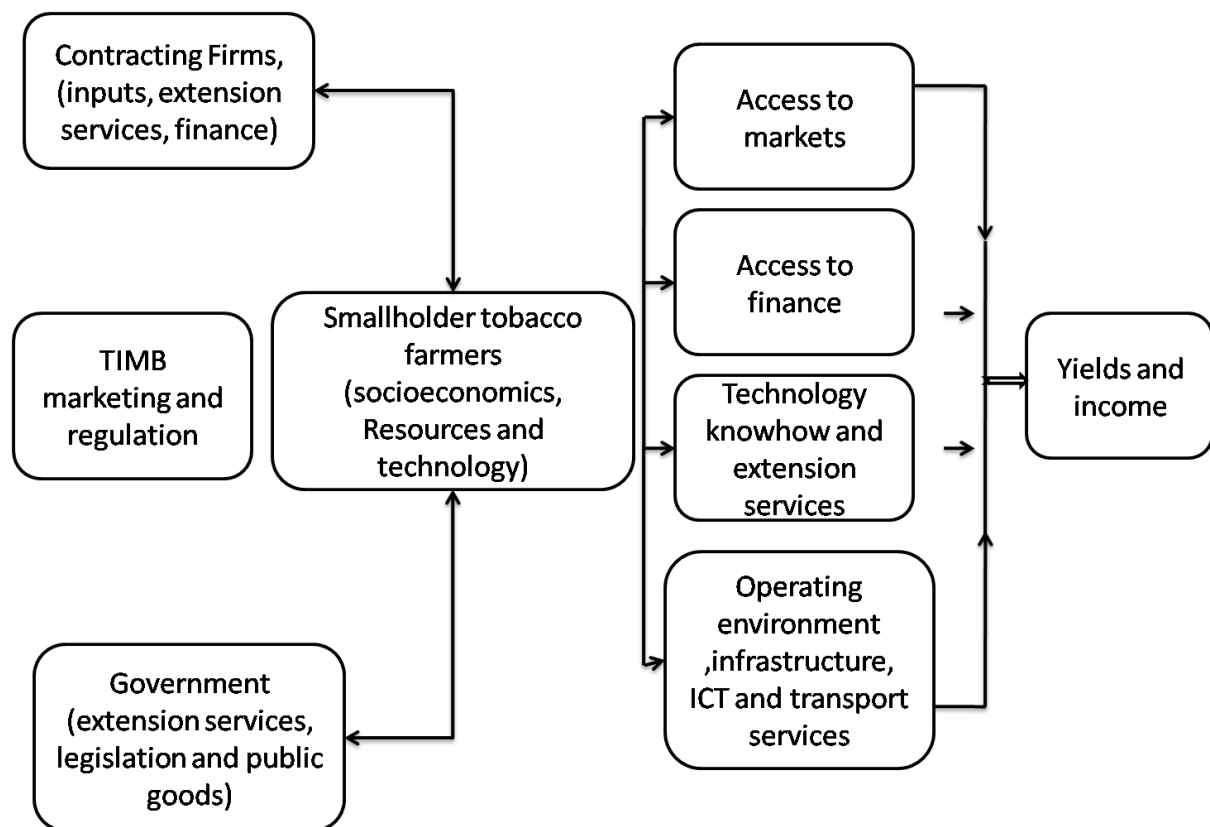
Figure 5: Conceptual framework

Source: Author's construct

3.3 ANALYTICAL FRAMEWORK

Table 3: Relationship between objectives, hypotheses, variables and method of analysis

Objective	Hypotheses	Data needs	Type of analysis
Determine the main socio-economic characteristics of contracted against non-contracted tobacco farmers in Karoi district.	Contracted and non contracted farmers differ in terms of age, number of years in formal education, farming experience, labour availability, asset ownership, income diversification.	Household data	Descriptive statistics, ratios and interactive bar graphs. Comparison of means using one way ANOVA
Estimate the extent to which socioeconomic and resource affect farmer participation in tobacco contract farming	Socioeconomic characteristics and resource endowments positively influence farmer's participation in contract farming.	Household data	Heckman's two stage model First stage probit selection
To assess the effects of participation in contract farming and other factors on tobacco net incomes.	Participation in contract farming, household demographic characteristics, and resource endowments positively influence tobacco farmers' incomes.	Household data and IMR from the selection equation	Second stage OLS regression

3.4 STUDY DESIGN AND DATA

3.4.1 Study design

The study involved a cross section survey method. By cross sectional survey, data were collected by interviewing a representative sample of tobacco growers at a single point in time i.e. in June and July 2015 when most of the tobacco crop had been sold.

3.4.2 Sampling

Multistage sampling was used. In the first stage wards 10, 11 and 12 were purposively selected. These wards have a mixture of A1 farmers, old resettlement and communal landholdings which covers the smallholder tobacco production subsector in this district. From the list in each ward two villages were randomly selected to get a total of six villages. Ultimately twenty-five households were randomly selected from a list of tobacco farmers that was obtained from TIMB for wards 10, 11 and 12. According to Boyd *et al.* (1981) a sample size of at least 5% is recommended, from a total of 2, 850 growers in these wards, a total of 150 tobacco growers was sampled.

3.4.3 Sources of data and collection methods

Data for the study were obtained from primary sources during the field survey. Primary data collection involved administering of the questionnaire (Appendix 1) to tobacco farmers with the assistance of Agritex extension officers. At each household a questionnaire was administered to the household member most knowledgeable with household tobacco farming operations. The questionnaire captured the socio-economic factors that were thought to determine the participation of farmers and aspects that affect the farmer's capacity to produce a quality crop which attracts better prices as well as improving productivity as well as income. A complete description of these factors is given in Table 4. Using one way analysis of variance, the researcher sought to check if there were significant differences between contracted and non contracted farmers in these attributes. These factors have also been specified in the probit and OLS model presented in subsequent sections. In order to check the validity of survey data, additional primary data were collected through informal discussion with key informants who include agricultural extension officers from Agritex, TIMB staff in Karoi district and tobacco contracting companies' representatives in the study area.

Table 4: Description of the variables captured in the questionnaire.

Variable	Type of measure
Dependent variables	
Farmer participate in contract farming (probit)	1= Contracted farmer 0= Non contracted farmer
Tobacco net income (OLS)	Total tobacco income less total cost of production for 2014/2015 season (costs of labour, chemical inputs, extension and marketing)
Independent variables: Household demographics	
Gender	1= Male 0= Female
Age	Grower' age
Marital status	1=Married 2= Widowed 3.= Divorced 4.Single
Family size	Number of full time family labour- adult equivalents
Education level	Number of years in formal education
Farming experience	Years of farming
Tobacco farming experience	Years of growing tobacco
Group membership	Number of groups a household is a member
Extension	Number of extension visits
Farm assets and use of hired labour	
Farm size	Number of hectares owned
Fertiliser use	Cost of fertiliser used per hectare
Use of hired labour	Number of part time workers employed per hectare
Use of permanent labour	Number of full time paid workers employed
Cattle ownership	Number of cattle owned
Other asset ownership	Number of other agricultural assets owned beyond manual tools
Income diversification options	
Income diversification options	1= Has either income from livestock, self or wage labour 0= Otherwise
Food crop income	Amount of income realized/expected from maize grown in 2014/2015 farming season

3.5 ANALYTICAL TECHNIQUES

Data were analyzed using descriptive statistics and econometric models using the statistical packages for social sciences (SPSS version 16). These tools are discussed below in detail.

3.5.1 Descriptive statistics

In order to test the first hypothesis raised in chapter 1, the comparison of contracted against non contracted tobacco farmers was done by summarizing descriptive statistics from the survey and means were compared using one way analysis of variance. The one-way analysis of variance (ANOVA) proposed by Ronald Fisher in 1918 has gained popularity in most social sciences statistical research. ANOVA is used to determine whether there are any significant differences between the means of two or more independent groups. Unlike the t-tests which are limited to two groups with increased chances of committing statistical type 1 error (false positives) when multiple two sample t tests are performed, ANOVA can be useful for testing three or more means of groups or variables for statistical significance.

The ANOVA tests the null hypothesis that those samples in two or more groups are drawn from populations with the same mean values by making two estimates of the population variance. It produces an F-statistic which is the ratio of the variance calculated among the means to the variance within the samples. If the group means are drawn from populations with the same mean values, the variance between the group means should be lower than the variance of the samples, following the central limit theorem. A higher ratio therefore implies that the samples were drawn from populations with different mean values. Statistically significant differences are shown by highest F values.

ANOVA is more suited to normal data, assumes independent samples and population of equal variances. Due to its ability in performing multiple sample comparison it has become the most useful technique in the field of statistical inference. ANOVA is also widely used because it is computationally elegant, more adapted to the analysis of a variety of experimental designs and relatively robust against violations of its assumptions. The major limitation of ANOVA is that it does not tell us which specific groups significantly different from each other when three or more groups are compared. It is also limited to work with normal data which is often difficult to find in reality.

Interactive bar graphs were also used to show the average household income, tobacco income, costs and profits per hectare of contracted and non contracted farmers so as to

deduce viability of tobacco production under contract farming. Ratios were also calculated to bring the contribution of tobacco to total household incomes which have implications on the importance of tobacco as a crop to rural households.

