University of Zimbabwe
Faculty of Social Studies
Department of Economics

Determinants of Smallholder Tobacco Contract Farming Participation in Zimbabwe.

By

Chaturuka Sylocious

A dissertation submitted in partial fulfillment of the requirements of the Master of Science Degree in Economics (MSc Econ).
DEDICATION

I dedicate this dissertation to my sons Hillary and Tatenda, my parents Mr. and Mrs. Chaturuka and my loving and supportive husband Taitos Chimbunde who have always been there for me at all times.
ACKNOWLEDGEMENTS

First and foremost my greatest and sincere gratitude is given to GOD almighty for the completion of my studies according to his will and plans. I really appreciate that it is not by my own strength, knowledge and/or understanding this dissertation is completed, but only by his grace.

Secondly, I would like to extend my sincere gratitude to my supervisors Doctor A. Makocheonwa and Doctor C. Mumbengegwi for your timeous, guidance and credible support which made the completion of this dissertation possible.

Also I am very grateful to African Economic Research Consortium (AERC) who extended me a scholarship during my studies and the opportunity to enjoy Joint Facility for Electives (JFE) 2012, in Nairobi Kenya. My gratification also goes to Tobacco Industry and Marketing Board particularly Mr Gudu for the provision of necessary information used in this dissertation.

Also special gratitude goes to the department of economics, particularly Dr Mbengegwi, Mr Mukura, Dr Kadenge, Mrs Mutuma and Mr Pindiriri for their invaluable contribution. Also special thanks go to my colleagues Admire Mutizwa, Bernard Kasakaza, Blessing Mautsa, Tafara Chiremba and Tatenda Nyachega.

I also appreciate the love, support, strength and motivation given to me by all my relatives and friends. My special appreciation is extended to my parents Mr and Mrs Chaturuka, my sister Purity Chaturuka and my sisters-in-law, particularly Precious Chimbunde who took care of my son in Nairobi, Kenya. Finally, special thanks go to everyone who contributed directly or indirectly to the completion of this work.
ABSTRACT

Determinants of smallholder tobacco contract farming participation were considered in this study. The study was motivated by the shift in Zimbabwe’s tobacco production base that used to be almost entirely large-scale commercial before the Fast Track Land Reform Programme to almost 50% now being produced by smallholder farmers. In the study, a self-administered questionnaire was used to collect data from 36 tobacco producing districts for the 2012/2013 tobacco season. Primary data was collected through visits to four of the main tobacco provinces namely Mashonaland East, Mashonaland Central, Mashonaland West and Manicaland. Data for the remaining provinces was then collected from contracted farmers selling their crop at their merchant’s premises in Harare and from non-contracted farmers selling their crop at auction floors namely Boka, FSF and Premier. Stratified random sampling technique was employed to select 140 contracted and 117 non-contract farmers from the two strata. After theoretical and empirical review on literature, data was collected on socio-economic characteristics such as age, education, off-farm income, gender, household size, farm size, experience, credit accessibility, extension services, ecological region, and distance from main road as well as asset specificity. The logistic regression model was then employed to determine the variables that influence smallholder tobacco farmers’ decision. The results indicated that among the included variables only age, household size, distance from main road, experience, access to credit, extension services and asset specificity significantly influence contract farming participation by smallholder farmers. From the results, the negative relationship between contract farming participation and access to credit, experience and distance from the main road could suggested that most smallholder farmers participate in contract farming because they lack alternatives. The policies in the study are then drawn bearing in mind that smallholder farmer may participate in contract farming only because they lack alternatives and the specific nature of tobacco producing assets. Also the study recommends for tailor-made policies that consider, for instance, geographical and ecological region differences. It is also suggested that provision of farmers with alternative sources of finance and information, help reduce farmer exploitation by large agri-business firms and possibly increase returns to farmers, thus, in turn help reduce poverty levels.
Table of Contents

DEDICATION ........................................................................................................... i
ACKNOWLEDGEMENTS ........................................................................................ ii
ABSTRACT ............................................................................................................... iii
LIST OF FIGURES ................................................................................................... viii
LIST OF TABLES ..................................................................................................... ix
LIST OF ABBREVIATIONS ..................................................................................... x

CHAPTER ONE ........................................................................................................ 1
1.0 Introduction ...................................................................................................... 1
1.1 Tobacco Farmers, Merchants and Views on the Importance of Contract Farming ........ 2
1.2 Economic Performance and Agriculture .......................................................... 7
1.3 Tobacco .......................................................................................................... 7
1.5 Problem statement ......................................................................................... 12
1.6 Research objectives ....................................................................................... 13
1.7 Research questions ......................................................................................... 13
1.8 Justification of the study ............................................................................... 14
1.9 Scope of the study .......................................................................................... 14
1.10 Organization of the study ............................................................................ 15

CHAPTER TWO ...................................................................................................... 16
THEORETICAL AND EMPIRICAL LITERATURE REVIEW ......................................... 16
2.0 Introduction ...................................................................................................... 16
2.1 Models of contract farming ............................................................................ 16
2.1.1 The Centralized Model ............................................................................. 16
2.1.2 The Nucleus Estate Model ....................................................................... 18
2.1.3 The Multipartite Model .......................................................................... 19
2.1.4 The Informal Model ............................................................................... 19
2.1.5 Asset Specificity, Uncertainty and Frequency of Transactions .............................................. 19
2.1.6 Opportunistic Behavior under Bounded Rationality ................................................................. 20
2.2.0 Empirical Literature Summary ................................................................................................ 21
  2.2.1 Household Contract Farming Participation in African and Asian Countries ......................... 21
  2.2.2 Small-scale versus large-scale participation in contract farming ........................................... 28
2.3 Conclusion .................................................................................................................................. 31
CHAPTER 3 ....................................................................................................................................... 31
METHODOLOGY ................................................................................................................................. 31
  3.0 Introduction .................................................................................................................................. 31
  3.1 The Theoretical Model of Contract Farming Participation ......................................................... 32
  3.2 Logit model .................................................................................................................................. 37
  3.3 Model specification ....................................................................................................................... 39
  3.4 Empirical Model ........................................................................................................................... 40
  3.5.0 DEFINITION AND JUSTIFICATION OF VARIABLES ............................................................ 40
    3.5.1 Contract participation (pat) .................................................................................................. 40
  Human Capital Investment .................................................................................................................. 41
    3.5.2 Education of a household head (edu) ...................................................................................... 41
    3.5.3 Extension services (evis) ....................................................................................................... 41
    3.5.4 Experience (fyears) ............................................................................................................. 41
  Demographic Factors ......................................................................................................................... 42
    3.5.5 Gender (sex) ....................................................................................................................... 42
    3.5.6 Age (age) ............................................................................................................................. 42
    3.5.7 Household size (hsize) ........................................................................................................ 43
  Economic Factors ............................................................................................................................... 43
    3.5.8 Off-farm income (ms) .......................................................................................................... 43
    3.5.9 Credit access (ca) ................................................................................................................. 43
    3.5.10 Asset specificity (aspe) ....................................................................................................... 44
  Farm Specific Factors .......................................................................................................................... 44
    3.5.11 Farm size (fsize) ................................................................................................................. 44
    3.5.12 Distance to main road (rdac) ............................................................................................. 44
    3.5.13 Ecological Region (eco) .................................................................................................... 44
3.6.0 DATA SOURCES AND SAMPLING PROCEDURES ........................................................... 45
3.6.1 The questionnaire ........................................................................................................... 45
3.6.2 Sampling and data collection methods ........................................................................... 46
3.6.3 Sample size .................................................................................................................. 48
3.7 Conclusion ....................................................................................................................... 49

CHAPTER FOUR ................................................................................................................. 51
ESTIMATION AND INTERPRETATION OF RESULTS ................................................................. 51
4.0 Introduction ...................................................................................................................... 51
4.1 Descriptive statistics ........................................................................................................ 51
4.1.1 Socio-economic descriptors of the respondents .......................................................... 52
Conclusion on Descriptive Statistics .................................................................................... 58
4.2.0 ESTIMATION OF THE ECONOMETRIC MODEL ............................................................. 58
4.2.1 MULTICOLLINEARITY TEST ...................................................................................... 58
4.2.2 MISSPECIFICATION TEST ...................................................................................... 59
4.2.3 HETEROSKEDASTICITY TEST .................................................................................. 59
4.3 THE UNRESTRICTED MODEL ......................................................................................... 60
4.3.1 LR Chi2 (10) .............................................................................................................. 62
4.3.2 Prob>Chi2 (10) ........................................................................................................... 62
4.3.3 Pseudo R2 ................................................................................................................ 62
4.3.4 Log likelihood ......................................................................................................... 62
4.4 MARGINAL EFFECTS OF THE LOGIT MODEL ............................................................... 62
4.5.0 DISCUSSION OF MARGINAL EFFECTS .................................................................. 63
4.5.1 Predicted probability of Participation ....................................................................... 63
4.6 Conclusion ....................................................................................................................... 67

CHAPTER FIVE ....................................................................................................................... 68
FINDINGS, CONCLUSIONS AND POLICY IMPLICATIONS ......................................................... 68
5.0 INTRODUCTION .............................................................................................................. 68
5.1 MAIN RESEARCH FINDINGS ......................................................................................... 68
5.2 POLICY IMPLICATIONS AND RECOMMENDATIONS ..................................................... 69
5.3 LIMITATIONS OF THE STUDY ..................................................................................... 72
5.4 AREAS OF FURTHER RESEARCH ............................................................................... 72
LIST OF FIGURES
FIGURE 1: CONTRIBUTION OF TOBACCO TO TOTAL AGRICULTURAL EXPORTS .................. 8
FIGURE 2: CONTRACT AND NON-CONTRACT TOBACCO PRODUCTION .......................... 10
FIGURE 3: 2011 TOBACCO SALES BY SECTOR MASS (KG) ........................................ 11
LIST OF TABLES

TABLE 3. 1: Tobacco growers for the 2012/2013 production season by province ........................................ 46
TABLE 3. 2: Summary of respondents’ participation ................................................................. 48
TABLE 3. 3: Tobacco growers (respondents) sample distribution by province ................................. 49
TABLE 4. 1: Descriptive Statistics for continuous variables .......................................................... 52
TABLE 4. 2: Distribution of household participation by sex .......................................................... 52
TABLE 4. 3: Distribution of households’ participation by marital status ......................................... 53
TABLE 4. 4: Distribution of household Participation by education ............................................... 54
TABLE 4. 5: Distribution by household head expertise and participation ........................................ 55
TABLE 4. 6: Distribution of respondents by road access and participation .................................... 56
TABLE 4. 7: Distribution of respondents by credit access and participation .................................. 56
TABLE 4. 8: Distribution of respondents by other income sources and participation .................... 57
TABLE 4. 9: The restricted logit regression model .......................................................................... 61
TABLE 4. 10: Marginal effects ........................................................................................................ 63
**LIST OF ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AfDB</td>
<td>African Development Bank</td>
</tr>
<tr>
<td>AGRI-BANK</td>
<td>Agricultural Bank of Zimbabwe</td>
</tr>
<tr>
<td>ASPEF</td>
<td>Agricultural Sector Productivity Enhancement Facility</td>
</tr>
<tr>
<td>CAAS</td>
<td>Chinese Academy for Agricultural Science</td>
</tr>
<tr>
<td>ESAP</td>
<td>Economic Structural Adjustment Programme</td>
</tr>
<tr>
<td>FTLRP</td>
<td>Fast Track Land Reform Programme</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GNU</td>
<td>Government of National Unity</td>
</tr>
<tr>
<td>IDBZ</td>
<td>Infrastructure Development Bank of Zimbabwe</td>
</tr>
<tr>
<td>IFPRI</td>
<td>International Food Policy Research Institute</td>
</tr>
<tr>
<td>IMF</td>
<td>International Monetary Fund</td>
</tr>
<tr>
<td>KTDA</td>
<td>Kenya Tea Development Authority</td>
</tr>
<tr>
<td>LR</td>
<td>Likelihood Ratio</td>
</tr>
<tr>
<td>MDG</td>
<td>Millennium Development Goal</td>
</tr>
<tr>
<td>ML</td>
<td>Maximum Likelihood</td>
</tr>
<tr>
<td>NIE</td>
<td>New Institutional Economics</td>
</tr>
<tr>
<td>RBZ</td>
<td>Reserve Bank of Zimbabwe</td>
</tr>
<tr>
<td>RESET</td>
<td>Ramsey Regression Error Specification Test</td>
</tr>
<tr>
<td>SADC</td>
<td>Southern African Development Community</td>
</tr>
<tr>
<td>TC</td>
<td>Transaction Costs</td>
</tr>
</tbody>
</table>
TIMB  Tobacco Industry and Marketing Board

US$  United States Dollars

ZTFAC  Zimbabwe Tobacco Farmers’ Association Certificate
CHAPTER ONE

INTRODUCTION AND BACKGROUND OF THE STUDY

1.0 Introduction

Contract farming has become a popular farming financing model in developing countries. According to Eaton and Shepherd (2001) in Bijman (2008), contract farming is defined as an agreement between one or more farmer(s) and a contractor for the production and supply of agricultural products under forward agreements, frequently at predetermined prices. In this study, a contract farming arrangement is deemed to have occurred when the tobacco farmer is contracted by a tobacco merchant(s). Tobacco merchants commit to provide farmers with production support in the form of farming inputs such as seeds, fertilizers, chemicals and monetary support for labour payment and family support during the production season. Technical assistance is often included in the agreement and has become one important aspect of the agreement. In return, the farmer commits to supply to the contractor the specific commodity in the right quantity and quality according to the contractor’s specifications and this forms the basis of a contract agreement (Musara, 2011). The two parties of a contract farming arrangement are intended to mutually benefit from it.

Despite the importance of contract farming initiative being promoted by governments, it has its own challenges, weaknesses or shortcomings. In Zimbabwe, there is a perception that contract farming arrangements are “exploitative” in their nature; the benefits are positively skewed towards the tobacco merchants. This exploitative contract farming argument comes due to misunderstandings that occasionally happen during tobacco selling seasons. At times prices are depressed as merchants argue that the quality of the tobacco is poor. However, quality is associated with a number of factors including the adequacy of contract farming support given to the farmer. Porter and Phillips-Howard, (1997: 227-238) and Poulton et al., (1998) reiterates that farmers are argued to have less negotiating power in the contract arrangement; this may be so if the farmers have less financing options and farming itself is capital intensive as the case
of Zimbabwean tobacco farming. However, one would wonder why in Zimbabwe, since 2009, the number of contract tobacco growers has been growing if contract farming is exploitative as alleged? The study, in light of the above, seeks to find out factors that determine contract farming in Zimbabwe.

The stratified random sampling procedure was used to draw data from 257 tobacco small holder farmers in Zimbabwe. Farmers were stratified as contract and non-contract farmers. The researcher chose to interview convenient farmers by simply carrying out the interviews during the 2013 tobacco selling season. Interviews were carried out at various contract and auction marketing places, namely Boka, TSF, and Premier Auction floors, Zimbabwe Tobacco Processors, Mashonaland Tobacco Company, Chidziva Tobacco Processors and Intercontinental Leaf Tobacco. The data that captured demographic, socio economic, human capital and farm specific factors is analyzed using the Logit model in Stata version 11.

1.1 Tobacco Farmers, Merchants and Views on the Importance of Contract Farming

Tobacco farming is characterized by a large number of farmers. In total, communal, A1, A2, small scale and large scale commercial tobacco farmers were 60,047 in 2012/13 and 56,656 in 2011/12 production seasons (TIMB, 2013). Most of the farmers are beneficiaries of the Fast Track Land Reform (FTLR) programme, thus they are new entrants into tobacco farming. The farmers are of less financial wealth in a sector that is capital intensive. Access to credit from the open market had been a challenge given that the farmers do not have collateral in the form of title deeds of the land they occupy. Since farmers are also new growers of tobacco, they do not have assets to use as collateral security for accessing loans from banks. Limited credit from the open market can also be a result of liquidity constraints in the country that emerged since the dollarization period. Farmers therefore resort to contract farming as their source of credit and input supply. In view of Bijman (2008) farmers are highly fragmented in terms of their distribution meaning difficulties in organizing themselves into powerful groups that can influence the market, and arrangements such as contract farming. The structure and characteristics of tobacco growers can lead one to believe the possibility of “exploitation” by contractors.
On the other hand, tobacco merchants as compared to contract farmers, form a monopsonistic structure. They are also relatively few organized players. During the 2012/13 production season, 14 tobacco merchants participated as contractors in tobacco contract farming; namely BoostAfrica, Chidziva Tobacco Processors, Curveid Tobacco, Intercontinental Leaf Tobacco Company, Leafco Tobacco, Leaf Trade Company, Mashonaland Tobacco Company, Northern Tobacco, Shasha Tobacco, Tiane Ze, Tribac, Zimbabwe Leaf Company (ZLT), Golden Leaf Merchants and TSL Classic Leaf. In 2011/12 production season, 12 contractors actively participated in contract farming despite 15 contractors having been licensed by TIMB. These tobacco merchants are in a more powerful position in contract agreements given that agricultural funding is not accessible from the open market. The number of contractors together with the market structure they form can play a role in skewing benefits of contract farming arrangements towards them.

Contract farming has been instrumental in providing growers access to supply chains with price and market stability, as well as technical assistance. Production input and farm investment on credit are often provided by firms for resource-poor growers. Contractors expect delivery of goods in specified quantities, quality and set prices in return. In the framework of Woodend (2003), the country’s competitiveness via improved quality products and an efficient supply chain is enhanced by market and price certainty for both parties and integrated farm-processing. In less privileged farming sectors, well-coordinated contract farming systems assist development. With effective management, contract farming can be a means to develop markets and to bring about the transfer of technical skills in a way that is profitable for both the sponsors and farmers.

Additionally, the contractor initiates for contract farming in order to increase capacity utilization (in case of processing) and to improve the supply of homogeneous high quality products. State concerns to promote critical commodity chains (for example in China) may also drive contract farming initiation. In the Zimbabwean case, constraints in funding agriculture through the budget and by commercial banks led government to adopt contract farming as an important model. Its benefits are expected to range from ensuring continuous production of the contracted crop to reduced poverty through improved farm income. According to Woodend (2003) it would appear contract farming is a private sector led approach to development hence has become more
important to governments, donors and development agencies. For several years in southern Africa, contract farming has been part of the agricultural landscape. Contract farming is receiving attention as governments strive to commercialize smallholder agriculture, diversify the agricultural production base, improve the incomes and livelihoods of smallholder farmers, increase export earnings and create local employment.

Contract farming is often associated with export crops and high-value crops (non-commodity crops) and these are likely to be more risky than traditional crops, for good reasons (Simmons, 2002). In the event of crop failure, more income is at risk since these non-commodity crops are associated with higher production costs. Also the thinly traded markets of non-commodity crops also help to explain the high volatility of prices in these commodities’ markets.

Furthermore, non-traditional crops are often more perishable and their yield is more uncertain than with traditional crops. Hence, the protection against production and marketing risks provided by contracts help induce farmers to grow these higher risky crops. Empirical support for this argument is provided in Saenz-Segura (2006), in his study on contract farming in the pepper and chayote supply chains in Costa Rica. In the study it was found out that for the farmers that consider the production of non-traditional crops, contracts provide the following functions: firstly, to enable farmers to gain access to specialized and take up new production activities, contracts act as a security device. Secondly, contracts provide incentives to make investments needed for specialty production; and thirdly, they also help provide information on specialty markets (Bijman, 2008: 16). All the three functions above have partial fulfillments in the Zimbabwean tobacco production, possibly indicating the rise in contract farming participation.

Contract farming has broad persuasive push as it is considered as an attractive mechanism for integrating poorer farmers into the open-market economy (Glover, 1984; Key and Runsten, 1999; Poulton et al., 2010). These farmers will increase their production levels and farm income. However, the poor may be excluded as contract farming may be selective. Additionally, farmers may be subjected to high risks and agribusiness normalization, while failing to increase incomes due to unequal bargaining power with the farmers losing out (Poulton et al., 2010). Poulton’s argument supports the allegations by farmers in the Zimbabwean case. This is exploitative
behavior of contractors where the contract is biased towards them. The behavior is alleged to ruin farmers, supplying more products at depressed prices thereby generating less income for the farmer.

There are conflicting views on contract farming’s impact on the welfare of smallholder farmers even though it is widespread in Africa and many other developing countries. Some authors argue that since contract farming enables farmers to access ready markets and also to access global markets it is beneficial to the smallholder farmers (Key and Rusten, 1999; Warnings and Key, 2002; Gulati et al, 2005; Minot, 1986; Minot and Roy, 2006; Minot et al, 2009). These authors also argue that contract farming enhances the income of farmers which they attribute to the economies of scale enjoyed in contract farming.

Allegations by farmers are founded in the empirical literature. Contract farming is argued to be a means of exploiting farmers by the large agribusiness firms due to the unequal bargaining power (Little and Watts, 1994; Singh, 2002). Contract farming is criticized by these authors on the basis that most large firms break the contractual terms at the expense of the smallholder due to unequal market power and that most of the contractual terms are too costly for smallholder farmers to comply with. Guo et.al (2005) further argue that contract farming only serves to push smallholder farmers out of the market and is only beneficial for large scale farmers hence could even lead to rural inequality and entrench poverty among the rural smallholder farmers. If this is the case, then how come more farmers join contract farming arrangements each season. This question is put into empirical test under this study.

In an effort to promote laissez faire economy in Zimbabwe for the past twenty years, the government of Zimbabwe has embarked on widespread economic reforms. However, grave market imperfections still fill the market. Therefore, the paradigms of the neoclassical economics are not reflected in the operations of the market, both in dictates and assumptions. According to de Janvry et al., (1991), in view of the New Institutional Economics, either a transaction fails to occur or to allow it to take place; a surrogate institution emerges, when market failures occur.

The production and sales process between farmers and their customers can be organized through contract farming which can be considered as transaction cost minimizing arrangement. Due to
(behavioral) uncertainty and/or specific investments, spot market transactions lead to high transaction costs particularly when production activities and processing/marketing activities require vertical coordination. In such situations, to reduce uncertainty and improve farmers’ incentive to make specific investment, contract farming offers an efficient alternative. According to Bijman (2008) in the organisational structure portrayed in contract farming, the contractor supply inputs, technical assistance and credit to the producers.

According to North (1990) institutions can be defined as the rules that govern a society or alternatively, they are constraints that are devised by humans to control and shape interactions between humans. These help structure the incentives in human exchange in a society, in social, political and economic terms. In most developing countries, the agricultural sector’s environment is characterised by incomplete markets, pervasive risks and information asymmetries, and institutions come into play to deal with these market failures (Key and Runsten, 1999). Parallel to the spot market, the functions of the imperfect markets are usually performed by the evolving institutions. Various alternative agrarian institutions exist such as credit and insurance groups, cooperatives, marketing boards for agricultural produce, household internal transactions, and associations by peasants and interlinked transactions that involve different types of contracts, (Bardhan, 1980; Ellis, 1988; Olomola, 2010).

Popularity in application of contract farming in both developing and developed countries has increased. Its supremacy is based on co-ordination and performance improvement in agricultural markets, apart from addressing the different types of market failures. In developing and developed countries, contract farming has been applied as an agrarian institution that is capable of improving agricultural market in terms of coordination and performance, as well as addressing market failures of different kinds at different times. Market imperfections are reduced or removed by contract farming in labour, credit, information, land and product markets. According to Grosh, (1994), Key Runsten, (1999) and IFPRI, (2005) contract farming facilitates local production activities in terms of better coordination of the initial investment and extension services. In addition, transaction costs are argued to reduce significantly, (Grosh 1994).

Furthermore, according to Benziger (1996) and Singh (2000) contract farming can also be used by the state as a policy measure in many situations that facilitate improved farm incomes and
employment brought about through crop diversification. Positive externalities such as infrastructure, employment as well as development of the market can also be created by contract farming if the state or open market fail to provide them and are better provided by the agribusiness firms (Key and Runsten, 1999)

1.2 Economic Performance and Agriculture
Zimbabwean economic stability and growth is grounded in its agricultural sector. The sector forms the basis of the direct and indirect livelihoods of almost 70% of the population (Anseeuw et al 2012). The improvement and growth of other sectors of the economy such as industry and services are expected to be supported by growth and development of agriculture. The sector contributes 30% of formal employment (Kapuya et al., 2010) and represents the largest single source of export earnings. Despite the challenges experienced during the hyper-inflationary environment as from 1998 to 2008, the sector remained resilient and significant for Zimbabwe’s transitional economy following the decade of” lost” economic growth (Robertson, 2011). The Zimbabwean economy is therefore dependent on the performance of the agricultural sector like other developing countries.

Tobacco is one of the key agricultural and economic drivers in Zimbabwe and any negative external shocks to the tobacco industry would hamper recovery of the country's economy. With export earnings of US$771 million in 2012, and 65 600 farmers into tobacco farming, tobacco provide employment to 1.13 million workers who support 5.67 million dependents (i.e. 55% of the population), while an estimated 500 000 more benefit from downstream industries (TIMB, 2013). High-grade tobacco is Zimbabwe’s largest agricultural export by value. Zimbabwe is the world’s third largest tobacco producer after USA and Brazil. In view of this study and supported by Anseeuw et al (2012) low labour costs and high yields make Zimbabwe a more competitive producer of quality tobacco than its Brazilian and United States of America rivals.

1.3 Tobacco
According to TIMB (2013) tobacco accounts for about 26% of agricultural GDP and 61% of agricultural exports; hence it is Zimbabwe’s most valuable agricultural commodity. Zimbabwe is now the world’s sixth-largest exporter, ranking behind Brazil, India, the United States, Argentina and Tanzania, but was once the world’s second largest flue-cured tobacco exporter (after Brazil)
in 2000, according to the world’s biggest tobacco-leaf merchant, Universal Corporation (Marawanyika, 2011). Figure 1 below shows that there is a close relationship between tobacco exports and total agricultural exports between 1995 and 2012. The figure suggests that tobacco production is an important source of foreign currency by shaping total agricultural exports which is a significant contributor of foreign currency and the backbone of the economy.

**FIGURE 1:** CONTRIBUTION OF TOBACCO TO TOTAL AGRICULTURAL EXPORTS

![Graph showing the relationship between tobacco exports and total agricultural exports from 1995 to 2012.](image)

*Source: Author compilation, Data adapted from TIMB*

The contribution of tobacco to the country’s total agricultural exports significantly influence the direction and performance of total agricultural exports. Depicting from the graph above, on average over 50% of agricultural exports are contributed by tobacco. This contribution is important to overall economic performance since the Zimbabwean economy is agro-based. Since the FTLR programme, dominance of small scale tobacco farmers in the sector mean that these agricultural earnings are distributed much evenly along the rural population and benefits about 55% of the population which depends on rural tobacco producers. There is a feeling that tobacco productions improves the livelihood of the rural poor, reduce poverty and enhances their access to other social necessities such as education and health.
According to TIMB (2013), tobacco produced in Zimbabwe is exported, to over 80 countries, which accounts for 98% of total tobacco production. Only 2% is processed locally by four cigarette-manufacturing plants, of which three produce for export. Processing companies had to resort to importing tobacco, in years of crisis, given serious shortages of raw material, particularly cut-rag (semi-processed tobacco), as a direct result of declining crop size (Sukume & Guveya, 2009).

Traditionally, an auction marketing system overseen by the Tobacco Industry Marketing Board had been the marketing channel for tobacco. Four Harare-based auction floors have been the platform of exchange, with the board approving the buyers on the auction floors. However during the period under study only three auction floors successfully registered and the fourth one faced some difficulties in meeting the requirements. Proof of offshore funds is a prerequisite for buyers since all price bids and payments are made in United States dollars. An important policy decision was made in 2003, to transform the tobacco marketing system from auction sales to a dual system that involves the adjacent operation of contract growing/marketing and auctions (Anseeuw, 2012). Following institutional challenges for banks to finance growers, contract farming was introduced to help sustain the crop (TIMB, 2011).

According to Sukume & Guveya (2009) contract farming initiative was meant to augment tobacco production through the extension of technical advice and input provision by contractors. This has seen contract growing accounting for 63.7% of tobacco sales in 2012 and has led to the timely availability of inputs (TIMB, 2013). The board does not have the legislative and regulatory instruments to manage contract growing and buying and has been geared to regulating auction marketing (Muir-Leresche & Muchopa, 2006; Sukume & Guveya, 2009). The contractors can either export directly to foreign markets or trade the tobacco on the auction markets. The ability to retain a portion of export proceeds for the contracting firm’s own import needs has been their main attraction (Muir-Leresche&Muchopa, 2006; Sukume&Guveya, 2009).