3.5.2 Regression analysis

The ability to choose an appropriate econometric model is mainly based on the nature of the dependant variable. In this context, the dependent variable, farmer participates in contract farming is binary in nature, which implies a farmer is either contracted or not one contractor during the period under review. This renders the classical linear methods inappropriate for dichotomous choices since they can lead to heteroscedasticity variances with choices often geared more towards the probit, logit or binary logistic models with flexible functional forms in the independent variables.

In this study, the probit model and OLS regression are incorporated together in a two-stage Heckman's model. The first stage which uses the probit model is used to estimate the influence of independent variables on the probability of farmer participating in contract. In this model the dependent variable is farmer's participation in contract farming. The probit model is preferred in this study because it assumes that the error terms are normally distributed, one of the assumptions underlying Heckman's model. Further it computes another explanatory variable termed lambda or inverse mills ratio (IMR) which corrects possible selection bias associated with the effect of other unobservable characteristics. Lambda is inserted as an extra explanatory variable in the OLS regression to estimate the effect of contract farming and other factors on income. Agricultural performance is normally measured by yields per hectare while quality is measures by the price per kilogram. In the OLS regression net income per hectare was used as the dependent variable as a measure of agricultural performance.

(i) **Probit regression**

Given the binary nature of the dependent variable and a set of explanatory variables in Table 4 above, the probit model is stated as:

$$\alpha_i = \beta x_i + e_i, \quad E(e_i \, I \, x) = 0, \quad e_i \sim N(0,1) \dots\dots\dots\dots\dots\dots\dots\dots\dots. [3.1]$$

Where α_i is a dummy for contract farming participation $\alpha_i > 0$ if farmer participates in contract farming and $\alpha_i = 0$ otherwise. The probability of participating in contract farming as provided by Sambuo in 2013 is given as:

$$P_i = \Pr(\alpha = 1) = \Pr(\alpha^* \geq 0) = \Pr(\beta x_i + \varepsilon_i \geq 0) = \Pr \varepsilon_i \geq (\beta x_i) = 1 - \emptyset(-\beta x_i)$$

$$1 - \int_{-\infty}^{(x_i\beta} \frac{1}{\sqrt{2\pi}} e^{\frac{t}{2}} dt \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [3.2]$$

The ratio of the probability's partial derivation Pr ($\alpha = 1$) towards x_i is estimated for the interpretation of β and is given as:

$$\frac{dPr(\alpha = 1/x)}{dx_{ik}} = \frac{dE(y_i/x)}{dx_{ik}} = \emptyset(x_i\beta)) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [3.3]$$

And Φ is the cumulative distribution function of the standard normal distribution. B quantifies the influence of the independent variables on the probability that the farmer participates in contract farming.

(ii)   **OLS regression**

According to Gujarati (1995), the OLS technique is commonly used in estimating linear-single equation models. The OLS estimation requires selecting a population parameter estimator such that the ordinary sum of squares of errors is minimized. Errors are defined as the difference of observed values; say Xi and the expected value of the variable X or the population of parameter. The OLS estimation technique is simple to use and leads to the best linear unbiased estimator and hence its popularity in applied econometrics (Gujarati, 1995).

On examining factors influencing income or welfare effects of CF among respondents, there is a selectivity problem. Heckman's self selection specification assumes that the error terms of the *participation* and the extent of *income* from participations are correlated and that *income* earned dominates the *participation* decisions. As provided above the probability of participating *(w)* in contract farming is estimated from the following equation:

$$w = \beta x_i + \varepsilon_i, \qquad E(\varepsilon I x) = 0, \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [3.4]$$

If w> 0, then $\alpha = 1$, if w≤ 0, then $\alpha = 0$ where β is the probability that a variable x_i has in influencing farmer's decision to participate in CF. And income earned is given by:

$$y_i = \gamma z_i + u_i, \quad E(uIz) = 0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [3.5]$$

Where y_i is the level of net tobacco income per hectare of respondent farmers, z_i is a vector of variables assumed to affect the income, and ε_i and u_i are disturbance terms. The model assumes that $u_i \sim N(0,1)$, $\varepsilon_i \sim N(0,1)$ and corr $(u_i, \varepsilon_i) = \rho$. Correlation between the error terms ε_i and u_i causes the sample selection bias. To see how the selection bias occurs, let us assume that (ε_i, u_i) are independent of *x*. By taking the conditional expectation of *(3.5)* on *x* and ε_i and considering that *z* is a subset of *x*, we have;

$$E(y_i I z_i, \varepsilon_i) = \gamma z_i + E(u_i I x_i, \varepsilon_i) = \gamma z_i + E(z_i I \varepsilon_i) \ldots\ldots\ldots\ldots\ldots\ldots\ldots [3.6]$$

Note that $E(y_i I z_i, \varepsilon_i) = (E(u_i I, \varepsilon_i)$ because (u_i, ε_i) is independent of x. It follows that if $(u_i$ and $\varepsilon_i)$ are jointly distributed with zero mean, then $E(u_i I \varepsilon_i) = \rho \varepsilon_i)$ for some parameter ρ, and replacing this in (3.5) we have;

$$E(y_i I x_i), \varepsilon_i = \gamma z_i + \rho \varepsilon_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots [3.7]$$

Although we do not observe ε_i, we can use this to compute $E(y_i I x_i)$ and get

$$E(y_i I x_i) = \gamma z_i + \rho E (\varepsilon_i I z_i) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots [3.8]$$

Considering the fact that ε_i has a standard normal distribution, it can be shown that $E(y_i I x_i)$ is simply the non-selection hazard, what Heckman (1979) referred to as the Inverse Mills´ Ratio (IMR), $\lambda(\beta x_i)$. Thus;

$$E(y_i I x_i) = \gamma z_i + \rho \lambda (\beta x_i)) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots [3.9]$$

Equation (3.9) indicates that the expected value of the income $(y_i,)$, given the set of characteristics (x_i), is equal to γz_i plus the IMR evaluated at βx_i. Thus, the inverse Mills ratio from the first stage enters as a regressor in the *income* equation (result equation).

$$E[w_i I y_i > 0] = E[w_i I\varepsilon_i - \beta x_i = \gamma z_i + E[u_i I\varepsilon_i > \beta x_i = \gamma z_i + (\rho\sigma u)\lambda \dots\dots\dots\dots [3.10]$$

The inverse mills ratio, IMR (λ) is obtained from these estimates for each observation as $\frac{\emptyset(x_i\beta)}{\vartheta(x_i\beta)}$ where $\emptyset(x_i\beta)$ and $\vartheta(x_i\beta)$ is the normal density and distribution functions, respectively. Equation (3.4) is estimated as a probit regression and then λ (IMR) is estimated, which enters equation (3.5) Giving the following equation;

$$y_i = \gamma z_i + \sigma\alpha + a\lambda + \varepsilon_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots [3.11]$$

This is estimated by OLS model. The $a\lambda$ term corrects the self selection bias, σ estimates the influence of contract farming participation on income and α represents participation in CF. The parameter ρ in equation (3.10) defines the selection bias. If $\rho=0$, OLS of y on x using the selected sample gives consistent estimates of γ. Otherwise, if $\rho\neq0$, we have omitted a variable that is correlated with z_i. As pointed by Heckman (1979), the presence of the selection bias can be viewed as an omitted variable problem in the selected sample. The parameter ρ will be equal to zero when $(u_i$ and $\varepsilon_i)$ are uncorrelated. The probit equation is therefore simplified as;

w$_i$ = β_0 + β_1 Age + β_2 gender + β_3 family labour + β_4 hired labour + β_5Hired labour + β_6 experiences + β_7 cattle ownership + β_8 other asset ownership + β_9 dummy for income diversification ……….. [3.12]

Where w$_i$= 1 if farmers participates in contract farming, 0 otherwise βs are estimation parameters. The result (income) equation is simplified as;

$Y_i = \gamma_0 + \gamma_1$ Age $+ \gamma_2$ gender $+ \gamma_3$ family labour $+ \gamma_4$ hired labour $+ \gamma_5$ farm size $+ \gamma_6$ fertiliser use $+ \gamma_7$ experience $+ \gamma_8$ maize income $+ \gamma_9$ cattle ownership $+ \gamma_{10}$ other asset ownership $+ \sigma$ contract participation $+ \gamma_{11}$ income diversification $+ a$IMR...[3.13]

Where net income (Y_i), is hypothesized to be affected by other factors, farmers participation in contract farming, IMR and γ, σ and a are estimation parameters.

3.6 EXPECTED OUTPUT OF THE THEORETICAL MODEL

Socio-economic characteristics of smallholder farmers such as gender, age, education level, farming experience, extension contacts, labour availability, asset ownership and diversification into off employment are hypothesized to influence farmer participation in CF. The table below shows the expected effect of the choice variables on the probability of farmer's decision to participate in contract farming.

Table 5: Hypothesized determinants of contract farming participation by smallholder farmers

Variable	Expected sign	Economic rationale for selecting variable
Age	-	The older the farmer the lower the probability of being contracted because older farmers are risk averse.
Gender **1= Male** **0=Female**	+	Male farmers are more likely to be contracted because they have broader source of income, land and labour supply.
Marital status **1= married** **0= single**	+	Married households have a lot of responsibilities that give them high chances of being contracted.
Family size	+	Large head size has labour available during peak demands.
Farm size	+	Large land sizes demand more inputs hence farmers will need additional inputs
Number of years in formal education	+	Education provides access to information and increases the chances to adapt to new activities.
Self employment **1=self employed** **0=not self employed**	-	Self employed farmers are less involved in contract farming due to constraints in labour.
Number of extension visits	+	Extension agents increase information flow and therefore increase the probability of being contracted
Farmer experience in tobacco	+	Low risk aversion in experienced farmers, the more time spent in tobacco production, the more they become contracted
Ownership of cattle and other agricultural assets	+	Farmers will invest more if they have more resources at their disposal and able to repay loans.
Number of farm groups	+	Farm group is accredited with collective agreements during contracting, bargaining power and attain crop insurance.