Recently, contract production has gained popularity especially in tobacco and cotton production. The contribution of contract production now exceeds that of non-contract producers. Figure 2 below shows the contribution of both contract and non-contract towards total tobacco production in mass. Contract produce has increased amid those allegations of exploitative behavior.
Increased benefits of contact farming in form of more output can be transferred in monetary terms to the contracted farmer after the sale of the crop. If farmers are being exploited, surely the alleged benefits of small scale tobacco farming in the form of equitable distribution of income and reduced poverty will not be realized. However, one would be interested to find why more farmers join this “exploitative” contract farming arrangement?

FIGURE 2: CONTRACT AND NON-CONTRACT TOBACCO PRODUCTION

Tobacco production has shifted in favour of the smallholder sector, since FTLRP, and now accounts for 60% of the crop area and 30% of total production. The number of tobacco farmers has been growing consistently from 8537 in 2000 to 31 761 in 2005 and almost 40 000 in 2010 (Sukume & Guveya, 2009) despite arguments of exploitative behavior by contractors. The growth in numbers joining contract farming may point towards positive contribution of contract farming to the farmers. However, there may be factors pushing farmers into such an arrangement despite its negative impacts on the farmer. It is therefore the objective of this study to point out
factors, farmer characteristics that are likely to push farmers into contract farming arrangements regardless of its label of being exploitative in nature.

The figure 3 below shows the contribution of each sector to the total tobacco production. According to TIMB, of the total tobacco in 2011, 49% of sales were sold by small-scale farmers. 28%, 18% and 11% was contributed by resettled A1, communal and small-scale commercial farmers respectively. TIMB also noted that this contribution is expected to increase as the number of small-scale growers registering is increasing each year. In the recent report by TIMB (2013), 80,000 farmers registered to grow tobacco in the 2013 season, and 83% of these are small-scale farmers.

**FIGURE 3: 2011 TOBACCO SALES BY SECTOR MASS (KG)**

![Pie chart showing tobacco sales by sector](image_url)

- **Resettlement A1**: 36,820,145 kg, 28%
- **Communal**: 24,459,321 kg, 18%
- **Resettlement A2**: 16,540,913 kg, 12%
- **Small Scale commercial**: 14,047,418 kg, 11%
- **Large Scale commercial**: 40,564,112 kg, 31%

*Source: Author compilation, Data adapted from TIMB*
Prospects for tobacco have improved since 2009 due to the stabilization of the economy. Smallholder farmers are potentially supplying more than 50% of the national crop and uptake of contract farming initiative among them (including a sizeable proportion of resettled farmers) was significant. Banya (2011) posits that there is substantial scope for the expansion of contract farming linked with the supply of agricultural inputs and private extension support, addressing the weakness of capital markets in funding agricultural inputs and the revitalisation of irrigation systems. The speed of the adoption of higher inputs and more sustainable farming practices determines the growth of tobacco production among smaller-scale farmers. Unlike other crops, tobacco production has an element of asset specificity in terms of bans, which may lock-in the farmers and restrict them from shifting to other crops.

1.5 Problem statement
Despite developments in smallholder tobacco contract farming, there are challenges inherent to tobacco contract farming in general and in particular to the smallholder farmer. There is alleged exploitative behavior of contract farming in Zimbabwe. Challenges in form of inputs, technology, mechanization, expertise and capital constrains affect the agro-industry in Zimbabwe. On the other hand, tobacco farmers, especially new entrants are highly incapacitated to fund their own production. Farmers allege exploitative behavior by the contracting firms, hence the argument that contract farming yield positive results is less lucrative as far as raising incomes of the rural poor is concerned. However, the number of tobacco contract smallholder participants has remained steadfastly growing. The number of contracted tobacco farmers doubled from 12,930 growers to 24,637 while non-contracted growers declined by 19% from 43,726 to 35,410 between 2011/12 and 2012/13 production seasons. This upward trend means more and more smallholder farmers are joining tobacco contract farming, hence production levels increasingly grown season after season such that the smallholder tobacco contract farming production levels surpasses that of large scale commercial contract farming.

Historically, research has shown that contract farming in Zimbabwe dates back to 1931 at large scale farming in various agro-crops excluding tobacco (Olomola, 1996:44). Tobacco contract farming started in 2004 after Zimbabwe’s fast track land reform (FTLR) programme. Years before the FTLR, contract farming firms’ focus was biased towards the large scale commercial
farming sector against the smallholder farmers. The smallholder tobacco contract farming received much attention after the FTLR and has realized a positive developmental trend in tobacco production regardless of the various challenges associated with it.

It is the objective of this study to investigate the factors that influence participation of tobacco smallholder farmers in contract farming in light of the inherent challenges and alleged exploitative behavior within the system. There is no study that was previously done in Zimbabwe in respect of determining factors that determine tobacco contract farming participation. TIMB (2013) mainly attributes increased participation to challenges faced by farmers in obtaining agricultural finance from the open market. However, the study investigated beyond this by including demographic and socio-economic factors likely to force farmers to participate in contract farming. The study recognizes the importance of smallholder farming in the distribution and improvement of incomes of the rural population. It is further motivated by the fact that improved rural income helps to improve rural food security and nutritional diversity.

1.6 Research objectives

The overall objective of the study is to identify the factors that influence the participation of smallholder farmers in contract farming given the associated challenges and alleged “exploitative” behavior by contractors.

The specific objectives are to:

- investigate the determinants of participation in tobacco contract farming by smallholder farmers in Zimbabwe;

1.7 Research questions

- What are the determinants of tobacco contract farming participation in Zimbabwe?
- What policy prescriptions can be given to the Government in relation to reasons why farmers are participating in tobacco contract farming?

The following methodology is used to achieve the study objectives and to answer the research questions:
Collection of primary data through the use of a two-stage stratified random sampling technique is applied to this research to obtain a relevant and unbiased sample. Stratified sampling is chosen in order to collect data from both contracted and non-contracted farmers. STATA-11 is the statistical software used for estimating a logit model where farmer participation is the independent variable and human capital, economic, demographic and farm specific factors are used as explanatory variables. The study use participation in contract farming as the dependent variable taking the value of 1 for contract farming participation and 0 for non-participation. A logit regression model was chosen for its ability to determine the effects of variables on the probability of farmer participation.

1.8 Justification of the study
This research will contribute to fill the knowledge gap in this area of study in Zimbabwe. The inclusion of a transaction cost variable such as asset specificity as part of explanatory variables put theory of information economics into practice. As the investment in specific assets increase, from theory, parties to a transaction are likely to enter into contracts to protect their interests and value obtained from these assets, but there is no available empirical literature to show the relationship between asset specificity and contract participation. The inclusion of this variable as part of the explanatory variables will contribute to the New Institutional Economics’ view.

The study considers ecological regions as possible explanatory variable differing from previous studies that have generalized policies not considering the potential impact on entering contract farming stemming from differences in ecological regions. Also it will bring to light the factors that have given contract farming popularity in tobacco production regardless of its problems to the farmers. It is hoped that the knowledge generated by this study will assist companies and farmers in improving their contracting systems and ultimately result in improved farmer livelihoods and national economic growth.

1.9 Scope of the study
The study targeted tobacco farming and used data drawn from Zimbabwe’s 7 tobacco producing provinces. Farmers were further drawn from 36 main tobacco producing districts while capturing the ecological region of each farmer. The data used was drawn in such a way that it helped modeling a farmer’s decision to enter into contract farming or not in Zimbabwe. It tried to
explore if the different transaction costs incurred in different geographical locations influence farmer’s decision. The study will make use of cross-sectional data for the 2012/13 tobacco growing season. The period under study has also been chosen because it is the most recent period and will consider tobacco farmers who are currently on contract farming and those who are not so that policy recommendations will be suggested. Furthermore, under this period there are no misalignments of exchange rate as it has been eliminated by the adoption of multicurrency system.

1.10 Organization of the study
This study is organized in five chapters, including this introduction. Chapter 2 details the review of literature, the theoretical framework, related studies as well as review of empirical studies. Chapter 3 details the methodology, model specification and a detailed discussion of the variables and the methods and procedures which will be used to collect the data which will be utilized in the study. Chapter 4 will present and discuss the results of the estimated determinants of participation and summary statistics of the variables used in the study. Chapter 5 will wind up the study by presenting the conclusions, of the major findings, recommendations and suggestions for future research based on the findings.
CHAPTER TWO

THEORETICAL AND EMPIRICAL LITERATURE REVIEW

2.0 Introduction
In this chapter presents the theoretical and empirical literature to solve the problem of the factors that affect participation of farmers in tobacco contract farming in Zimbabwe. Firstly, the chapter reviews the theoretical models of contract farming. We develop a theoretical model of participation in contract farming as supported by theory and empirical findings. It is unfortunate that there are no studies that had tried to solve our problem in Zimbabwe, our empirical literature therefore relates to studies in crops different from tobacco while many of the studies reviewed were done outside Zimbabwe. Review of studies is also done on smallholder participation in contract farming schemes. The review of both the theoretical and empirical literature will be useful in identifying the variables and methodology to be used in modeling participation in tobacco contact farming in Zimbabwe.

2.1 Models of contract farming
According to Eaton and Shepherd (2001), contract farming is structured in terms of key stakeholders involved, product and the intensity of vertical coordination between the contractor and the farmer. There exist various models of contract farming from which factors influencing participation of farmers in contract farming can be inferred.

2.1.1 The Centralized Model
In the view of the central model of contract farming, a tobacco farmer can be believed to join contract farming to solely benefit from a controlled production process and a predetermined market. This view is based on the fact that in the centralized model of contract farming, the contracting firm has control over the production process (production management) through input and technical support and it will further buy the product at predetermined quantities and under strict quality control from a large number of small farmers (market contract) (Woodend (2003) and Gibbon et al., (2009)). Farmers’ skills, intensity of the risk and the characteristics of the
product determine the involvement of the contracting firm. Tobacco, together with sugar cane which needs a high degree of processing generally fits under this model.

This model applies to the Zimbabwean tobacco production blends aspects of market, resource providing and production management contracts. In a market contract, pre-harvest agreements that specify delivery time, price, quantity and quality of the product, and can be verbal or written agreement exist between a farmer and a tobacco merchant (contractor). The farmer makes most management decisions and retains product ownership over his/her farming periods. In this type of contract, price risk is shared between the farmer and the contractor. Reduced cost of gathering and exchange of information on price, quality, timing and demand assist in reducing market risks and uncertainty. Also increased information availability reduces coordination cost.

Minot (1986) noted that in addition to market provision for the product, resource providing contracts also provide on a credit basis, key inputs at various stages of production to farmers. The repayment of credit is made when the crops are sold. This contract leaves a significant part of the risk and most production decision with the farmer and focuses mainly on provision of inputs and output market. Risks of getting appropriate input on time for farmers are reduced under the contract arrangement. Reliable supplies of required quality and quantity and lower selling price are the benefits that accrue to the buyer. The success of this type of contract is centered on timely delivery of inputs. When the product quality depends on the inputs used, then this type of contract is used as the case in tobacco.

Contrasting to the market contract described above, production-management contracts exist when farmers agree to follow precise production methods, specific cultivation, input use and harvesting systems. In this type of contract the contractor has more control than in the market contract. Usually this type results in high quality product and reduced costs of production since steps of production are under supervision. The farmer shares with the contractor most of the decisions over cultivation and harvesting practices. The risk to the contractor may increase with inefficient farmers.
One would argue that farmers may enter contract farming because of poverty and lack of technical skills of production. Given the structure of the centralized model, a poor farmer with skills of tobacco production can enter contract farming to benefit from input support. However, one may also be rich but lacking technical skills of tobacco farming, thus the model provides that there may be possibility of a farmer to enter contract farming to benefit in technical skills. This rich but technically lacking argument for joining contract farming may however be relevant in the case where extension services by the government are non-existent or weak. These arguments seem to be relevant in the Zimbabwean scenario where beneficiaries of FTLR programme, and subsequently tobacco farmers were not assessed on their financial capability and technical skills before they enter into production.

It can be argued that, the perspective above put the farmer at an exploitative disadvantage. This is because the farmer can be perceived as more risk as s/he is poor and maybe lacking technical skills. The contractor, thus have to be more involved in the production process to ensure the supply of quality products. In addition, the farmer’s main inputs remain land and labour which may be of less value compared to those supplied by the contractor. This may leave the farmer with less power to negotiate a favorable contract. This model of contract farming points to the likelihood of exploitation as the contracting firm tries to be risk averse and benefit from the weak position of the farmer.

2.1.2 The Nucleus Estate Model
The centralized model and the nucleus estate model points towards the need for technical and input support as key in contract farming participation. The firm illustrates and demonstrates technological applications and farming systems to the farmers and supply relevant farming inputs, and pesticides as well as equipment and machinery in full. In the nucleus estate model, in addition to sourcing from independent farmers, the contracting firm has its own farm for production. The firm secures tobacco supply throughout the year. Sometimes the estate is used for research and breeding purposes. This model is not being applied under the current scenario of tobacco contract farming in Zimbabwe. However, it can be inferred from the model that one enters contract farming for benefit of input supply and technical support. Despite the differences in how contract farming is structured, both models point out poverty, lack of inputs, technical
support, machinery, equipment and finance to likely determine one’s participation in contract farming.

2.1.3 The Multipartite Model
Farmers under a multipartite model benefit from input supply, technical support, production management and processing and marketing of the product. Under the contract model, it can be argued that the integration of effort of many actors to reduce the burden of contracting parties making the model suitable for smallholder farming, as evidenced by case studies in Vietnam and China (ADB, 2005). The multipartite model is a joint venture between legal bodies and private companies jointly contracting farmers. Under this model a separate organization is usually responsible to supply technical support, inputs, production management, processing and marketing. Joint ventures of the private sector and the government may act as the facilitator to investment in contract farming.

2.1.4 The Informal Model
Credit provision is identified as the most important reason for engaging farmers in contract farming under this model while the government provides extension services. Crops such as vegetables and fresh fruits which require a minimal amount of processing can be contracted under the informal model. In this model farmers are informally contracted on a seasonal basis by small companies. Since these companies do not invest in technical support, their achievement of contract farming depends on the government support such as government extension services. This method enables farmers to get credit from traders, which means they sell their crop before harvest. The biggest disadvantage of this model is that at times, the price turns out to be lower than normal market price. While tobacco contract farming participation can be explained by the centralized model than the informal model, the later suggest accessing credit as one of the most important reason that may determine participation in contract farming.

2.1.5 Asset Specificity, Uncertainty and Frequency of Transactions
Asset specificity can be argued as a potential explanatory variable of contract farming participation. Tobacco farming is characterized by asset specificity and uncertainty. Asset specificity can be defined as an investment made by the buyer or farmer that is meant specifically for that transaction and has little or no value in an alternative use. The asset receives the highest value from that particular transaction. This characteristic may result in “lock-in/ hold-
up problems”. The incentive to enter into a contract increases as the degree of asset specificity increases. Bans for tobacco curing provide an example of such specific assets. If farmers had invested much in bans these bans will not yield more use in alternative use compared to tobacco curing.

Supply of agricultural inputs in Zimbabwe is a challenge. Inputs such as fertilizers and chemicals are in short supply during the production season. Under such circumstance, tobacco production may be solely affected such that the farmer may fail to optimize the use of specific assets. Thus in order to secure optimal use of specific assets, the farmer may enter into contract farming where inputs are provided. Thus one would argue that farmers that have invested in specific assets such as bans are more likely to participate in contract farming. This argument is convincing in the event that the concerned farmer also lack other sources of credit.

2.1.6 Opportunistic Behavior under Bounded Rationality
Participation in contract farming can be determined by opportunistic behavior by farmers as in the presence of bounded rationality. Opportunistic behavior arises when one party to a transaction seeks personal benefits without considering the other party. This situation often results when one party to a transaction is more informed than the other. This behavior is quite often when parties enter into contracts. With opportunistic behavior, parties may voluntarily provide incomplete and/or biased information or make promises which they may not keep. Bounded rationality can be defined as the lack of capacity of the parties to formulate and solve complex problems in a costless and straightforward way, (Bijman, 2008). In an effort to curb these problems, transaction costs for the other party who agrees to the contract may be higher due to higher monitoring costs. Farmers may have opportunistic benefits from contract farming arrangements that are not displayed to the contractor. These may include access to financial credit which they may use in other projects different from tobacco production itself. Such behavior exists because even inputs from contract arrangements may not be entirely used for tobacco production; this may explain participation in tobacco contract farming.
2.2.0 Empirical Literature Summary

2.2.1 Household Contract Farming Participation in African and Asian Countries
Musara et al (2011) carried out a study on the determinants of smallholder cotton contract farming participation in Patchway district in Zimbabwe. Purposive sampling and snowballing techniques were used to select the 100 respondents in the villages studied. Data was collected using focus group discussions, observations and questionnaires. Logit regression model and Friedman rank test was employed in the study to analyze the data. Land size, dependency ratio, years of schooling, age, access to other income, duration growing cotton, and years of schooling-by-age interaction were the independent variables in the study and a dichotomous dependent variable, contract farming participation, taking a value of one in case of farmer participating in contract farming and zero otherwise.

The regression results indicated that land size, dependency ratio and duration of growing cotton were significant and positively related to contract farming participation, while years of schooling, age and access to other income were negatively related to participation and significant. Although education-age interaction had the expected sign, it was statistically insignificant. The negative sign of the age variable could be explained by the negative correlation between age and adoption decision for most technologies in dynamic economic environments. Older farmers tend to be less willing to adopt and tend to be risk averse and avoid the initiative to avoid the risk associated. However, Norsidia (2007) observed that chances to participate in contract farming increases with age because older farmers have more appreciation on the importance of agricultural activities in most rural set ups.

The study by Musara et al (2011) gives a fair representation of the determinants of contract farming participation. The use of a relatively large sample in the study gives the study strength, and makes the results more credible and accurate. This study however, may be considered to be less informative because it did not include factors such as gender and distance from main road which were found to be significant determinants of participation, (Maertens and Swinnen, 2007.,Nor Aini, 2003., Benfica et al 2006., Wainaina, 2012)
Randela et al (2010) carried out a study to determine the factors enhancing market participation by small-scale cotton farmers in Mpumalanga, South Africa. The study used data collected from 177 small-scale farming households and a logistic regression model applied within the transaction costs framework to identify factors that significantly influence the degree of commercialization and/or market participation. Results supported the hypothesis that transactions costs rank among the main determinants of commercialization. Statistically significant variables were age, ability to speak/understand English, region, ownership of transport, access to market information, distance to market, dependency ratio, trust, land size and ownership of livestock. Dependency ratio, trust, land size and ownership of livestock negatively affect commercialization. The negative relationship of land size to commercialization may indicate that increased market participation is also a function of input (land) productivity.

Wainaina et al (2012) first determined the factors that influence the decision by farmers to participate in contract farming before examining the impact of contract farming on smallholder poultry farmers’ incomes in Kenya. Using logit regression, family size, experience, education, gender, age composition, occupation, risk attitude, farm size, total assets, brooder capacity, credit, group membership, farm income, non-farm income, distance to main road and extension services were the independent variables. Only age, education, farm income, off-farm income, gender, extension services, distance to main road and risk attitude were found to significantly influence the probability of participation, at least at 10% level. Contrary to expectation, results showed that households which received technical advice from extension agents have 0.19 lower chances of participating in contract farming compared to those farmers who have no access to these services. This finding suggested that farmers who accessed technical advice from extension agents are likely to be informed and aware of alternative marketing channels and also production methods. The results also indicated that male farmers have a marginal effect of 0.22 higher chance of participating in contract farming than female farmers. This could be attributed to the disproportionate ownership of productive assets by males in Kenya.

Similar determinants where also considered by Angula (2010) in an effort to find the determinants of sustainable coffee marketing channel choice and supply response among organic
and certified smallholder Uganda farmers. The study used the Cragg (double hurdle) model which was also previously used by Holloway et al (2002) and Mark et al (2009). The first part of this model is given as participation model which is similar to the Probit model. Ability to hire labour, household size and farm size were found to have a positive and statistically significant effect on the probability of participation. Contrary to the author’s expectation that age is negatively related to participation, older household heads participated more than younger farmers. This finding was consistent with what Wollni et al., (2008) found in organic markets during their study of Honduran farmers. However, studies by Marenya and Barret (2006), Knowler and Bradshaw (2007), found younger farmers to be more receptive to new ideas and are less risk averse.

Using detailed household level data and controlling for possible selection bias in participation, Benfica et al (2006) carried out a study on the determinants of farmer participation and performance in the Zambezi river valley in Mozambique. Stratified random sampling was employed to select 117 growers and 42 non-growers. The factors that influenced participation were determined using the Probit model and Heckman selection bias model to control for selection bias.

The study found no statistical differences in terms of demographic characteristics such as age of the household head, household size, labour endowments and education in the tobacco sector. Gender was almost statistically significant with non-participants more than twice as likely to be female-headed. In the cotton sector, only educational attainment of the household head is statistically different between contract and non-contract farmers. Results suggest that non-contract households had higher formal educational attainment. This is similar to the result found by McLarty, (2005) who found university graduates to be passively involved in agriculture. This was supported by studies done by Bahaman et al. (2009), Md. Salleh et al. (2009) and Hayrol et al. (2009) that proved that agriculture is among the main choice for those with lower education group. In the same study, technology, income diversification opportunities and asset endowments are more associated with household participation in contract farming than with demographic characteristics. Agro-ecology was also found to matter to participation.
Treatment effect model or Heckman selection-correction model was employed by Olomola (2010) in a study on contract farming in Nigeria. Selection bias is corrected and adjusted for in this model by the adoption of the maximum likelihood technique in the model estimation. The model controls for unobservable characteristics that may cause differences between non-contract and contract farmers. These unobservable characteristics may include the risk attitude of the farmer and entrepreneurial skills. The study also used the Probit model in which age and availability of land are observed as the predictors of rice contract farming participation while the Heckman model also include crop mix to the predictors.

In the same study, soya bean is also considered in which size of the household, age and availability of land were identified from the Probit model to significantly influence participation. The results from the sample indicate that 72% of the farmers in the sample are correctly predicted from the model will have contracts. Size of the household and farm are identified as the predictors from the selection equation of the treatment effects model. Furthermore, results show that farmers with smaller land size are less likely to participate in either rice or soybean contract farming.

In another study Meshesha (2011) assessed the impact of contract farming on household income of smallholder organic honey farmers in Sheka Zone in south west Ethiopia. Socioeconomic and institutional characteristics of households were collected from both contracted and non-contracted beekeepers. The descriptive statistics of the total sample respondents in terms of literacy level shows that 29.7% and 70.2% are illiterate and literate respectively. The results show no significant difference in literacy level between contracted and non-contract beekeepers. Consistent with Benfica (2006), age and education level of household head showed no significant difference between contract and non-contract farmers. In contrast, significantly different mean value at 1% critical level was noticed in total family size, family members and quality aspects between contract and non-contract farmers. Household beekeeping experience and transitional hives owned also show significant difference in mean values at 10% and 1%
respectively. Furthermore, annual income showed significant mean difference at 1% level between contract and non-contract beekeepers, with contract farmers earning more annual income than non-contract farmers. This difference could be attributed to the higher price offered to farmers under contract farming and the difference in transitional hives owned that help contracted farmers to supply honey of a better quality compared to non-contract farmers.

A farmer survey conducted by Sribooncitta et al., (1996) found that 52% of the respondents joined contract farming for market certainty of their produce, 46% for price stability, 28% for provision of input on credit and 35% observed their neighbors gained higher income. Other reasons identified included lack of alternatives and expectation of higher price. In a similar survey Wiboonpongse et al., (1998) observed that 52% of farmers keep contracts because of high return from contract crops, while 16% indicated they did not know other alternatives and 11% accounted for certainty of market outlet. Furthermore, in a study in Chiang Mai by the Sriboonchitta and Wiboonpongse (1998), the contract vegetable soya bean, cucumber and maize seed farmers had learned new knowledge directly from the firms’ extension staff. This was consistent with Manarangsan and Suwanjindar (1992) who reported that farmers participating in contract farming projects of oil palm, pineapple and asparagus gained new technical knowledge from input suppliers who launched sale promotion (e.g. demonstration plot).

In an effort to establish the welfare and poverty implications of increasing standards on fresh and processed fruits and vegetables exports in Senegal, Maertens and Swinnen (2007) first assessed characteristics of fruits and vegetable farmers. The results show that households differ substantially in their access to human, physical and social capital. Also contract farmers come from households with more labourers and a slightly higher education. The result was consistent with Isin et. al., (2007), Marenya and Barret (2006), and D’Souza et. al. (1983) who postulates that education attained by the household head does positively influence adoption of contract farming. No female-headed households were involved in contract farming. Contract farmers had on average larger farms (6.8 hectares) compared to 4.9 hectares for non-participating households, more livestock (4.1 units) compared to 2.9 units. Farmers’ organizations and regions closer to exporting companies and shipping facilities were also observed to influence participation.
The study also point out that households can decide (based on their preferences and access to resources) to participate and self-select into contract farming, meanwhile, exporting companies might select or exclude potential contractors based on their skills, access to resources, etc. Increasing transaction costs in sourcing from distant (or isolated) farmers might cause some geographic selection by firms. These observations are consistent with economic theory which states that individuals and firms are rational economic agents given choice.

Miyata et al., (2009) conducted a study in China on linking small-farmers, packers, and supermarkets and the impact of contract farming on their income. One of the objectives of this study was to investigate the extent to which less educated and small-scale farmers participate in contract farming schemes. The study uses farm survey data carried out by the International Food Policy Research Institute (IFPRI) and the Chinese Academy for Agricultural Science (CAAS) in Shandong Province, China. A questionnaire that include questions on household characteristics, assets, crop production and marketing, other sources of income, input costs, credit, contractual details, and perceptions of changes over the previous five years was administered on a sample of 162 households growing apples or green onions. To estimate the probability that a given household will participate in a contract farming scheme, the Probit model was used. To address the question of whether contract farmers tend to be better endowed than non-contract farmers, household size and composition, age of household head, education of household head, and ownership of land and other assets are used as the regressors in the model.

The results indicated that differences are not statistically significant in terms of household members, age and schooling of household head and cultivated land between contract and non-contract apple and green onion farmers. Statistically significant differences were observed in agricultural assets, with contract farmers having more assets than non-contract farmers. The results show no evidence of bias against less educated farmers since the education of the household head is weakly related to contract participation, but the relationship is U-shaped. The results also indicate that 93% of the farms in the sample are correctly predicted in the model will have contracts.
Guo et al (2006) explored contract farming in China using data collected from Zhejiang, Jiangxi and Shangdong provinces. This study was qualitative in nature. In the study, market access (56.4%) and price stability (33.2%) were identified as the key motivations to participate in contract farming. However credit support (7.7%) and technology support (2.7%) offered by contracting firms were also identified by some households. The same study also assessed reasons why households do not participate in contract farming. 52.2% had no opportunities, 20.7% found no obvious benefits, 2.6% found process too complicated and 24.5% owing to small scale.

Using nontraditional vegetable exports from Zimbabwe, Masakure and Henson (2005) did a study to assess reasons why small-scale producers choose to produce under contract. 114 men and 186 women were interviewed in the survey of 300 small-scale farmers, which accounted for 38% and 62% respectively. From the results, 11 factors relating to market uncertainty, indirect benefits, income and intangible/latent benefits were identified to motivate farmers’ participation. Market uncertainty reasons include guaranteed minimum prices, guaranteed market for crops, reliable supply of inputs and no need to transport crop to market. Indirect benefits accounted for 25.6% of the variation and these include acquire knowledge for use on traditional crops, stepping-stone to other projects and acquire knowledge for use on new crops. 19.3% of the variation accounted for income which include earn extra income and lack of alternative sources of income as reasons for participation. Intangible and or latent benefits only accounted for 9.4% and the reasons included that they saw benefits to other farmers and get satisfaction from growing export crops.

Keshavamurthy (2005) studied contract farming in gherkin production in Karnataka and found that friends, relatives and neighbours influenced the decision to participate in contract farming. The study observed that all the contract farmers were influenced due to assured market for gherkin (100.00%), as well as good irrigation sources for taking up gherkin production (100.00%), as the major factors, followed by the factors like higher returns (92.50%), timely supply of inputs (87.50%), low risk i.e., market fluctuation and assured returns (83.33%), more favourable climatic condition (78.33%), short duration (70.83%) were the major factors
influencing participation in contract farming. Other authors such as Patil, 1995; Gattu, 2001; Neelaveni et al., 2002; Anitha, 2004; Suresh, 2004, noticed that access to mass media such as radio, television and newspapers influenced participation of farmers.