Table 6: Hypothesized determinants of farmer incomes.

Variable	Expected sign	Economic rationale for selecting variable
Age	+	The older the farmer the more experience gained hence more income
Family size	+	Tobacco demands more labour which increases yield
Farming experience	+	the more time spent in farming production, the more the farmer produces
Tobacco experience	+	the more time spent in tobacco production, the more the farmer produces
Number of extension visits	+	Adequate training and information increases incomes
Fertilizers use	+	More use of inorganic fertilisers increases yield
Farm size	+	Farmer with more land have the capacity to produce more
Hired labour	+	Tobacco demands more labour which increases yield
Agricultural asset	+	Farmers endowed with more agricultural assets tend to produce more
Food crop income	-	Farmers who get more income from food crops have limited time and resources for cash crop production.
Contract farming	+	Contract farming improves farmers' access to chemical inputs, extension and credit which are important for increased farm incomes.

3.7 LIMITATIONS OF ECONOMETRIC MODELS AND DATA COLLECTION

Sambuo (2013) stated that although the estimation of Heckman's two stage model using maximum likelihood (ML) estimator exhibits better statistical properties, ML estimator is more computationally difficult to implement. Again if the model's assumption of normality among error terms fails, the model suffers from giving inconsistent estimators and misleading inferences where small samples are used. Bushway at al (2007) points that the covariance matrix generated by OLS estimation of the second stage may be inconsistent which can be corrected by re sampling.

The study was limited to grower's inability to recall the past events in giving correct accounts of household production and marketing data such as actual area cultivated, quantity of inputs used and the average selling price of tobacco due to poor record keeping techniques. Extension agents had to be consulted in areas where records of farmers were not available, and a lot of cross check questions were employed so as to confirm the given information. Despite this major limitation, the researcher is confident that the data collected are reliable to address the objectives set for the study.

CHAPTER 4: CHARACTERISTICS OF CONTRACTED AND NON CONTRACTED TOBACCO FARMERS

4.0 INTRODUCTION

This chapter is a descriptive summary of the sampled farming households. It tests the first hypotheses raised in chapter one. The chapter specifically presents the mean values for three types of household level variables: demographic characteristics; farm assets and use of hired labour and the levels of crop income as well as discussing them. The chapter further compares contracted and non contracted farmers' sources of inputs. Mean comparison of household income, production costs and profits per hectare are shown in graphs. Ratios are also calculated and compared for tobacco incomes, costs and profits again per hectare basis.

4.1 FARMER CHARACTERISTICS

4.1.1 Comparison of household demographics

The selected variables for this study included three types of household level variables: demographic characteristics; farm assets and use of hired labour; and levels household income and tobacco income, costs and net income per hectare. A summary of the mean values of these characteristics is presented in Table 7. The mean values are the average values of independent variables for the sample population, contracted versus non contracted farmers. The F-test and the p-value assess whether or not the means of the contracted and non contracted farmers are statistically different from each other. If the p-value is less than 0.05, accompanied by a large F value, the difference between the means of the two groups of farmers is significant, but if it is greater or equal to 0.05, the difference between the two means is considered not significant.

Table 7: Comparison of mean values for selected variables.

Variable	All farmers(N=150)	Contract (N=99)	Non contract (N=51)	Statistic between contracted and non contracted farmers	
				F-test	**p-value**
Demographics					
Male (%)	84	95	41	0.812	0.475
Female (%)	16	5	59	2.263	0.126
Grower's age	41.92	42.04	41.8	0.100	0.753
Labour adult equivalents	4.4	4.5	4.3	0.914	0.341
Number of years in education	8.98	9.34	8.63	0.100	0.753
Farming experience	16.2	17.4	15.01	4.715	0.031[**]
Experience in tobacco	5.36	6.81	3.92	24.571	0.000[*]
Farm assets and use of hired labour					
Farm size	4.23	4.6	4.2	0.31	0.827
Hired labour (% using)	51.37	71.79	30.95	18.87	0.000[*]
Cattle ownership	4.5	4.6	4.3	0.211	0.647
Other asset ownership	0.7	0.8	1.2	18.94	0.049[**]
Fertiliser cost	1076	1379	606	20.53	0.000[**]
Income diversification (%)					
Income from livestock	75.0	72.98	76.15	0.910	0.354
Self employment income	47.1	50.15	43.85	0.626	0.459

Level of significance at [*] 1%; [**] at 5 % level;

Source: Karoi district study survey, 2015

From the summary of survey data given in Table 7 above, 66 % of the sample population were contracted farmers, 95 % of them are males indicating a higher participation rate from males. Non contracted farmers constitute 34% of the sample population, and 41 % of them are females. The sample population had 84% of males and 16% of females. Though gender is not statistically significant, the likelihood for female headship was relatively higher among non contracted farmers.

Results from the table also indicate that contracted farmers and non contracted farmers are not statistically different in terms of other demographic characteristics such as household size, labour endowments, education, and age of the head. The education level for contracted farmers' is on average 9.34 years and 8.63 years for non contracted. Although this is the case, an educated household head is more likely to make informed decisions compared to an uneducated person (Morris, 2001). The average age of the growers is 42.91 years across the three wards. The average age of the grower for contracted farmers and non contracted farmers is 42.02 years and 41.8 years respectively. Also, differences are not statistically significant for the use of animal traction (number of cattle owned), and the rate of diversification into livestock and self-employment nonfarm activities. Family labour availability is statistically not significant with households across the sampled districts having an average of 3.38 labour units.

Statistically significant differences exist for variables such as farming experience, tobacco farming experience, availability of permanent labour, other assets ownership, and cost of fertiliser. On average, tobacco growers have been engaged in farming for about 15 years. Contracted farmers' experience in farming (17.14 years) is higher than that of non contracted (12.6 years) and of all the sample farmers. The probability that farming experience positively influence farmers participation in contract farming is therefore expected to be positive. Tobacco farming experience is higher in contracted farmers (6.81 years) than in non contracted farmers (3.72 years). As expected contract tobacco growers are twice as likely to hire permanent labour. Again non contract growers significantly own a greater number of other agricultural assets (motorcycles, grinding mill and water tanks) than contracted farmers although asset ownership is assumed to reduce the risk associated with participation in contract farming arrangements thereby influencing farmers to take part in contract farming. The relationship between asset ownership and contract farming membership therefore may not be positive. Results also reviewed that fertiliser use among contracted farmers is significantly higher among non contracted farmers than non contracted farmers when the cost of fertiliser was used as a surrogate for fertiliser use.

4.1.2 Sources of inputs for contracted and non contracted farmers

As shown in Table 7 the use of fertiliser is higher among contracted farmers and statistically different from non contracted farmers. The quality and quantity of fertiliser and chemical

used by the farmer determines the quality of leaf brought to the market which will also determine the price that will be paid. Limited resources expose farmers to the risk and temptation of using low quality and forbidden fertilisers. The sources of inputs for farmers are shown in Table 8.

Table 8 Sources of inputs

Responses (%)	Contract only	Contract + self	Self only	Total
Contract farmer (n=99)	77	23	0	100
Noncontract farmer (n=51)	0	0	100	100

As shown in Table 8, 76 percent of contracted farmers obtained inputs from contracts only, while 24 percent of them added to contract inputs and all non contracted farmers financed their inputs from personal resources. This increases the chances of using poor fertilisers among non contracted farmers which may result in the difference in incomes. The types of inputs provided by contracting firms include coal to curb firewood shortages, fertilisers in the form of compound L, herbicides, pesticides, extension services and in some cases cash for labour. Provision of inputs is important for the quality and yields of the crop. Fertiliser use and number of extension visits were used as explanatory variables in determining farmer incomes.

4.1.3 Comparison of income

Total household incomes of contracted and non contracted farmers were also computed and compared. These incomes came from various sources; the sale of tobacco, food crops and self employment. Graphical comparison of total household incomes is given in Figure 6.
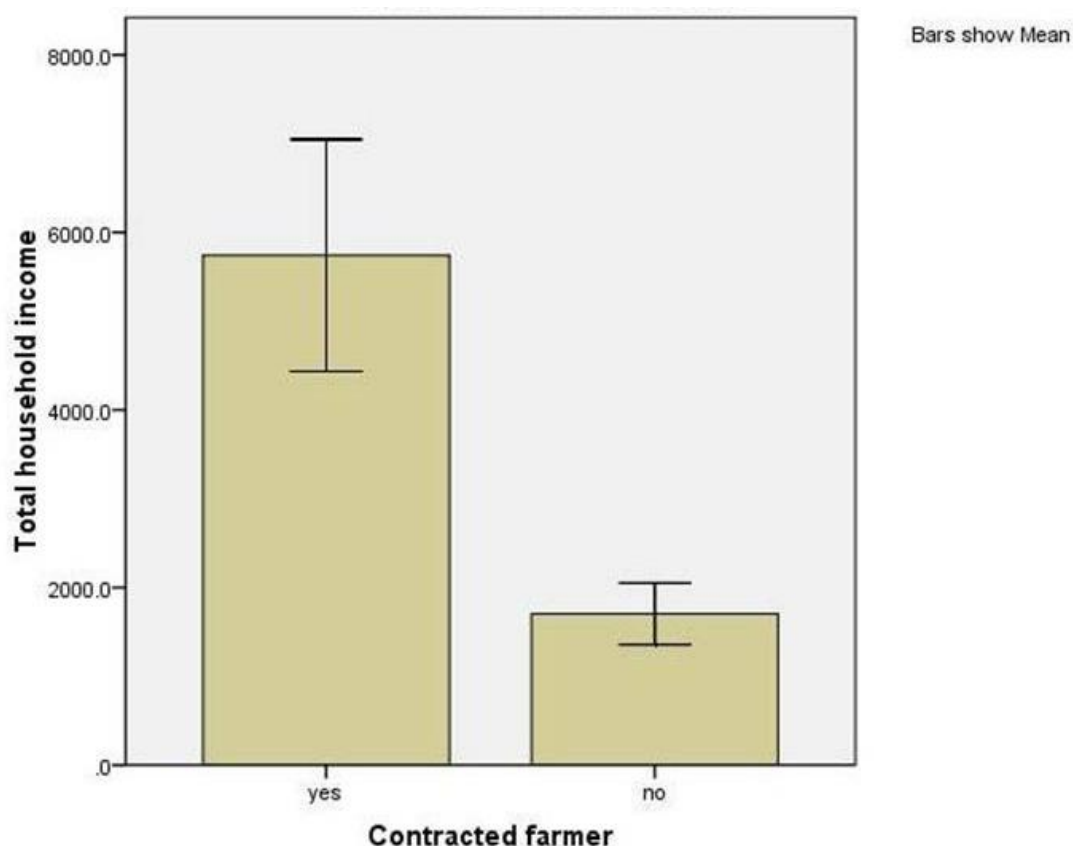
Figure 6. Comparison of total household income of contracted against non contracted tobbaco farmers

As shown in Figure 6 contracted farmers have significantly higher total household incomes averaging $5,741compared to $2,018 among non contracted farmers. However there is much variation in total household incomes within groups. Since some contractors provided cash to pay for labour, income from wage labour employment and total tobacco incomes per hectare of contracted and non contracted farmers were also compared as part of household income and the results are illustrated in Figure 7 and 8 respectively.
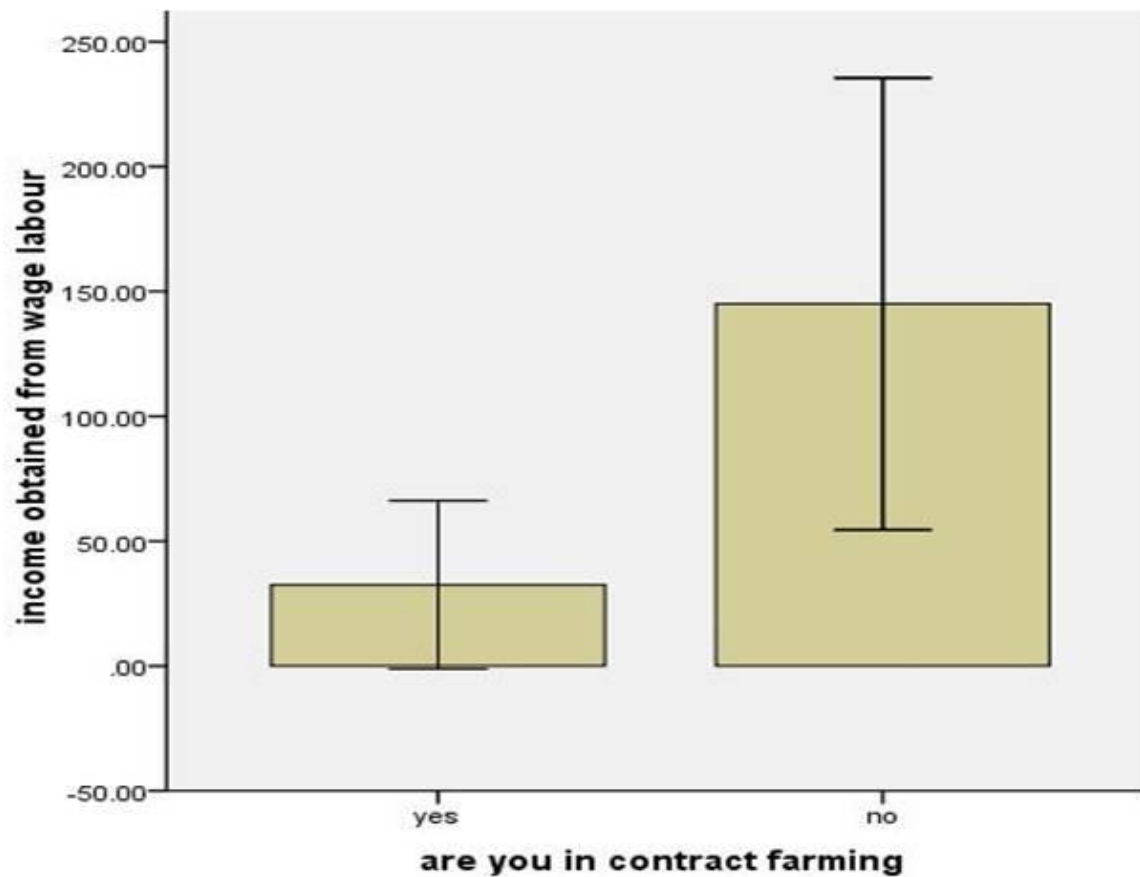
Figure 7: Comparison of income from wage labour employment for contracted and non contracted farmers.

Availability of wage labour income is significantly higher among non contracted farmers. As shown in Figure 7, non contracted farmers realise an average of $158 from wage labour employment than contracted farmers whereas mean wage labour income among contracted farmers are below $25. Non contracted farmers provide labour for contracted farmers during peak labour requirements.
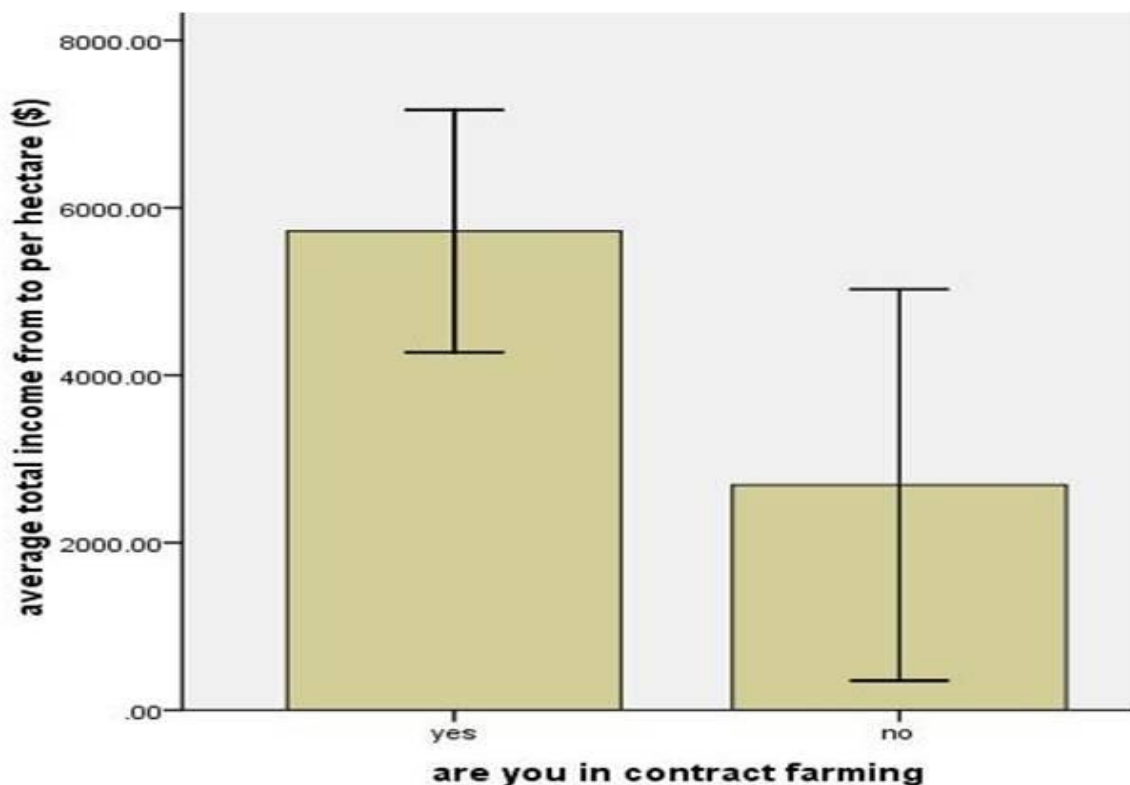
Figure 8 Average incomes of tobacco farmers per hactare for contracted and non contracted farmers

Again average income per hectare realised from tobacco by contracted tobacco farmers and non contracted farmers, as shown in Figure 8 were $5,035 and $1,298 respectively. None overlapping of the error bars means that the differences in their income are statistically significant. Further we want to see the contributions of tobacco income to total household income. The ratios are shown in Table 9 below.

Table 9: Tobacco- household income ratio and Income cost ratio

Variable	Contracted farmer	Non contracted farmer
Tobacco- household income ratio	0.90	0.64
Income -cost ratio	2.64	1.75

From the ratios in Table 9, tobacco contributes 90% to total household income among contracted farmers and 64% to household incomes of non contracted farmers. Comparing this to wage labour income it implies that non contracted farmers are employed by their

counterparts during peak periods neglecting their own fields such that the incomes they get is more than offset by the incomes obtained by contracted farmers from their tobacco. As a result contracted farmers will still have more in terms of total household incomes.