2.2.2 Small-scale versus large-scale participation in contract farming

Contract farming can be an interesting institution for poverty reduction strategies if it integrates small-scale farmers. Generally, smallholder farmers are considered to benefit from contract farming because it provides them with technical assistance, inputs on credit and often a guaranteed price, allowing them to produce a higher-value crop than would otherwise be possible, (Minot, 1986). According to Bijman (2008) contract farming also helps farmers to reduce production risk, improve market access, achieve higher yields, diversify into new crops, and to increase income.

Bijman (2008) noted that at least three constraints limit the potential of small-scale farmers to increase productivity and income in developing countries. Small-scale farmers where noted to lack the necessary information on production methods and the available market opportunities, especially on crops that they rarely grow. Even if they get sufficient information, they often lack the necessary financial reserves and lack of collateral and/or high interest rates demanded by financial institutions often limit their access to credit. Unlike large farmers, small farmers operate near subsistence and are more risk averse. Before expanding commercial production for an uncertain market, small farmers generally prefer to assure themselves a minimum food supply. Large-scale growers were clearly preferred by foreign processing companies as was found by Key and Runsten (1999: 396). According to their findings, transaction costs associated with negotiation, providing inputs, credit, extension services, monitoring of quality, and product collection and grading appears to be the main disincentive for firms to contract with smallholders. Also contractors may favour sourcing from middle to large scale farmers because large farmers usually have better skills and more resources available which lower the probability of producer default.

To estimate the likelihood of participating in contract farming, Guo et al. (2005) used data from farm-level surveys on household characteristics, crop mix, and farm size covering several
products in China. The results from the study indicated that small farmers were less likely to participate in contract farming than large farmers.

In the tomato-processing industry in Mexico, Key and Runsten (1999) found that multinational Agro-processors from the United States first contracted with large growers but then involved small growers. They argued that firms found it increasingly difficult to enforce contracts they had with larger growers.

In Indonesia, Simmons et al. (2005) found that contract seed growers had larger farms than independent growers. In contrast, contract poultry producers tended to be smaller than independent poultry growers.

Some reviewed empirical evidence suggests that whilst contract farming does include smallholders, the middle peasantry are included and not the poorest of the poor. The landless and tenants are excluded because contract farming usually requires a legal title to land. It is argued that many of the smallholders who become contractors already have some experience of cash cropping and some non-agricultural income alternatives which allow them to bear the risk of signing a contract. Goldsmith, (1985) postulates that many contract farming schemes are located in high potential areas with fertile soil and access to irrigation and transport. Similarly Little and Watts (1994) surveyed 7 countries and found that contract farming occurs in areas in which commercial agriculture is already entrenched and many a times involves middle and upper class peasants who already have off-farm sources of income.

It can be argued that contracts requirement of a minimum land size, good health, a proven ability to hire labour or enough family labour, many projects prefer a married status and sometimes even education or prior experience with the crop further discriminates against poorer farmers.

Similarly, in the research conducted by Freguin-Gresh et al (2012) in the Limpopo Province of South Africa on whether and how contract farming can provide viable market opportunities for small-scale farmers in South Africa. The study used the Probit model as part of the Heckman
model, to analyze the determinants of participation in contracts. The results from both qualitative and econometric analyses showed that contract farming is not a panacea for small-scale farmers. The study further highlighted that contracts mostly involve the already well-off, who are either large-scale managerial commercial farmers who have benefited from public support during apartheid which further enable them to become highly productive, well-equipped and well-inserted in output markets, or medium-scale farmers who have benefited from case-specific public programmes and/or social or political connections. The existence of entry barriers for small-scale farmers in concluding contracts (production and commercialization scales, education and asset endowments such as access to land and irrigation) was confirmed by both the qualitative and quantitative analyses. Small-scale farmers with limited access to assets and rely mainly on diversified incomes (part time work, social grants etc.) to sustain their livelihoods, remain excluded and thus often marginalized. Having limited access to assets and relying mainly on diversified incomes such as income from part time work and social grants, small-scale farmers remain excluded and thus often marginalized. Similar and supporting results were also found by Losch et al., 2010, Poulton et al., 2010 and Vorley et al., 2007)

Tobacco merchants are said to prefer to work with larger farmers. However, little evidence was found by Miyata et al. (2007) to support that contracting firms prefer to work with larger farmers, when he studied contract farming in horticulture in Shandong Province, China. In addition, no clear preference for middle to large-scale producers against small-scale was found in a study of contract farming in Costa Rica by Pomareda (2006) Instead he found that, more interesting to contractors was responsible behavior and low risk exposure than the size of the holding.

Other studies argued that vegetable contractors prefer to contract with smallholders because they make use of family labour and usually are more dedicated. Similarly, Bithal et al. (2005), found no structural preference of contractors for large-scale producers in the study of contractual arrangements adopted by different firms to integrate small-scale producers of vegetables, milk and broilers in supply chains. The authors instead, observed that contractors found it more convenient to contract with small-scale farmers and their associations, in India. They argued that
in the event of crop failure of a few or one smallholder farmer(s), the overall effect on supply is lower, and the production portfolio of smallholders is more flexible. The flexibility of smallholder farmers enables them to quickly respond to changing consumer preferences and meet the contractors’ demands. Lower bargaining power and more family labour enable smallholders to strictly comply with the production practices advised by the contracting firm and hence ensuring better quality. Furthermore, dependency on contracting firms for profit maximization by the smallholders is also engraved by the little/ low marketable surplus,(Birthal et al. 2005:21).

In Senegal, Maertens and Swinnen (2006) found that green bean exporters switched from small-scale contract production to large-scale contract production. These results indicate that the comparative advantage of smallholders is not a static concept. Comparative advantage can change as farmers and buyers experiment and learn from experience.

2.3 Conclusion
Theoretical and empirical literature presented in this chapter show the models and types of contract farming, and the research done so far on contract farming. Empirical literature on the determinants of contract farming participation was drawn mainly from developing African and Asian countries. Literature was also reviewed on small-scale farmers’ participation in contract farming. However, much of the literature was on other crops other than tobacco and little research was done on the effect of transaction cost economics. Guided by previous researches, this study seeks to assess the determinants of contract farming participation by tobacco smallholder farmers in Zimbabwe. Based on the theoretical model developed, Chapter 3 will present the empirical model and discuss measurement of the proxies of factors theoretically and empirically justified as determinants of participation in contract farming.

CHAPTER 3

METHODOLOGY

3.0 Introduction
Contract farming is an institutional arrangement that researchers ascertain a model that predicts the factors that determine farmer participation using relevant predictors. This chapter will give an
outline of the procedures and methods employed to identify the determinants of tobacco contract farming participation in Zimbabwe. The chapter further defines and discusses various variables thought to influence contract farming participation. In addition, data collection and descriptive analysis of the data will be carried out. We therefore state the estimation procedure, specify the estimated model as borrowed from the literature, justify the variables through logical deduction of theory and describe the data used in analysis.

3.1 The Theoretical Model of Contract Farming Participation

The study builds a theoretical model of contract farming participation based on contract farming models discussed above and the summary of literature that follow. In this model that we support with empirical literature on contract participation in different crops across countries, tobacco contract farming participation is given as a function of demographic, human capital investment, socio-economic and farm-specific factors as shown below:

\[ \text{Participation} = f(\text{demographic, human capital, social-economic, farm specific factors}) \]  

In the model above, demographic influence on contract farming participation is measured by age, household size, gender, and sex. Among the socio-economic factors are prices, income sources, sources of credit, farm assets, and dependency ratio. Proxies of farm-specific influence include farm size, soil types and quality, agro-ecological regions and infrastructure while human capital investment include education, training, experience in farming and access to extension services. These factors are expected to interact in diverse ways that influence a farmer’s decision to participate or not.

Socio-economic factors points the extent to which poverty and financial issues affects farmers’ decision to enter contract farming or not. They are diverse and their relation to contract farming participation is grounded in the models discussed above. Models above points out that a farmer is likely to join contract farming to gain access to the market, reliable input supply, technical support, improved information availability, improved market prices, credit provision and some latent benefits. These factors are however likely to interact in diverse ways and the extent to which they affect contracting farming participation in Zimbabwe is what this study established.
Masakure and Hanson (2005) as supported by Guo et al (2006) argued that guaranteed prices and market, reliable inputs supply and transport to the market were the main reason why small scale farmers chose to produce under contract in Zimbabwe. Farmer participation was further motivated by market uncertainties, indirect benefits, income sources and intangible/latent benefits. Guo et al (2006) supported Masakure and Hanson as their study reviewed that infrastructure development or network (market access) are the key motivators for farmers’ participation in contract farming. Credit and technological support were further mentioned by Guo et al (2006) as other motivators towards participation in contract farming. Masakure and Hanson’s study was carried out using farmers in the nontraditional vegetable export crops of Zimbabwe. The study results cannot be generalized to imply the same for tobacco which is a different crop from vegetables, and is capital intensive while it is being produced by farmers who are mainly new growers. Guo’s study which was done in China may not imply the same motivators for Zimbabwe as was found in China. The two countries are different in terms of level of development, population sizes, geographical locations, and agricultural policy framework among other things; this means the possibilities of having different motivators for contract farming in Zimbabwe exists. Hence, we carried out this study that give particular attention to Zimbabwean tobacco farming.

Our theoretical model considers various demographic attributes of farmers to interact in influencing farmer participation. Inclusion of demographic factors in cross sectional studies has become so familiar following the publication of household decision making theories. A number of studies (Musara et al., 2011; Randela et al., 2010; Wainaina, 2012; Angula, 2010; Benfica et al., 2006; Mushesha, 2011) related to our study have employed demographic factors that include age, gender, and marital status of household head and family size. Demographic factors such as family size, age, gender and marital status of the household head are measurements of the extent to which family decision choice is shaped by social pressure. However, family size can also be a measure of labour endowments of a family. Household head age was found to negatively affect decision to participate in cotton contract farming by Musara et al in 2011. Older farmers were argued to be less willing to accept technologies and to avoid risk. However, Norsidia (2007)
noted that older farmers tend to participate in contract farming because they appreciate the importance of rural farming activities than young farmers.

Older farmers should be expected to participate more than young farmers. With age, responsibilities increases, and social pressure from a large family, usually extended family means the farmer needs to be assured of income. That’s, in the event where agricultural inputs are not readily available such as the case in Zimbabwe, a farmer may join contract farming to be ensured of input supply together with market and good prices for support of the large and extended family. It may be argued that, a farmer joins contract farming not sorely because he wants reliable inputs but there exists some demographic influence such as social pressure. Additionally, higher dependence ratio may imply that income available to the household has diverse uses. Less income retained may not be sufficient for tobacco growing hence the need to find other mechanisms; thus the farmer joins contract farming. In light of this argument, one would expect a positive relationship to exist between dependency ration and contract farming participation as noted by Musara et al (2011) for cotton farming. It is therefore important to note that demographic factors have a role to play in influencing the decision of a farmer to participate in contract farming.

Human capital investment can also influence a farmer’s decision to participate in contract farming. Proxies of human capital investment include education level/years of schooling, training and extension service provision. From the theoretical model above, it can be noted that one of the primary purpose of contract farming initiative is to provide with technical knowhow. Contractors can control tobacco production by shaping the production process through technology. Extension services if provided by contractors further help to shape production of tobacco. However, technical knowhow can be acquired through education and training. Extension services can also be provided by government outside the contract initiative but through agricultural policy. In Zimbabwe, there exist government extension officers while tobacco contractors also provide their own officers commonly termed “field officers”. The
formal education systems also provide agricultural knowhow from the secondary level through agriculture as a subject to tertiary levels through diploma/degree in agriculture and related areas.

Human capital investment is an important characteristic that can shape tobacco contract farming participation. If contract farming initiative has extension services provision as its important component, it may be less lucrative to a farmer who has huge investment in education and training. However, formal education may not be as good as specific tobacco extension services; hence an educated farmer may also participate in contract farming for extension benefits that cements investment in education. In Zimbabwe, contract farming participation was found to be negatively associated with education (Musara et al., 2011). Benfica et al (2006) further found out that non-contract participants of the Zambezi Valley had higher education. In addition, Wainaina et al (2012) indicated that households receiving technical advice from external agents had less chances of participating in contract farming than those without. He argued that these households are more informed and aware of alternative production and marketing channels. However, agricultural activities are the choice of those with less education (Brahaman et al., 2009; Md Shellah et al., 2009; Hayrol et al., 2009; Mclarty, 2005). Given such characteristic of farmers, extension services are of prime importance in influencing tobacco production as well as influencing farmer participation in contract farming.

Tobacco contract farming participation is also influenced by farm specific factors at theoretical and empirical levels. Farm specific factors and related infrastructure included in empirical studies (Musara et al., 2011; Rundela et al., 2010; Angula, 2010) as inferred from models of contract farming includes farm/land size, soil type and quality, ecological regions, distance to markets and main roads. Models of contract farming points out that participation in contract farming is associated with resource poor households, these resource poor households are likely to be associated with location and infrastructure characteristics that are different to resource rich households. As an example of how the resource poor households are related to farm specific characteristics; resource poor households may be labeled so because they were failing to buy
fertilizers, seeds and chemicals for their large farms characterized with poor soils, while poorly linked to main roads and they are far away from market places as well as agricultural offices. This extreme case do apply in the Zimbabwean case where roads are dilapidated, tobacco market is centralized in Harare while tobacco is being produced mostly in three agro-ecological regions that differ in input requirements. Thus, the extent to which a farmer is labeled to be resource rich or poor depends on the farm specific factors.

Considering farm characteristics, capital requirements can be beyond the reach of the farmer and this necessitates the need to be contracted by tobacco merchants. Farmers that may be transiting from subsistence production to commercial production may also demand more technical advice; thus they may join contract farming. In Zimbabwe, beneficiaries of the FTLRP started by farming very small pieces of their farms as they were incapacitated and the country was experiencing economic challenges. As the farmers gained more experienced and stability they started to improve their production. They could have found it important to join contract farming so as to get assistance in input as well as technical support. Transfer costs of agricultural inputs are likely to increase with poor roads and increased distance to markets possibly going beyond the reach of the farmer. Thus the poor-resource hypothesis may be linked to farm specific factors in their determination of farmer participation in contract farming.

Cross sectional studies related to contract farming participation in tobacco production had tried to examine the relationship between farm specific factors and participation. In Zimbabwe’s cotton production, Musara et al., (2011) found that land size was positively related to contract farming participation. Distance to the market and land size significantly influenced the degree of market participation by small scale farmers in Mpumalanga, South Africa (Randela., et al 2010). In addition to farm size, Wainaina et al (2010) found out that distance to main roads significantly influence the probability of participation in poultry contract farming for farmers in Kenya. In Uganda, Angula (2010) argued that farm size positively and significant effect the probability of participation in Sustainable coffee marketing choice an supply response among the organic and
certified smallholder farmers. In Nigeria, Olomola (2010) reported that farmers with less land size are less likely to participate in either rice or soyabean contract farming. Based on these empirical findings and the models of contract farming discussed above, we support the idea that participation in contract farming depend on farm specific factors such as land size, access to main roads, and distance to market.

Our study regards participation in contract farming as a function of human capital, demographic, socio-economic and farm specific factors. In order to meet our objectives specified in chapter one, theoretical variables will be proxied by various measurable variables as specified in our empirical model in chapter three. The following section provides a summary of literature used to support our theoretical model.

3.2 Logit model

Binary choice models such as Logit and Probit are used when the dependent variable takes only two values. The binary dependent variable in this study, contract participation, takes the value of one (1) if a farmer participates in contract farming and zero (0) otherwise. Participation implies a tobacco farmer being contracted to one or more tobacco merchants. Based on this concise definition of participation, an appropriate econometric model was chosen. The Logit regression model technique of estimation is employed in this study. Logistic regression is a statistical technique used to examine the link between one or more independent variables with a dichotomous dependent variable. In this study we analyze the relationship between tobacco contract farming participation and the various demographic, transaction costs, farm specific and socio-economic variables using the logit model.

The Probit regression model has also been used by other researchers to estimate such binary dependent variable regression models. Both Probit and Logit use maximum likelihood to estimate parameters. However, the Logit model assumes a logistic distribution of the error term, while Probit assumes normally distributed error term. Consistency of parameter estimates associated with the assumption that error term in the equation has a logistic distribution makes
the logit more preferable (Ravallion 2001; Baker 2000). Sikwella (2008) and Gudeta (2005) also
used the logit model in their researches. A logit regression model is also chosen because of its
ability to determine the effects of variables on the probability of farmer participation. The Logit
model has more density mass in the bounds, (Caliendo and Kopeinig 2005). Therefore the
probability of contract farming participation is estimated using the Logit regression model to
assigned socio-economic characteristics in this study.

Maximum likelihood estimation procedure is going to be used to estimate the regression
coefficients using the odds ratio in logit transformation. The utilization of the maximum
likelihood estimation using odds ratio is referred to as logit transformation of the dependent
variable. Logit transformation transforms the independent data into probabilities versus the
dichotomous dependent data to a continuous function, ranging from infinity to negative infinity.
When the data tend to depart from normality, MLE provides important and cogent estimates and
remain relatively stable when estimating nonlinear equations. The odds ratio is given by the
following formula in equation 2

\[
\text{Odds } Y_i = \left[ \frac{P_i}{1 - P_i} \right] = e^{b_0 + b_1 X_{i1} + \ldots + b_n X_{in}}
\]  

(2)

Where \( P_i \) measures the probability of participating in contract farming,

\( 1 - P_i \) measures the probability of farmer \( i \) not participating in contract farming and

\[ Y_i = e^{b_0 + b_1 X_{i1} + \ldots + b_n X_{in}} \]

represents the econometric regression model to be estimated.

\( b_1, \ldots, b_n \) – captures the coefficient of the explanatory variables.

\( X_{i1}, \ldots, X_{in} \) – measures the explanatory variables.

Decreased likelihood of participating in contract farming is shown by an odds ratio of less than
one while an increased likelihood of participating is shown by an odds ratio of greater than one.

Logit is given by the log of the odds ratio as follows:

\[
\ell n Y_i = b_0 + \sum_{i}^{n} b_i X_i + u_i
\]

--------------------------------------- [3]
3.3 Model specification

Model specification is given as follows:

\[ Y_i = b_0 + \sum_{j} b_j X_{ij} + \mu_i \] \[ \text{[4]} \]

Where:

\( Y_i \) = participation (Pat) in contract farming by household \( i \)

\( b_0 \) = constant coefficient

\( b_j \) = a vector of coefficients estimates for \( X_{ij} \).

\( X_{ij} \) = vector of exogenous determinants of participation.

\( \mu_i \) = error term

The general to specific modelling technique will be used to eliminate insignificant variables so as to remain with significant variables only. Stata version 11 will be used to estimate the equation above, and identify significant variables to the model. Stata is chosen because this program automatically drops variable \( X \) that perfectly discriminates between \( Y=0 \) and \( Y=1 \) because the logit will be infinite and the respective coefficient goes towards infinity. The remaining significant variables will then be used to estimate the odds ratios.

Maximum likelihood estimation procedure is used to estimate the regression coefficients using the odds ratio in logit transformation. The maximum likelihood (ML) estimator maximizes the log-likelihood function. The likelihood gives us the probability that the observed values of the dependent variable will be predicted by the observed independent variable data. Odds ratio is given as follows:

\[ \frac{\Pr[Y_i = 1]}{\Pr[Y_i = 0]} = e^{b_0 + \sum_{j} b_j X_{ij} + \mu_i} \] \[ \text{[5]} \]

Where: \( \Pr[Y_i = 0] \) is the probability that farmer \( i \) will not participate in contract farming.
Logit is given by the log transformation of the odds ratio as follows:

$$\ln \left( \frac{\Pr[Y_i = 1]}{\Pr[Y_i = 0]} \right) = b_0 + \sum_{i}^{n} b_i X_i + u_i$$

To determine the average partial effects of the independent variables on contract farming participation, marginal effects will be computed to give the quantitative effects of the determinants.

### 3.4 Empirical Model

The empirical model is also referred to as the functional form of the model. In this study the logistic regression model will be applied following the empirical models applied by Wainaina et al (2012), Musara et al (2011) and Randela et al (2010).

Participation= f(age, age squared, gender, off farm income, education, farm size, household size, experience, distance from main road, asset specificity, extension services ecological region, access to credit,)

Or

\[
\text{pat}_i = b_0 + b_1 \text{age} + b_2 \text{age}^2 + b_3 \text{sex} + b_4 \text{edu} + b_5 \text{size} + b_6 \text{hsize} + b_7 \text{years} + b_8 \text{rdac} + b_9 \text{aspe} + b_{10} \text{evis} + b_{11} \text{eco} + b_{12} \text{ca} + \mu_i
\]

### 3.5.0 DEFINITION AND JUSTIFICATION OF VARIABLES

The selection of variables was based on the literature in related studies, the researcher’s perception on socio-economic as well as institutional dynamics of the study area. Conceptual framework on the factors that are known to affect tobacco contract farming was provided by a thorough theoretical literature review. The possible determinants of tobacco contract farming participation were identified by empirical literature review.

#### 3.5.1 Contract participation (pat)

Contract farming is the dependent variable in the model. A value of one (1) is assigned to a household who participates in contract farming and zero (0) otherwise. To come up with a model of the factors that influence contract farming participation in tobacco, data is collected on the independent variables which are household head’s age, size of household, household head’s
education, size of the farm, credit, extension services, distance from main road, asset specificity, ecological region, experience and gender. The logit model is employed to determine the influence of these characteristics on tobacco contract farming participation. Wainaina (2012) and Musara et al (2011) also used similar method to determine the factors that influence contract farming participation in their studies.

**Human Capital Investment**

3.5.2 Education of a household head (edu)

This variable will be used as a continuous variable. The variable will be measured by the number of years of formal schooling that the farmer has attained. Musara (2011) found that, farmers’ participation in contract farming was significantly influenced by the level of education, but with more achievements in academics tending to decrease participation. Miyata, et al (2009), however found no bias against less educated farmers as the education of the household head relates to contract participation, though the relationship starts by falling and then rise continuously. Therefore this study expects the relationship between education and contract participation to fall up to a certain point and then rise, although the relationship may either be weak or strong.

3.5.3 Extension services (evis)

The variable will be continuous, measured by the number of visits by extension agents/officer that a farmer received per season. Bijman (2008) noted that smallholder farmers participate in contract farming because they lack technical assistance. Hence, in this study, extension services are expected to positively influence contract farming participation.

3.5.4 Experience (fyears)

This is a continuous variable measured in years. It measures the number of years the farmer has been exposed in the production of the crop. Meshesha (2011) concluded that experience significantly influenced contract participation in honey production in Sheka zone. Musara(2011) found a positive relationship between experience and contract farming participation. However, it can be argued that as the number of years of growing tobacco increase, the farmer will be able to self-finance farming activities from previous proceeds hence reducing the chances of participating in contract farming. Therefore, in this study there is no a priori sign expectation of how experience influence contract participation.
Demographic Factors

3.5.5 Gender (sex)
Gender is captured as a dummy variable with male assigned one (1) and zero (0) otherwise. Maertens and Swinnen, (2007) found no female-headed household participated in contract farming in Senegal. Child care and responsibility for household tasks limits the agricultural activities of women and these are among the major problems why women find it difficult to accept contract farming (Nor Aini, 2003). Similar results were displayed by Benfica et al (2006) who stressed that female headed households were less likely to engage in tobacco contract production, although the statistical significance was not strong. However, in studies done by Hayrol et al (2010) and Patrick (2004), gender was found to have no influence on acceptance towards contract farming, although Patrick further noted that frequent exposure to certain skills either to women or men will result in a better acceptance towards contract farming activities. In this study, male headed households will be expected to participate more than female headed households.

3.5.6 Age (age)
Age measured in years, it is a continuous variable that captures the age of the household head and an approximation for skills. Studies by Musara et al (2011) found, as expected, the age of the farmer had negative and significant influence on the chances of farmers entering contract farming. Contract farming initiative is avoided by older farmers in an attempt to avoid risk. Makhura et al., (1996) argued that being older tend to assist farmers overcome fixed transaction cost due to experience overtime about the market. However, a study by Norsidia, (2007) observed that chances to participate in contract farming actually increased with age because of little appreciation of the importance of agricultural activities by the youth in most rural set ups and takes marginal effort to expand these activities. In support of this idea, Hayrol et al (2010) noted that age heavily affect acceptance towards contract farming. Conversely, Mann and Kogl (2003), did not notice differences in interest and constant positive attitude towards contract farming between younger and older people. Therefore, there is no a priori sign expectation in this study.
3.5.7 Household size (hsize)
This is a continuous variable measuring the size of the household members. More adult household members are expected to provide more family labour for farming activities reflecting labour intensity of contract production. Miyata (2009); Maertens and Swinnen,( 2007) found that households with more active family labour tend to participate in contract production than households with less family labour. It is expected in this study that, larger households will participate more than smaller households.

Economic Factors

3.5.8 Off-farm income (ms)
This variable will be used as continuous variable measuring wage income and remittances in United States dollars (US$). Non-farm income earned by the household per year will be used to measure this variable for the period under consideration. Remittances are included in this study because some households receive a significant amount from these, which may affect their decision. Key and Warning (2002) noted that farmers with higher income tend to have higher level of acceptance compared to lower income farmers. However, Musara et al., (2011) and Benfica et al., (2006) found that well-to-do farmers are unlikely to participate in contract although the likelihood of being contracted increase as farmers’ access to income from off-farm and non-farm sources increases. Thus in this study, a positive or negative relationship can be expected.

3.5.9 Credit access (ca)
Access to credit will be measured as dummy variable capturing credit accessibility by a farmer to finance tobacco production. Access to credit in this study refers to credit from other sources other than contract farming, including inputs provided on credit. Credit is equal 1 if the farmer received credit for tobacco production, 0 otherwise. An expectation is that farmers, who can access credit on their own, will have less chances of participating in contract farming than their counterparts. However a study by Wainaina (2012) found no influence of credit to participation. In this study, it is expected that contract farming is negatively influenced by access to credit.
3.5.10 Asset specificity (aspe)
Specific asset value in US dollars will be used to measure this continuous variable. Asset specificity captures the value of assets that are only used in tobacco production and has little or no value in alternative use. Williamson (1985) asserts that the more the value of assets specific to a particular transaction, the more the parties are held-up to a transaction because most of these are sunk costs. Benfica (2006) points out that the greater the degree of specific assets the likely spot market will be relied upon. Little and Watts (1994) noted that farmers may lose bargaining power and be more likely to accept less favourable or exploitative contract terms after they have invested in specific assets, or altered their cropping patterns and become more dependent on their contract crops. For example from the survey, the contracting firms mentioned that they expected their potential applicants to have built standard bans. It is therefore anticipated that asset specificity positively influences participation in contract farming.

Farm Specific Factors

3.5.11 Farm size (fsize)
This is a continuous variable measuring the size of the farm held by the household for farming purposes and is measured in hectares (ha). In Senegal, contract farmers were found to hold on average more land compared to non-contracting farmers, with participation biased towards households with initially larger farms, (Maertens and Swinnen, 2007). Olomola (2010) found no significant difference in farm size held by contract and non-contract farmers. In this study, there is no a prior expectation of the influence of farm size on tobacco contract farming participation.

3.5.12 Distance to main road (rdac)
Kilometres from the nearest road will be used as a continuous variable. Michelson (2013) posits a negative relationship between distance from main road and contract farming participation. Wainaina (2012) also noted the same conclusion for poultry farmers in Nakuru, Kenya. It is expected that farmers with greater distance from the main road are less likely to participate in contract farming. Hence, a negative relationship between access to communication networks and participation is expected in this study.

3.5.13 Ecological Region (eco)
Ecological region is a dummy variable that captures favorability of climatic conditions to the crop in question. The study uses there dummy variables, for region 1, 2 and 3. An expectation is
that some regions are more favorable for tobacco production than others and hence expect contractors to be biased towards certain regions than others. Barrett et al. (2011) in a comparative study of five countries, posits that contracting firms choose the location and region(s) to operate from, hence, influencing farmer participation. A study in Senegal on Fresh Fruits and Vegetables, found that region greatly influenced participation in contract production. Similar conclusions were also drawn by Frick et al. (1995); and Hayrol et al., (2010). Therefore, in this study it is expected that contract farming participation is affected by region, though with no predetermined direction of effect.

3.6.0 DATA SOURCES AND SAMPLING PROCEDURES

In this study, data was collected from small holder tobacco farmers of Zimbabwe. Farmers included includes communal, A1 and A2 farmers from 7 main tobacco producing provinces, namely Mashonaland Central, Manicaland, Mashonaland West, Mashonaland East, Midlands, Masvingo and Matebeleland. Stratified random sampling procedure was applied in data collection to group farmers into contracted and non-contracted groups. The random sampling procedure was then applied to collect data from both contracted and non-contracted farmers. Primary data was collected directly from districts in Mashonaland East, Mashonaland Central, Mashonaland West and Manicaland provinces. Data for the remaining provinces was then collected from contracted farmers selling their crop at their merchant’s premises in Harare and from non-contracted farmers selling their crop at auction floors namely Boka, FSF and Premier. Collection of data was done during the year 2013 marketing season representing the 2012/2013 tobacco production season. A structured questionnaire was used in data collection, both closed and open-ended questions were used. The primary data were supplemented by secondary data from the Tobacco Industry and Marketing Board (TIMB) whenever necessary.