The analysis further makes a comparison on the viability of tobacco production under contract and non contract. Costs of producing tobacco per hectare (labour, fertilisers, wood, coal, chemicals, and transport) were computed and subtracted from the total tobacco income per hectare. Results showing costs and net tobacco income per hectare of contracted and non contracted farmers are shown in Figures 9 and 10 below.
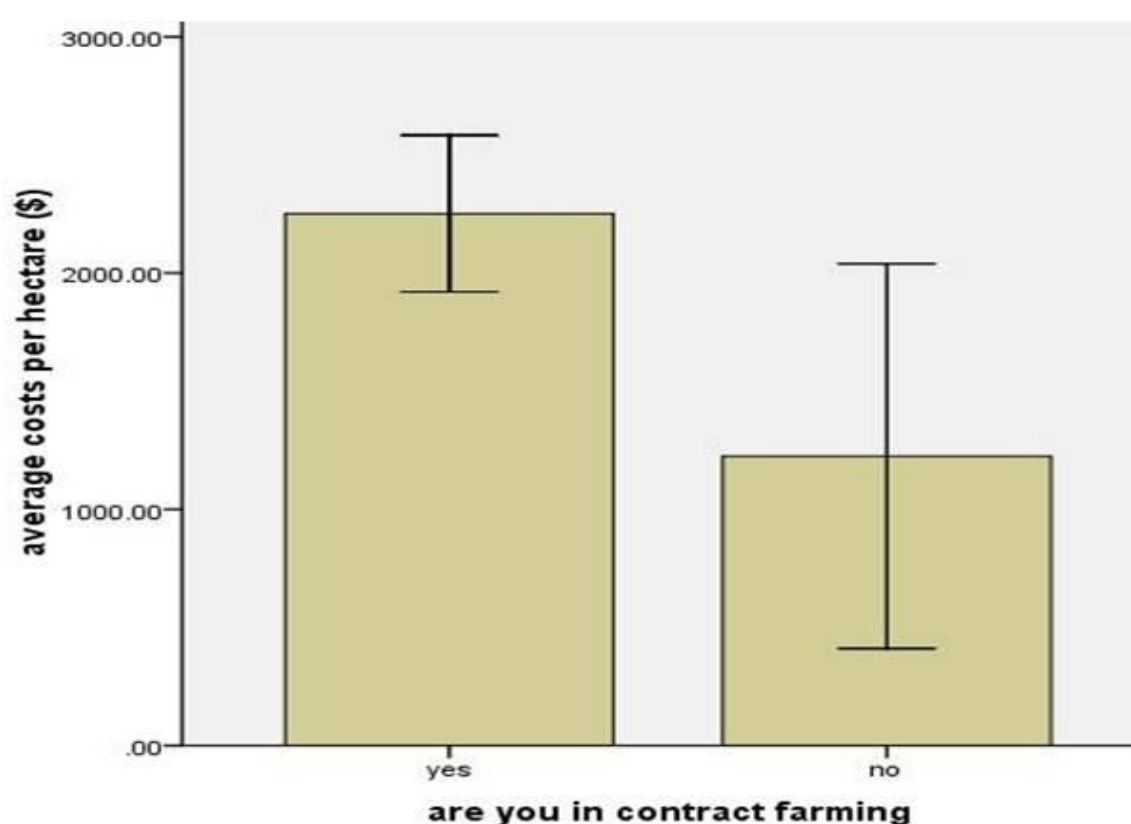
Figure 9: Average costs of producing tobacco per hectare among contracted and non contracted farmers

As shown in Figure 9 the average costs incurred per hectare by contracted and non contracted farmers are $2,256 and $1,304 respectively. The differences in costs are attributed to the fact that contracted farmers employ more inputs that non contracted farmers since they have access to inputs on credit especially fertilisers and coal compared to non contractors. Contracted farmers get inputs such as coal, seed herbicides, bailing bags pesticides and

money for labour (average $250) and extension services at a cost. An interest is also charged on part of inputs provided averaging 2 percent of total costs. Although the costs of contracted farmers seem to be high above those of non contract, contracted farmer are also far much better than non contracted farmers in terms of net tobacco income per hectare after deducting costs from total income. These results are illustrated in Figure 10.
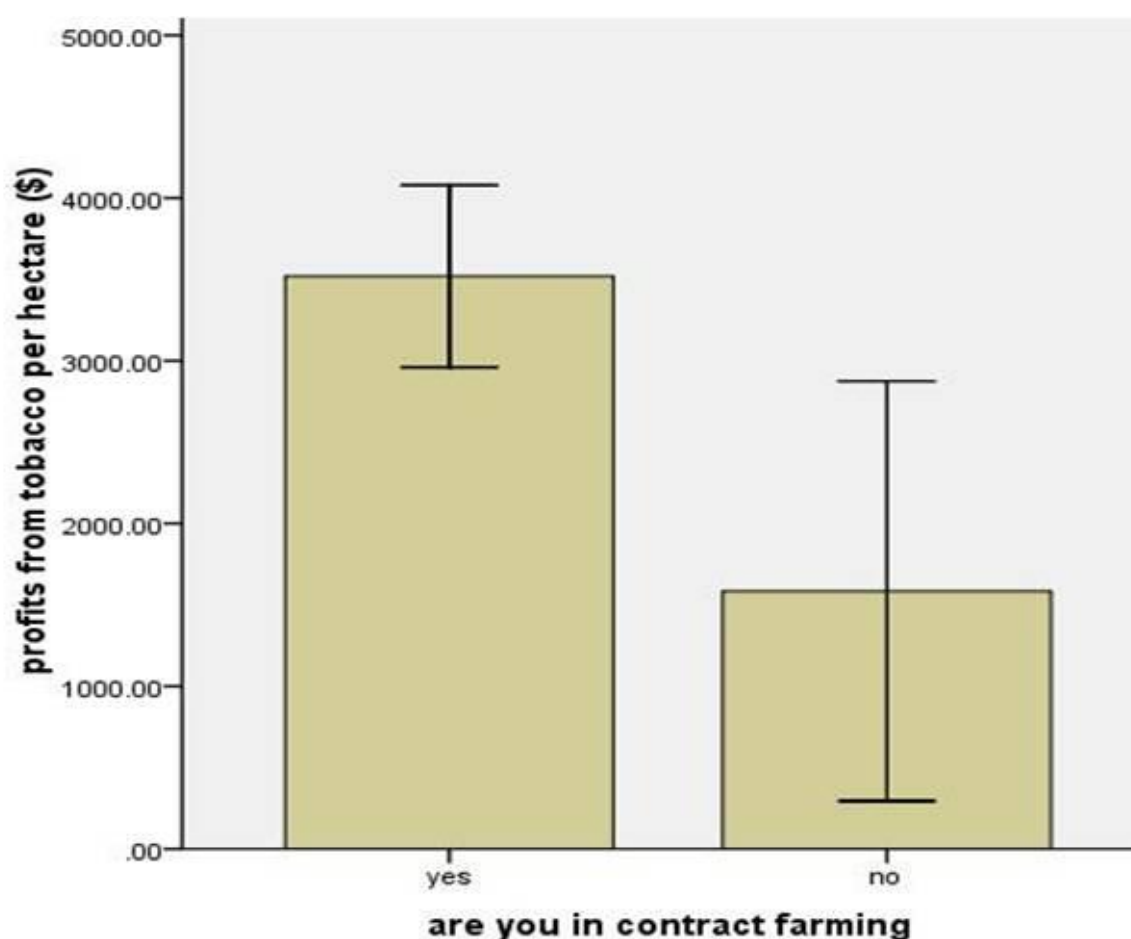
Figure 10: Net income per hectare for contracted and non contracted tobacco farmers

As shown in Figure 10 contracted farmers have significantly higher net incomes per hectare averaging $3,490 than non contracted farmers who average $1,560. After deducting the cost of producing tobacco, the profits of contracted farmers are twice as much as those of non contracted farmers. As reflected by the income cost ratio in Table 9, for every dollar spend on production, contracted farmers get $2.64 which is higher than that for non contracted farmers who get $1.75. Although contracted farmers have twice as much profits as that of non contracted farmers this does not tell us much about the contributions of contract farming to net income. This is discussed from regression results in section 5.2.

CHAPTER 5: FACTORS INFLUENCING PARTICIPATION AND PERFORMANCE IN CONTRACT FARMING.

5.0 INTRODUCTION

In this chapter estimation and discussion of the determinants of farmer's participation in contract farming and the effects of contract farming and other factors on tobacco incomes are presented.

5.1 DETERMINANTS OF FARMER PARTICIPATION AND PERFORMANCE IN CONTRACT AND NON CONTRACT FARMING

5.1.1 Probit selection of factors influencing participation in contract farming

The farmer participation equation (3.4) is estimated using the entire sample. The dependent variable is a dummy equal to 1 for a contracted farmer and 0 otherwise. It is assumed that the probability of participating in contract farming is affected by demographic factors, asset and factor endowment and income diversification factors as hypothesised in Table 6. Probit analysis result shown in Table 10 show the probability that the factor affect participation in contract farming and provides the IMR for the second stage analysis. The sign of the coefficient gives the direction of the probability of the independent variable on contract farming participation. The variable is significant if the corresponding p-value is less than 0.05.

Table 10: First Stage Probit Analysis

Dependent variable: Contract farming membership			
Independent Variables	**B-value**	**Standard error**	**p-value**
Household demographics			
Gender 1= Male 0= Female	-0.191	0.191	0.826
Age	-2.214	0.882	0.017[**]
Marital status 1= Married 0= Single	0.31	0.662	0.018[***]
Number of years in formal education	0.924	0.357	0.159
Labour adult equivalents	1.198	1.35	0.020[***]
Farming experience	0.016	0.021	0.433
Tobacco farming experience	10.4	1.008	0.000[*]
Number of farm groups	0.215	1.112	0.031[**]
Farm assets and hired labour			
Farm size	-1.71	0.123	0.397
Cattle ownership	0.017	0.085	0.834
Otherasset ownership	-0.282	0.720	0.000[*]
Income diversification			
Has livestock income	1.49	0.126	0.971
Has self employment income	-7.41	1.32	0.026[***]
Has wage labour income	-0.326	0.062	0.842

[*] Level of significance at 1%; [**] at 5 % level; [***] at 10 % level; $R^2 = 0.73$

Source: Karoi district study survey, 2015

From the analysis marital status, family size, number of years in growing tobacco and number of farm groups had significant positive influence on farmer participation in cash crop contract. Farmers' age and availability of off/non farm income had significant negative influence on contract farming participation. Though positively influencing participation in contract faming, education, number of years in farming, cattle ownership and livestock income did not have significant positive influence. On the other hand, possession of wage labour income has a negative influence on participation which is not significant.

While point estimates indicate that female headed households are less likely to engage in tobacco contract production, the statistical significance of that result is also not strong. The negative coefficient of farm size is not significant and is silent in relation to participation in contract farming. This indicates growers own plenty of land areas which are not effective on influencing farmers to participate in contract farming.

Farmer's age had the expected negative and significant influence on the chances of farmers participating in contract farming. The negative sign for the age variable could be understood from the commonly observed negative correlation between the age and adoption decision for most technologies in dynamic economic environments. In other words, younger farmers tend to be more willing to adopt than their older counterparts. With increase in age farmers tend to abandon tobacco contract for less demanding cropping systems with low transactional cost associated with them. Furthermore, older farmers tend to be risk averse and may avoid contract farming in an attempt to avoid risk associated with the initiative (Rugimbana, 2008). The results however contradicts with Norsidia (2007), who observed that chances in participation in contract farming increases with age because youths have little appreciation on the importance of agricultural activities in most rural set ups and will not take marginal effort to expand these activities. He also added that older farmers are more experienced which allows them to assess the attributes of an improved technology relative to younger household head.

Marital status is positively associated with higher probability of participation which is consistent with apriori expectations. Married household heads are more likely to participate in contract farming. The probability of participating in contract farming amongst married household heads is 0.31 higher than single household heads at $P<0.05$. Although, unmarried household head may also have a higher probability of participation in contract farming due to perceived benefits associated with such initiatives as well as availability of time as the main motivation, this seems not to matter in their willingness to participate. Married farmers have the capacity to share ideas and also lots of responsibilities which includes ensuring the well-being of the household members. These responsibilities largely influence the household head to participate in development projects that will impacts positively in their income levels.

Household's labour availability was expected to positively affect the farm household's decision to participate in contract farming. Number of adult labour equivalents was

introduced into the model to indicate the status of labour availability in the household. The variable had a positive and significant effect on the participation decision as expected. This greatly reflects on the high labour requirements of tobacco production as compared to other crop enterprises. The higher the effective labour available the more likely the household is to be contracted since chances of labour shortages during peak times are low. This enhances the chances of favourable yields and ability to repay the contractor. The results are however inconsistent with a study on accessibility of microcredit on rural households in China conducted by Hu et al. in 2011 that found a negative relationship between household size and credit access by arguing that large households tend to have low repayment capacity resulting from the smaller future expected income per capita which lowers the probability of borrowing.

As per apriori expectations, duration of growing tobacco is found to have a highly significant positive influence (at $p<0.01$) on the farmers' decision to participate in contract farming. This means that, the more time spent in tobacco production, the more farmers become contracted in tobacco farming. In the context of the study, most farmers had on average five seasons under contract. The positive attribution can be due to the fact that contracting firms mainly looked at production history as part of their selection criteria. Upcoming farmers who are not yet registered with TIMB are not eligible to get contracts, at the beginning they use the usernames of the registered farmers until they are members of TIMB in possession of a growers' number when they will be able to enter into contract farming arrangements. However, Mudiwa (2011) argued that the greater the experience in a certain farming enterprise, the lesser the probability of partaking a new production venture introduced in enhancing it. He added that farmers adopt a technology on the basis of perceived benefits of the technology. If there are no or few benefits, farmers will not adopt the technology as such they will adhere to their old and familiar methods of input procurement. However the current situation of liquidity challenges and market failures in Zimbabwe has caused banks and micro financial institutions to shun lending opportunities to farmers even though farmers may have previously benefitted from them. The only option available for farmers is contract farming despite the number of years engaged in growing tobacco.

A very strong relationship exists between ownership of other agricultural assets beyond manual tools and the probability of not participating in contract farming. Asset ownership such as possession of grinding mills, tractors and motor bikes is negatively related to

participation in contract farming. A unit increases in the number of assets acquired decreases the chances of participating by a factor of 1.326. The more assets a household acquires, the lesser the household is likely to participate in contract farming. Tobacco production requires intensive use of agro inputs for its production and these inputs are mainly fertilizer and agro chemicals which all are either purchased by cash or obtained through contract farming as inputs on credit. Small holder farmers in possession of other productive assets would therefore need to have sufficient inputs to augment their already acquired inputs and maximising economies of scale. This is only possible for those farmers who are not budget constrained, since the cost of inputs are very high, otherwise such farmers with such assets would definitely need input on credit to meet their production needs. However current results reflect otherwise, the negative coefficient implies the reverse relationship that farmers in possession of other productive assets are less likely to participate in contract farming. This might be true because these farmers are also rich farmers in rural areas having sufficient liquid financial assets and who are thought to have many sources of finance, and therefore are liquid enough to self finance agricultural activities. Such farmers may not need input credit for tobacco production. In this case we reject our assertion that, farmers will invest more if they have more resources at their disposal and are most likely to adopt input credit.

In relation to possession of other assets above, on average, well-to-do farmers are less likely to participate in tobacco contract. In the context of the study the access to off farm and non-farm income had the expected sign. Involvement in off farm activities will, given the constraints in labour and other endowments, lower the likelihood of farmers to enter into cash crop contract. As the farmers' access to income from off farm and non-farm sources increases, the likelihood of being contracted increases to some point. This shows the importance of cash (for leverage) in the initial participation decision of farmers. However, at higher levels of off-farm and non-farm income, the farmers are less likely to participate in contract farming because they have enough to finance their farming activities and still remain with enough for contingencies. On contrary, Ng'ombe et al (2014), Martey et al (2013) and Arumugam et al (2011) argue that farmer's off- farm income positively affect farmer's participation in contract farming. According to them household heads that earn off farm income are able to meet the financial demands associated with participation and adoption of improved technologies. They added that farmers with surplus funds under their own control would be more likely to borrow due to increased confidence on repayment. Sustainability of participation and adoption is highly dependent on farmers' income level (both on and off-

farm). A negative relationship between off farm income and participation concur with Musara et al (2011)s' findings on the analysis of the determinants of smallholder cotton contract farming participation in Zimbabwe's recovering economy. Ilembo (2013) also added that households whose major sources of income are from off-farm activities are less likely invests in agricultural technologies. As postulated by Moyo (2014) agricultural finance is a major constraint limiting market access, participation and commercialization of the smallholder farmers.

Number of agricultural groups was highly significant and positive which indicates that, if smallholders participate in one or more agricultural groups, the probability of participating in contract farming will increases. Studies by Tongchure and Hoang (2013) indicate that farmers in agricultural organizations are believed to be centre of information which can be accessed by households. Members and individuals are also motivated by other farmers to participate in beneficial groups such as contract farming. In addition, a number of agricultural groups to impart useful information to farmers could result in increased knowledge, productivity and income.

5.1.2 The effect of contract farming on tobacco income

In spite of indications in section 4.1.3 that total agricultural income of participants are higher than those of non participants, we cannot yet attribute that difference to their participation in contract farming; our analysis needs to take into account the possibility that the households that do participate in the schemes could have obtained higher incomes even if they had not chosen to participate, i.e., there may be factors that affect both their likelihood of participating in the schemes and their crop and household income levels.

Assessing the impact of contract farming by simply regressing crop income on the contract farming membership dummy variables using OLS could bias the estimate of the impact of participation. In this income model, the IMR was used also as a regressor to correct for this possible selection bias in the first stage (selection equation) and adjust the result equation to achieve consistent and unbiased estimates. IMR (lambda) is truncated in the second regression income equation. Table 11 shows the second stage OLS regression results of the impact of factors on income. Net tobacco income per hectare is taken as a dependant variable which is the total amount of money earned after selling the tobacco per given household for a given hectare of land cultivated in 2014/2015 growing season less total cost of production.

The explanatory variables include, IMR, dummy for contract membership as well as household socioeconomic characteristics, resource endowments and income diversification factors selected from Table 4.