3.6.1 The questionnaire
Information is obtained from the respondents using a questionnaire with sections covering personal details of the household head, structure of household, income sources, specific assets endowments, ecological region, and credit and extension services accessibility. Questionnaires were distributed to both contract and non-contract tobacco farmers who utilize contractors’
premises and auction floors for the marketing of their produce, respectively. The questionnaire was pre-tested for clarity of instructions, anomalies in wording of questions and any other problems that could impede its ability to collect the required data. Pre-testing also allowed testing for clarity of questions, and to estimate the average time and resources required to interview and collect information from a respondent.

3.6.2 Sampling and data collection methods
Given limited time and resources, it is impossible to collect data from every tobacco farmer in Zimbabwe; hence a sample is drawn from the population under study. Zimbabwe is made up of 10 provinces, but only 7 of these produce tobacco. Almost 40 districts are in the 7 tobacco producing provinces (TIMB, 2013). In the production season 2012/13, a total of 60,047 farmers grew and delivered tobacco at the sales floors (TIMB, 2013). The sample of this study shown in table 3.2 is drawn from this population of 60,047 growers who are distributed across the 7 tobacco producing provinces as given in the figure below.

<table>
<thead>
<tr>
<th>Province</th>
<th>Contracted</th>
<th>Non-Contracted</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mashonaland Central</td>
<td>8,151</td>
<td>10,646</td>
<td>18,797</td>
<td>31.30</td>
</tr>
<tr>
<td>Mashonaland West</td>
<td>7,489</td>
<td>11,100</td>
<td>18,589</td>
<td>30.96</td>
</tr>
<tr>
<td>Manicaland</td>
<td>5,234</td>
<td>6,795</td>
<td>12,029</td>
<td>20.03</td>
</tr>
<tr>
<td>Mashonaland East</td>
<td>3,740</td>
<td>6,715</td>
<td>10,455</td>
<td>17.41</td>
</tr>
<tr>
<td>Midlands</td>
<td>20</td>
<td>91</td>
<td>111</td>
<td>0.18</td>
</tr>
<tr>
<td>Masvingo</td>
<td>2</td>
<td>62</td>
<td>64</td>
<td>0.11</td>
</tr>
<tr>
<td>Matebeland</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24,637</strong></td>
<td><strong>35,410</strong></td>
<td><strong>60,047</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Source: TIMB 2013

Statistics of the 2012/13 tobacco production shows that most growers of tobacco are situated in Mashonaland central (31.3 %), followed by Mashonaland West (30.96 %), and followed by Manicaland with (20.03 %), then Mashonaland East with 17.41 % of the total tobacco growers in Zimbabwe. These four provinces make up more than 99 % of tobacco producers while Midlands, Masvingo and Matebeland make up the remainder of less than 1%. As shown in appendix a,
Pfura, Mazoe, Hurungwe, Makoni, Mutare, Murehwa, Marondera, Kwekwe, Bikita, Gutu and Chiredzi are situated with more than 20 percent of their province’s total growers. The study made the attempt to collect data that represent provinces and districts as presented in the population.

Stratified random sampling technique is applied to this research to obtain a relevant and unbiased sample. Stratified sampling is chosen since it is suitable for comparison of groups, in this research, the comparison is between contracted and non-contracted farmers. The households in the seven provinces are stratified into two strata: contracted and non-contract tobacco farmers. The non-contract farmers were selected within provinces of farmers under contractual tobacco production to ensure homogeneity of factors except contract farming. The size of the two groups was determined based on the probability.

An advantage of the stratified approach is that in the event of non-response or unwilling respondent, another individual in the group can be selected to replace the reject. While this still may lead to some bias in the sample, the bias is not likely to be as great as in a purely random sample. This is because the reject is being replaced by another individual with similar characteristics, and the assumption is made that any individuals within the group are representative of the group. The greater the degree of stratification, the more likely this assumption is to hold.

Three research assistants from Infrastructure Development Bank of Zimbabwe (IDBZ) were used together with the author, as interviewers. Two-day training is done by the author to the research assistants so that they familiarize with the study. The survey is expected to take at most four weeks. Primary data was collected using personal interviews because it has the following advantages:

- Interviewer can clarify questions and clear any doubts about the interview
- The interviewer can observe non-verbal expressions and draw further conclusions
- Interviewer can build rapport with and motivate the respondents.
3.6.3 Sample size

According to Durrheim (1999), a researcher rarely can collect data on all the subjects of interest in a particular study largely because of limitations of time and other resources. Samples provide a practical and efficient means to collect data. A valid and reliable sample size should enable the researcher to generalize the findings from the sample to the population under study. In this case, the sample serves as a model of the study population. For most researches, a sample size between 30 and 500 is appropriate and the sample size should be several times as large as the number of variables in the study in multivariate research including multiple regression analyses, is the rule of thumb when determining the sample size, (Roscoe, 1975). At this sample size range sample error will not exceed 10 percent of the standard deviation about 98 percent of the time.

In line with Roscoe’s rule of thumb, a sample size of 257 farmers was used in this research. Among the 257 household heads interviewed, 117 were non-contract and 140 were contract tobacco growers. This means that the sample had 45.53 % non-contract and 54.47 % contract farmers. The sample distribution has more contracted farmers despite the population from which it is drawn having more non-contracted tobacco farmers (41.03% contract and 59.97% non-contract). Using this sample distribution, the study to draws inferences about the population.

**TABLE 3.2: Summary of respondents’ participation**

<table>
<thead>
<tr>
<th>Participation</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-contracted</td>
<td>117</td>
<td>45.53</td>
</tr>
<tr>
<td>Contracted</td>
<td>140</td>
<td>54.47</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>257</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Our sample was drawn from 7 tobacco producing provinces. Table 3.3 below shows the distribution of our respondents by province. The study, through random sampling procedure made efforts to ensure that the sample is representative of the true population from which it is
drawn. This is made so by ensuring that a larger sample was drawn from a province with more tobacco producing farmers. Table 3.3 below can be argued to be a mirror image of table 3.1; the order in terms of percentage province distribution of the population and sample are similar. More respondents for the study were drawn from provinces with more tobacco farmers.

**Table 3.3: Tobacco growers (respondents) sample distribution by province**

<table>
<thead>
<tr>
<th>Province</th>
<th>Respondents</th>
<th>Percent</th>
<th>Cumulative Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Mashonaland Central</td>
<td>69</td>
<td>26.85</td>
<td>26.85</td>
</tr>
<tr>
<td>2 Masonaland West</td>
<td>64</td>
<td>24.90</td>
<td>51.75</td>
</tr>
<tr>
<td>3 Manicaland</td>
<td>44</td>
<td>17.12</td>
<td>68.87</td>
</tr>
<tr>
<td>4 Mashonaland East</td>
<td>44</td>
<td>17.12</td>
<td>85.99</td>
</tr>
<tr>
<td>5 Midlands</td>
<td>21</td>
<td>8.17</td>
<td>94.16</td>
</tr>
<tr>
<td>6 Masvingo</td>
<td>13</td>
<td>5.06</td>
<td>99.22</td>
</tr>
<tr>
<td>7 Matebeleland</td>
<td>2</td>
<td>0.78</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>257</strong></td>
<td><strong>100.00</strong></td>
<td></td>
</tr>
</tbody>
</table>

The study sample was drawn from 36 tobacco producing districts. In this study, data from small holder tobacco farmers was collected over a period of three months. Districts that have more representation in our sample, Pfura, Mazoe, Hurungwe, Makoni, Mutare, Murehwa, Marondera and Kwekwe are those that have more population with except of Bikita, Gutu and Chiredzi as shown in appendix a and b. This distribution of our sample, along the provincial and district lines of tobacco production make it possible for the study to generalize its findings as representing Zimbabwe.

**3.7 Conclusion**

This chapter presented the methods and procedures used to establish the determinants of tobacco contract farming in Zimbabwe. The logit model used in estimation was outlined. Variables used were justified based on the available empirical and theoretical evidence. Data sources and collection procedures together with a descriptive analysis of the sample and the population used in the study concludes the chapter. Diagnostic tests and discussion of results from the estimated logit model will follow in chapter 4.
CHAPTER FOUR

ESTIMATION AND INTERPRETATION OF RESULTS

4.0 Introduction
This chapter focuses on the estimation of the economic model for the determinants of participation in tobacco contract farming. Descriptive statistics of the respondents for the survey using frequency, percentages, mean and correlations are given in this chapter. As outlined in chapter three, the study estimates the economic model using the logit regression estimation technique. After estimation, the study tested for model misspecification, multicollinearity and heteroskedasticity. Results for the econometric model for presented and interpreted.

4.1 Descriptive statistics
The study established that, the age of household heads in tobacco farming range between 27 and 76 years, with an average of 41 years. The mean household size was found to be 5 though it varies between 1 and 11. On average a farmer has 5 years’ experience in tobacco farming; however some were in their first year while others were in their 19th year of tobacco farming. As shown in the table below, it was also established that on average extension officers visit farmers 4 times per season. The study further established that the respondents had a mean value of us$5 737.94 in assets while assets with a mean value of us$3 363.15 were specifically for tobacco production with no other immediate alternative use.
### TABLE 4.1: Descriptive Statistics for continuous variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observation</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>257</td>
<td>41</td>
<td>10.45</td>
<td>27</td>
<td>76</td>
</tr>
<tr>
<td>Household size</td>
<td>257</td>
<td>5</td>
<td>2.31</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Farming years</td>
<td>257</td>
<td>5</td>
<td>4.57</td>
<td>1</td>
<td>19</td>
</tr>
<tr>
<td>Farm size (ha)</td>
<td>257</td>
<td>4</td>
<td>2.8</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>Distance to main roads (km)</td>
<td>257</td>
<td>9.28</td>
<td>9.16</td>
<td>0.1</td>
<td>40</td>
</tr>
<tr>
<td>Visits by extension officers</td>
<td>257</td>
<td>4</td>
<td>3.18</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>Assets (us$)</td>
<td>257</td>
<td>5737.94</td>
<td>4977.27</td>
<td>500</td>
<td>35000</td>
</tr>
<tr>
<td>asset specificity (us$)</td>
<td>257</td>
<td>3363.15</td>
<td>3338.18</td>
<td>500</td>
<td>23500</td>
</tr>
</tbody>
</table>

### 4.1.1 Socio-economic descriptors of the respondents

Of the interviewed 257 households, 64.09% and 31.58% of household heads were male and female respectively, as shown in table 4.2. Among the 181 male household heads interviewed, 116 participated in contract farming while out of the 76 females interviewed, only 24 participated in tobacco contract farming. It follows from these statistics that, the chances of getting a household headed by a male participating in tobacco contract farming were higher than that of a female headed household.

### TABLE 4.2: Distribution of household participation by sex

<table>
<thead>
<tr>
<th>SEX</th>
<th>no</th>
<th>Yes</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>65</td>
<td>116</td>
<td>181</td>
<td>64.09</td>
</tr>
<tr>
<td>female</td>
<td>52</td>
<td>24</td>
<td>76</td>
<td>31.58</td>
</tr>
<tr>
<td>Total</td>
<td>117</td>
<td>140</td>
<td>257</td>
<td>54.47</td>
</tr>
</tbody>
</table>
Among the household heads interviewed, 35 were single while 222 were married or widowed. The marital status of the household head was important as the study seeks to find out if social pressure may determine one’s decision to participate in contract farming. Statistics in the table 4.3 below shows that only 6 out of 35 single headed households (17.14 %) participated in tobacco contract farming. However, 134 of the 222 married households (60.36 %) participated in tobacco contract farming. This distribution implies that a household is likely to participate in tobacco contract farming if the head is married than if single.

**TABLE 4.3: Distribution of households’ participation by marital status**

<table>
<thead>
<tr>
<th>Marital status</th>
<th>Participation</th>
<th></th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>29</td>
<td>6</td>
<td>35</td>
<td>17.14</td>
</tr>
<tr>
<td>Married</td>
<td>88</td>
<td>134</td>
<td>222</td>
<td>60.36</td>
</tr>
<tr>
<td>Total</td>
<td>117</td>
<td>140</td>
<td>257</td>
<td>54.47</td>
</tr>
</tbody>
</table>

Among the household heads interviewed, 31.52% had primary education while 53.31 and 15.18% had secondary and tertiary education respectively. This shows that a higher number of household heads in tobacco farming have secondary (ordinary or advanced) education. Table 4.4 below shows that, 54, 70 and 16 of the 81, 137 and 39 households with primary, secondary and tertiary education participated in contract farming respectively. Thus 66.67 %, 51.09 % and 41.03 % of households headed by heads with primary, secondary and tertiary education participated in contract farming. It therefore implies that, those in households headed by heads with primary education were more likely to participate in tobacco contract farming than those with secondary and tertiary education. In addition, household heads with secondary education were more likely to participate in contract farming than those with tertiary education. Thus, chances of participation in tobacco contract farming decreases with education.
### Table 4.4: Distribution of household Participation by education

<table>
<thead>
<tr>
<th>Household education</th>
<th>no</th>
<th>yes</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>27</td>
<td>54</td>
<td>81</td>
<td>66.67</td>
</tr>
<tr>
<td>Secondary</td>
<td>67</td>
<td>70</td>
<td>137</td>
<td>51.09</td>
</tr>
<tr>
<td>Tertiary</td>
<td>23</td>
<td>16</td>
<td>39</td>
<td>41.03</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>117</td>
<td>140</td>
<td>257</td>
<td>54.47</td>
</tr>
</tbody>
</table>