Table 11: Second Stage Truncated Regression of Income

Dependent variable: Income			
Independent Variables	**Coefficient**	**Standard error**	**p-value**
Household demographics			
Age	-0.314	0.301	0.296
Labour adult	0.185	0.372	0.020

equivalents			
Farming experience	0.92	1.656	0.159
Experience in tobacco farming	0.235	0.388	0.010[*]
Number of farm group	0.48	0.662	0.001[***]
Number of Extension visits	0.45	1.03	0.018[***]
Farm assets and hired labour			
Farm size	.256	0.193	0.123
Cattle ownership	0.009	0.74	0.894
Other asset ownership	0.21	0.08	0.007[**]
Fertilizer use	0.432	0.174	0.000[*]
Hired labour	0.32	0.168	0.009[**]
Income diversification			
Income from food crops	-4.55	.191	0.018[**]
Inverse Mill's Ratio	0.163	0.189	0.398
Contract farming membership **1= Contracted** **0= Non contracted**	**0.28**	0.245	0.013*

[*] Level of significance at 1%; [**] at 5 % level; [***] at 10 % level, pseudo R^2= 0.64

Source: Karoi district study survey, 2015.

As shown in Table 11, the analysis of the determinants of tobacco income in the second step does not indicate the presence of sample selection bias, i.e., the coefficient of lambda is not statistically significant at 10% or less. Overall, the OLS model fit reasonably well and has a good explanatory power, with pseudo R^2 of 0.64. The results in Table 11 show that age, gender, family labour and farm size do not have an influence on tobacco income. We find that, land has no effect on net tobacco income although it was hypothesised that highest tobacco yield can be achieved with increased farm size and a higher level of production assets.

Hired labour, fertiliser use, farming experience, cattle ownership and contract farming membership positively influence farmer incomes. On the other hand maize income negatively affects farmer's income from tobacco. All these factors have the expected signs. The coefficient of hired labour used per hectare was positive. Tobacco crop is demanding in terms of labour requirements. High effective labour during peak times (planting and reaping) enhances the chances of favourable yields which results in higher incomes. Contrary to

present results, Rugimbana (2008) found a negative relationship between hired labour and tobacco income which he attributed to a fall in marginal physical productivity of labour due the lack of experience and managerial skills of the labourers as well as high dependency on the use of family labour for all farm activities by smallholder farmers. Adult labour equivalents variable is also statistically significant at 10%, indicating that once in contract farming, additional adults generate positive returns to tobacco profitability; each additional adult adds on average $37 per year.

The coefficient of fertilizer use/cost shows a positive significant impact on income. The coefficient of amount of fertilizer used per unit hectare as a variable was positive and significant at $p < 0.01$ (Table 5.2). The positive relationship between the amount of fertilizer used per hectare and tobacco yield realized implies the greatest influence fertiliser has on tobacco yields. Farmers who use fertilizer at the recommended amounts are likely to realize more yields as compared to those who use less fertilizer. This means that, the increase of fertilizers also leads to a rise in tobacco production and thus impacts the income earned by farmers.

The results in Table 11 show that the farmer's experience (years) in tobacco farming has had a positive effect on income as expected. The variable was statistically significant at $p < 0.01$ implying that those farmers with many years in tobacco farming have a higher possibility of producing more and quality tobacco per hectare as compared to farmers with less experience in tobacco production. Repetition leads to perfection. The parameter estimate for the number of visits by the extension agent to the farmer is positive and statistically highly significant. This is because extension education exposes the farmer to improved production techniques which results into the increased farm performance. Similar results were reported by Miyata et al (2009) who found a positive relationship between the number of extension visits and farmer's level of education on farm performance in onion production in China. The exposure of farm households to extension has been found to be an important factor affecting the level of household income Musara et al (2011) added that increased farm household exposure to extension programmes in the form of multiple visits by extension personnel and through information dissemination as well as technical support to farmers, greatly increase farmers ability and access to technology with potential benefits.

Ownership of other agricultural assets is positively associated with higher crop incomes. It indicated that households having more implements and tools for agricultural production are more likely to utilize them more efficiently to obtain higher output and consequently higher income. The negative significant effect of maize incomes on tobacco income is somewhat consistent with apriori expectations indicating some kind of food first strategy being carried out by farmers with maize production clearly competing for household labour and land resources; the end result is the prevalence of a situation where farmers who concentrate more on maize have significantly higher incomes from maize than tobacco.

As expected contract farming increases farmer incomes by 23% at 10% level of significance even after controlling for unobservable characteristic. The average net incomes per hectare between contracted and non contracted farmers are $3,490 and $1,560 respectively. Results are consistent with Singh (2009), Miyata et al (2009), Birthal et al (2011) and Sambuo (2014) who also obtained a positive relationship. Significant gains from contracting come from the fact that contract growers gain more from comprehensive crop management assistance, inputs and the credit provided by the firm. Availability of credit allows them to hire more labour to augment their own family labour which is critical particularly in planting, reaping and curing. Quality pays in tobacco. Most contracted farmers indicated that they realized more than double average prices of $3.00/kg compared to an average of $1.35 paid at auctions. Farmers also improved on quality due to comprehensive crop management and frequent visits from contractors' extension agents. Again contractors also provide inputs especially fertilisers which are also important. As a consequence, the incomes realised by contracted farmers are significantly higher than non contract growers.

CHAPTER 6: SUMMARY AND CONCLUSIONS

6.1 INTRODUCTION

The general objective of this study was to determine the factors influencing smallholder farmer's participation and performance in tobacco contract farming system in Karoi district. The study aimed at estimating the extent to which socio economic, resource and technological factors affect farmer participation in contract farming arrangement. The study also assessed the effect of participation and other socioeconomic factors on farmer's incomes.

This chapter therefore presents a summary of the major findings followed by conclusion and recommendations.

6.2 SUMMARY

Characteristics of farming households were compared using analysis of variance technique (one way ANOVA). Heckman's two stage regression analysis, involving probit regression in the first stage and OLS regression in the second stage was used to analyze socioeconomic factors and resource endowments that affect participation and performance in contract and non contract farming system in Karoi district. Data was collected by the researcher with the assistance of extension officers from AGRITEX in Karoi district through formal interviews and using a questionnaire attached in Appendix A. The questionnaires covered randomly selected 150 smallholder farmers from wards 10, 11 and 12.

Smallholder tobacco growers in Karoi district have household characteristics common in most rural household settings elsewhere in Zimbabwe. Tobacco production is the most important enterprise because of the cash earnings realized from the crop. Maize production ranked the second most important crop enterprise because of food security reasons and thus, competes with tobacco for resources in terms of land, capital and labour. Competition for labour is due to the fact that both crops need to be planted in the beginning of rainy season so as to take advantage of first rains.

Results have shown that 66% of tobacco growers in Karoi district are contracted. This is slightly higher than 60% which is the national average contracted number (TIMB; 2014). The increasing number of contracted farmers is a result of the increasing importance of tobacco as the main smallholder cash crop in the district which is hindered by input market failures and liquidity challenges present in the economy. Most contracted farmers indicated that tobacco is their main cash crop and the main reason why they participate in contract farming is to acquire inputs especially fertilisers at affordable prices. Contract farming has dominated because of comprehensive crop management system granted to contracted farmers than the assistance they would get from government extension agents.

There was a significant difference in the mean values of farming experience, experience with tobacco farming, percentage of farmers using hired labour, other asset ownership, use of fertilisers and total agricultural incomes between contracted and non contracted farmers. This

implies that the above mentioned factors might have a significant influence on participation in contract farming. For gender, age, education level, family labour available, cattle ownership and self employment income, no significant difference was found in the mean values between contracted and non contracted farmers. This implied that these variables may have no significant effect on participation in contract farming.

The probit regression results found out that marital status, family size, number of years in growing tobacco, and number of farm groups had significant positive influence on farmer participation in cash crop contract. The implication is that married farmers have the capacity to share ideas and also lots of responsibilities which include ensuring the well-being of the household members thus take part in activities like contract farming. The influence of family size reflects on the high labour requirements of tobacco production once the family gets in the scheme as compared to other crop enterprises. The decision to participate in contract farming was largely influenced by number of years farmers are in growing tobacco, the more time spent in tobacco production, the more farmers became participants in contract farming. This could be mainly because production history marked the eligibility of farmers into contracts. Farmers who were members of a number of agricultural groups were found to participate in contract farming. Group memberships are accredited with collective agreements during contracting, bargaining power and attain crop insurance. It also helped in members imparting useful information among themselves about contract benefits.

Furthermore results indicated that farmers' age, other asset ownership and availability of off/non farm income had significant negative influence on participation. This implies that with increase in age farmers tend to abandon tobacco contract for less demanding cropping systems for example maize with low transactional cost. Research also found that well-to-do farmers are less likely to participate in tobacco contract as indicated by negative influence of ownership of other assets and availability of off farm income. The implication is that rich farmers in rural areas having sufficient liquid financial assets are liquid enough to self finance agricultural activities. The involvement into non cash crop activities, given constraints in labour also limits farmer's participation in contract farming. The influence of gender, education level, farming experience, cattle ownership and farm size was not significant. This implied that an increase, decrease or no change in these factors would not affect participation in contract farming.

Results from OLS regression found out that tobacco production under contract farming yields higher net income than non contract farming even after controlling for unobservable characteristics. Significant gains from contracting come from the fact that contract growers gain more from comprehensive crop management assistance, inputs and the credit provided by contracting firms. For example most contractors provided coal for curing which is more accessible and affordable than firewood. In addition to that their fertilisers are more affordable and are delivered on farms which reduce the cost of transport. Together with high prices this increased participant farmers' net incomes. The results from the regression analysis also reveal that farmer's experience in tobacco farming, family size, group membership, fertilizer use (USD) per hectare, the number of visits by the extension agent and use of hired labour have a significant positive contribution to net income. Furthermore the contribution of age, farming experience and farm size is not significant. The competition for resources between maize and tobacco as well as the food first strategy, resulted in maize income negatively influencing tobacco net incomes.

6.3 POLICY RECOMMENDATIONS

Empirical results showed that variables such as tobacco farming experience, group membership and marital status have significant positive effect on participation. It is advisable to promote programs that encourage disadvantaged groups like widows and single headed households to get into lucrative contract farming business. For example formation of groups amongst smallholder farmers should be encouraged in order to increase the flow of information hence promoting participation. Group memberships for example the popular Master Farmer Groups in Karoi district are accredited with collective agreements during contracting and bargaining power. It also helps in members imparting useful information among themselves about contract benefits. Promotion of contract participation among poor farmers is also encouraged to reduce income disparities among resource endowed and non resource endowed farmers than what the situation would be if richer farmers had responded positively.

The influence of gender, education level, farming experience, cattle ownership and access to wage labour income on contract farming was not significant. Since a change in any of these factors will not significantly affect participation in contract farming this study recommends that policy-makers and development agencies do not focus on them if their objective is to

alter participation in contract farming schemes. Targeting farmers on the basis of these factors may be a waste of time, money and human resources and other resources.

Since contract farming results in farmers earning higher incomes, the government must continue promoting the involvement of private sector organisation in contract farming. This will enhance farmer incomes, increase food security and reducing rural poverty. It is important to note that the impact of contract farming includes not only direct impact on contract farmers but also the indirect impact on non-contract farmers through farm labour and industry employment. Indeed, when farmers commit themselves to supplying higher quantities of an agricultural product to a buyer, family labour is usually not sufficient anymore and they rely more on hired labour. This way they give employment to those who do not meet the requirements for being contracted. Fertilisers were also found to positively influence tobacco incomes. The problem is that they are not affordable at market prices. As such the government is encouraged to provide fertiliser subsidies where contract options are not available. The use of hired labour is also critical in tobacco production. In contract cases firms should continue to provide a significant amount of cash to finance tobacco labour requirements and for those who do not provide cash they should start doing so.

6.4 CONCLUSIONS

The main objective of this study was to estimate the factors influencing smallholder farmers' participation and performance in tobacco contract farming system so as to provide insights to other researchers, and policy makers responsible for the development and promotion of contract farming. The study was guided by contract enforcement theory, transaction cost economics and welfare utility economics. Primary data were collected in Karoi District by the researcher with the assistance of Agritex officers. Data were analyzed using Heckman's two stage regression analysis. Results showed that there was a significant difference in the mean values of farming experience, tobacco farming experience, availability of hired labour, other assets ownership and total household income as well as wage labour employment between participants and non participants in contract farming. There was no significant difference in the mean values of age, education level, family labour available, and income from self employment and cattle ownership. Furthermore, marital status, family size, number of years in growing tobacco and number of farm groups were found to positively influence farmer participation in cash crop contract in Karoi. Farmers' age and availability of off/non farm income had significant negative influence on participation. Hired labour, fertiliser use,

farming experience, cattle ownership and participation in contract farming were found to positively influence farmers' net incomes. On the other hand maize income negatively affects farmer's income from tobacco. All these significant factors had the expected signs. The study recommends the government to promote private sector involvement in contract farming. In addition, the study proposed to promoters of contract farming to consider targeting least endowed farmers and promote participation among disadvantaged groups like widows if they anticipate an increase participation in contract farming.

6.5 AREAS OF FURTHER RESEARCH

This study is based on only one district out of about 41 tobacco growing districts and the data obtained are based on cross sectional survey. Therefore further research which covers a large geographical area need to be carried out so as to enrich the findings of this study especially on performance under contract farming and propose a suitable contract farming model that could ensure sufficient gains between farmers and the contracting company.

Future researchers may decide to use other different methods apart from probit such as the Tobit or any other model depending on the nature of the data to investigate the effects of different factors affecting participation in contract farming. In assessing the effect of contract farming on household income further research might look at effects per capita income to see the profitability and actual welfare per person. Further, since contract farming is increasingly becoming important, future research may want to validate the findings from this study by conducting the same study but at a different point in time.

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Appendix 1: Household questionnaire

Determinants of smallholder participation and performance under tobacco contract farming system in Karoi district of Mashonaland West Province, Zimbabwe

HOUSEHOLD QUESTIONNAIRE

Date of Interview:	Name of Enumerator:

SECTION A: HOUSEHOLD DEMOGRAPHICS (*circle the appropriate*)

1. **Respondent's name**	
2. **Age of respondent**	
3. **Sex**	1. Male 2. Female
4. **Ward**	
5. **Type of land holding (A1, communal, old resettlement)**	
6. **Grower's name**	
7. **Age**	
8. **Sex**	1. Male 2. Female
9. **Marital status**	1. Married 2. Widowed 3. Divorced 4.Single
10. **Employment status**	1. Fulltime Farmer 2. Full time formally employed 3.Casual Worker 4.Self employed 5. Pupil/Student 6. other, specify
11. **Number of years in formal education**	
12. **Total number of people in a household (>15 years)**	
13. **Total number of chronically ill members**	
14. **When did you start farming**	
15. **When did you start growing tobacco**	
16. **Size of landholding (ha)**	

SECTION B: HOUSEHOLD LIVESTOCK OWNERSHIP

Livestock type	Number owned
1. Poultry	

2. Goats	
3. Sheep	
4. Donkeys	
5. Cattle	
6. other specify	

SECTION C: HOUSEHOLD PRODUCTIVE AND NON PRODUCTIVE ASSETS

Implement type	Number owned
1. Cultivators	
2. Tractor	
3. Scotch carts	
4. Ploughs	
5. Planter	
6. Ripper	

Type of asset	Number owned
1. Car	
2. Radios	
3. Solar panel	
4. TVs	
5. Bicycles	
6. Generator	
7. Other, specify	

SECTION D: TOBBACCO CONTRACT FARMING ARRANGEMENTS (current season)

17. Are you in contract farming.......1**. Yes   2. No**

18. If ***not*** why are you not in contract farming?
....

19. What are the benefits of not being in contract farming?
....

20. If ***yes*** why are you in contract farming?
....

21. What are the benefits of being in contract farming?
....

22. If in contract, what is the name of the contractor
....?

23. How were you selected?
....

25. How long have you been growing tobacco under contract?
....

29. What type of support did you receive from the contracting company?

Input	Quantity	Monetary value
Seed		
Fertilizers		
Herbicides		
Credit		
Bailing Bags		
Type of training received		
Others specify		

30. if you have other sources of support other than those from the contracting company, specify,

Input	Source	Quantity	Monetary value
Seed			
Fertilizers			

Herbicides			
Credit			
Bags			
Others specify			

31. Are there any changes you wish could be made on the conditions of the contract?

1.

2.

32. Are you a member of any agricultural group? 1= yes, 2 = no

33. If yes, how many groups are you a member....................?

34. Did you receive any assistance from extension officers? 1= yes, 2= no

36. If yes, how often did the agent visits in the past season 2014/2015........

SECTION E: TOBACCO PRODUCTION REQUIREMENTS

32. Fill in the following table of number of workers employed in the current season, 2014/2015

Activity	Number of workers needed		
	Part-time workers	**Fulltime workers**	**Total Cost**
Nursery management			
Ploughing			
Planting			
Fertiliser application			
Weeding			
Topping			
Priming			
Curing			

33.   What   do   you   use   in   the   curing   process**?**
..

SECTION F: TOBACCO PRODUCTION

34. Fill in the following table for tobacco production for current and past seasons

	2014/15	2013/14	2012/13	2011/12	2010/11
Total Area (ha)					
Area under contract (ha)					
cost of production					
Finance from outside					
Source of financing					
Type of financing (Bank, contract, other – specify)					
Total production (t)					
Income from tobacco					
Tobacco sold at auction (kg)					
Average price realized at auction					
Tobacco sold to contractor					
Average price realized from contractor					

SECTION G: 2014/15 AGRICULTURAL PRODUCTION

35. Complete the following table for the current season 2014/2015

		Soybean	Groundnuts	Sugar bean	Cotton	Maize
1	Area under cultivation					
2	Amount of seed (kg)					

3	Source of seed sown					
4	Quantity of compound D					
5	Sources of compound D					
6	Quantity of AN					
7	Sources of AN					
8	Amount of manure applied					
9	Output(kgs/50 kgs) indicate units					
10	Output retained for own consumption					
11	Output sold (or to be sold)					
12	Amount of income realised/expected $					

SECTION H: HOUSEHOLD INCOME AND EXPENDITURE

36. What are the HH s three main sources of income (**circle the three**)

 (1)informal work (2) livestock sales (3)formal employment (4) food crops sales (5) cash crop sales (6) remittances (7) self employed

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Source of income	Verification 1=yes 0=no	Amount (Rands or USD)
1. Food crops		
2. Retained food		
3. Livestock sales		

4. Cash crops
    a. Tobacco
    b. Cotton		

5. Self employment		
6. Petty trade		
7. Casual work		
8. Remittances		
9. Brewing beer		
10. Others specify		

END OF QUESTIONNAIRE