Among the 257 participants, 197 (76.65%) do not possess any expertise related to tobacco farming, 28 (10.89%) had a Zimbabwe Tobacco Farmers’ Association Certificate (ZTFAC), 13 (5.06%) had a National Certificate in Agriculture and 19 (7.39%) had a degree in agriculture, diploma in agriculture or both as shown in table 4.4. Of the 197 respondents with no expertise related to agriculture, 113 (57.36%) are in tobacco contract farming. In addition, out of the 28 respondents possessing a Zimbabwe Tobacco Farmers’ Association Certificate (ZTFAC), 16 (57.14%) are contract farmers. A total of 13 respondents had a National Certificate in Agriculture and 6 (46.15%) of these respondents are contract farmers. The study also reports that of the 19 respondents with a Diploma/Degree in Agriculture, only 5 (26.32%) participated in contract farming. Statistics given imply that chances of one participating in tobacco contract farming were high and the same for those without any expertise in agriculture and holders of ZTFAC. As expertise in Agriculture improves, the chances of one joining contract farming are likely to decline.
### TABLE 4.5: Distribution by household head expertise and participation

<table>
<thead>
<tr>
<th>Expertise</th>
<th>Participation</th>
<th></th>
<th></th>
<th>Percent*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>yes</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>84</td>
<td>113</td>
<td>197</td>
<td>57.36</td>
</tr>
<tr>
<td>Zimbabwe Tobacco Farmers’ Association Certificate</td>
<td>12</td>
<td>16</td>
<td>28</td>
<td>57.14</td>
</tr>
<tr>
<td>National Certificate in Agriculture</td>
<td>7</td>
<td>6</td>
<td>13</td>
<td>46.15</td>
</tr>
<tr>
<td>Diploma/Degree in Agriculture</td>
<td>14</td>
<td>5</td>
<td>19</td>
<td>26.32</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>117</strong></td>
<td><strong>140</strong></td>
<td><strong>257</strong></td>
<td><strong>54.47</strong></td>
</tr>
</tbody>
</table>

*refer to % of respondents in a particular category of expertise

When asked on their perception regarding access to main roads, 122 (47.47%) respondents reviewed that they do not have access to main roads while 135 (52.53 %) responded in favour of access to main roads as shown in table 4.6 below. Statistics in table 4.6 further shows that 77.9 % of households without access to main roads participated in contract farming compared to 33.33 % of those with access to main roads. On average, households are 9 km away from main roads. Those who are close to main roads are at least 100 metres away while those who are furthest are 40 km away. Statistics shown in the table below shows that if a household has no access no main roads, it is more likely to participate in contract farming than the one with access to main roads. The correlation between access to main roads and participation in tobacco contract farming is negative 0.45, thus as a farmer gets access to roads, he/she is less likely to participate in contract farming. The result may imply that farmers that are less connected, with poor transport infrastructure are likely to enter contract arrangements.

---

1 Refer to table 1
When the 257 households heads were asked if they have access to other forms of credit (credit from the open market), 194 (75.49 %) reviewed that they do not have access to credit while 63 (24.51%) of them do have access to credit. Out of the 194 respondents without access to credit, 113 (58.25 %) participate in tobacco contract farming while out of the 63 with access to credit, only 27 (47.86 %) participated. This means that, households without access to credit were more likely to participate in contract farming than those with access to credit. This can also be explored from the negative Pearson’s correlation coefficient of 0.13 between access to credit and participation in tobacco contract farming. These statistics implies that even if contract farming arrangements are exploitative, poor farmers with less credit options are likely to participate in them.
The study found that more households in tobacco farming have other sources of income compared to that earned from tobacco sales. Table 4.8 below shows that 51.36 and 48.68 % of the respondents had other income sources and no other income sources respectively. Out of the 125 households with no other income sources, 85 (68 %) participate in tobacco contract farming whilst 55 out of 132 households (41.67 %) with other income sources participate in tobacco contract farming. This means that, more households without other income sources participate in contract farming than those with other income sources. It implies that there are more chances to participate in tobacco contract farming for those without other income sources that those with other income sources. The Pearson’s correlation coefficient for other income and participation is negative 0.26, meaning that as households move from no other income sources to have other income sources, the household is likely to move from participation to none participation in tobacco contract farming. This is because as households’ access to other income increase, they are more likely to finance their farming activities on their own without having to source from contracting tobacco merchants.

**TABLE 4.8: Distribution of respondents by other income sources and participation**

<table>
<thead>
<tr>
<th>Other income</th>
<th>Participation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
<td>40</td>
<td>85</td>
</tr>
<tr>
<td>Yes</td>
<td>77</td>
<td>55</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>117</td>
<td>140</td>
</tr>
</tbody>
</table>
Conclusion on Descriptive Statistics
The descriptive statistics above point some important directives about the model to be estimated. The statistics rules out social pressure as a driver of participation in contract farming. This is because males are found to be more likely to participate in contract farming than females while divorced/single headed households were less likely to participate in contract farming. Investments in human capital negatively influence participation in contract farming. As the level of education and expertise in tobacco production improves, farmers were found less likely to participate in tobacco contract farming. The descriptive statistics above further shows that as road infrastructure improves as well as the economic well-being (measured by access to credit and other income sources than tobacco farming) of the farmer, the likelihood of participating in tobacco contract farming declines.

4.2.0 ESTIMATION OF THE ECONOMETRIC MODEL

4.2.1 MULTICOLLINEARITY TEST
Multicollinearity refers to the existence of one or more linear relationships among some or all explanatory variables of a regression model. With the problem of multicollinearity, estimates are unbiased but assessment of the relative strength of the explanatory variables and their joint effect are unreliable. As a rule of thumb, a Pearson’s correlation coefficient above 0.8 signals the problem of multicollinearity. Multicollinearity in a model is usually signaled by high $R^2$, insignificant t-test of the coefficients in combination with significant F-test. In this study the Pearson correlation matrix was used to test the model variables for multicollinearity.

There is less multicollinearity among most variables as given in appendix e. However, it was found that assets and asset specificity were highly correlated (Pearson’s correlation coefficient of 0.82). These variables found to be collinearly related were not included in the model at the same time to avoid biased results. The study carefully examined the potential problems of specification error that were introduced by dropping one of the collinearly related variables from the model, however the restricted model passed the specification test as discussed below. Therefore, in the study results, asset and asset specificity were separately included in the models.
4.2.2 MISSPECIFICATION TEST
To test for the model specification, the Ramsey regression Error Specification Test (RESET) was undertaken in this study. In Stata, the RESET test is used to test if there are no omitted variables in the specified model. The RESET test uses the chi-test statistic. If chi-statistic is insignificant, then the model is adequately specified.

The results reported in appendix g shows no evidence of mis-specification. The reported Chi-square of 0.17 and a P-value of 0.6812 means that the null hypothesis (the model is not mis-specified) failed to be rejected. This means the restricted model provide useful insights and can be interpreted as such without adding any more variables that are likely to yield explanatory power.

4.2.3 HETEROSKEDASTICITY TEST
Heteroskedasticity arises if the error terms in a model do not have constant variance and is mostly a problem in cross-sectional data. Heteroskedasticity arise if the model is mis-specified (e.g., due to an omitted variable) such that the specification error induces heteroskedasticity. Heteroskedasticity can also arise as a result of the presence of outliers, that is, an observation that is much different than the other observations in the sample.

Heteroskedasticity in logistic regression can produce biased and misleading parameter estimates. The presence of heteroskedasticity can be tested for using the Breusch-Pagan / Cook-Weisberg or White test. The white test is a generalization of the Breusch-Pagan and so may detect more general forms of heteroskedasticity, but at the possible cost of having lower power against certain heteroskedasticity. In the presence of heteroskedasticity, the study reports robust standard errors.

White test or Breusch-Pagan test tests the null hypothesis that the error variances are all equal (Homoskedasticity) against the alternative that the error variances are a multiplicative function of one or more variables (unrestricted heteroskedasticity). The White test relaxes the assumption of normally distributed errors and uses the chi-test statistic with n-K degrees of freedom.

Given superiority of Breusch-Pagan heteroskedasticity test, it was undertaken to determine if the variance of the errors is constant or non-constant. The test reports a Chi-square statistic of 0.07 and a p-value of 0.7896 meaning that the null hypothesis of a constant variance for errors
failed to be rejected. Thus, the variance of errors is constant. This rules out the presence of outliers in the data used and cements the sufficiency of the model employed.

4.3 THE UNRESTRICTED MODEL
An unrestricted model was estimated using all variables that were assumed to have an impact on tobacco contract farming participation based on theoretical and empirical literature. The estimated unrestricted logit model shows that type of farming and farm size, gender of the household-head, other income and earnings from other income are neither significant at 1%, 5% nor 10% level of significant as indicated in appendix c. The study therefore estimates a restricted model where the fore-mentioned variables are dropped sequentially; this is the general to specific model specification approach. Age, household size, experience measured by farming years, network access measured by access to main roads and distance to main roads, visits by extension officers, access to credit and asset specificity were found to be important variables explaining participation in tobacco contract farming. The unrestricted model is presented below.
### TABLE 4.9: The restricted logit regression model

| Variable | Coefficient | Std. Err. | z     | P>|z| | 95% Confidence Interval |
|----------|-------------|-----------|-------|-----|-------------------------|
| _Ieco_2** | 3.62        | 1.72      | 2.11  | 0.035 | 0.2558, 6.9857         |
| _Ieco_3** | 3.44        | 1.82      | 1.89  | 0.059 | -0.1289, 7.0071        |
| Age*     | -0.10       | 0.04      | -2.45 | 0.014 | -0.1835, -0.0205       |
| Hsize*   | 1.23        | 0.22      | 5.54  | 0.000 | 0.7967, 1.6682         |
| Fyears*  | -0.28       | 0.11      | -2.59 | 0.010 | -0.4920, -0.0681       |
| Rdac*    | -2.15       | 0.65      | -3.32 | 0.001 | -3.4167, -0.8820       |
| Dist***  | -0.07       | 0.04      | -1.66 | 0.097 | -0.1594, 0.0131        |
| Evis**   | 0.24        | 0.09      | 2.47  | 0.013 | 0.0491, 0.4243         |
| Ca**     | -2.78       | 1.17      | -2.37 | 0.018 | -5.0830, -0.4779       |
| aspe\(^2\)* | 0.0010    | 0.0002    | 4.47  | 0.000 | 0.0005, 0.0014         |
| ass\(^3\)* | 0.0002    | 0.00008   | 2.57  | 0.010 | 0.0005, 0.0003         |
| cons**   | -4.70       | 2.3138    | -2.03 | 0.042 | -9.2347, -0.1645       |

**note:** * 1 %, ** 5 % and ***10 % level of significance

\(^2\) Asset specificity (aspe) and assets (ass) were not included in the model at the same time.

\(^3\) See 2 above
4.3.1 LR Chi2(10)
This is the likelihood ratio (LR) chi-square test statistic for the logistic regression. The logit regression reports a chi-square statistic of 267.16 within 10 restrictions as 10 parameters were estimated.

4.3.2 Prob>Chi2 (10)
The logistic regression reports this probability of getting the chi-square statistic given that the null hypothesis is correct. In this case the probability of obtaining the chi-square of 267.16 if all explanatory variables have no effect on tobacco contract farming participation is 0.0000. Since the p-value is less than 0.000, the model is statistically significant; the model fits the data very well.

4.3.3 Pseudo R2
This is the McFadden’s Pseudo R² for the logistic regression since it does not have an R² equivalent to that of Ordinary Least Squares regression. The study reports a Pseudo R² of 0.75; however this is difficult to interpret in a logistic regression. Otherwise, it could have been interpreted as the percentage of variation in tobacco contract farming participation that could be explained by the explanatory variables included in the restricted model above, if it was an OLS regression.

4.3.4 Log likelihood
The model converges at the log likelihood of -43.5289 and seems to be the best model if we compare this with the log likelihood of other possible nested models.

4.4 MARGINAL EFFECTS OF THE LOGIT MODEL
Marginal effects were computed to give the effects of changes in the explanatory variables on tobacco contract farming participation. The results of marginal effects are presented in the table4.10 below.
TABLE 4. 10: Marginal effects

Marginal effects after logit

\[ y = \text{Pr} (\text{pat}) \text{ (predict)} \]

\[ = 0.7058 \]

| variable  | dy/dx       | Std. Err. | z     | P>|z|   | [ 95% C.I. ] | X     |
|-----------|-------------|-----------|-------|--------|-------------|-------|
| _Ieco_2*  | 0.7323594   | 0.1541    | 4.75  | 0.000  | 0.430329    | 1.03439| 0.719844|
| _Ieco_3*  | 0.4310144   | 0.12175   | 3.54  | 0.000  | 0.192379    | 0.669649| 0.190661|
| age       | -0.1934492  | 0.05847   | -3.31 | 0.001  | -0.308057   | -0.078842| 41.4786|
| hsize     | 0.2863326   | 0.05052   | 5.67  | 0.000  | 0.187325    | 0.385341| 5.02335|
| fyears    | -0.0438406  | 0.01945   | -2.25 | 0.024  | -0.081971   | -0.00571| 5.86576|
| rdac*     | -0.4690507  | 0.0915    | -5.13 | 0.000  | -0.648392   | -0.28971| 0.525292|
| evis      | 0.0572411   | 0.01974   | 2.90  | 0.004  | 0.018546    | 0.095936| 4.89105|
| ca*       | -0.4522985  | 0.17361   | -2.61 | 0.009  | -0.792563   | -0.112034| 0.245136|
| aspe      | 0.0001818   | 0.00005   | 4.03  | 0.000  | 0.000093    | 0.00027 | 3363.15 |

(*) dy/dx is for discrete change of dummy variable from 0 to 1

4.5.0 DISCUSSION OF MARGINAL EFFECTS

4.5.1 Predicted probability of Participation

The table 4.10 above shows that holding covariates at reference point; the mean for continuous variables and zero (0) to one (1) for dependent variables under column x, the predicted probability of participating in contract farming is 0.7058. Thus, a region 2 farmer aged 41 years with a household size of 5, 5 years’ experience in tobacco farming in an area without road access, without access to credit and receiving 5 visits from extension officers is likely to participate (prob = 0.7058) in contract farming.
**Age of Household Head (Age)**

This variable is statistically significant at 1% and has a negative effect on tobacco contract farming participation. However, the coefficient of age squared is positive and significant at 1% level. This mean that for a year increase in the age of the household head from the mean age of 41 years, the predicted probability of contract farming participation decrease by 19.34%, holding all other factors constant at their reference points. The study therefore confirms study by Norsidia (2007) that chances to participate in contract farming increases with age. Norsidia argued that, youth fails to appreciate the importance of agricultural activities. We therefore argue that, older farmers are likely to participate in tobacco contract farming than young farmers than young tobacco farmers.

**Household Size (hsize)**

Size of a household is statistically significant at 1% and has a positive impact on tobacco contract farming participation. The study shows that, an increase by 1 member within a household from the mean of 5 will increase the probability of participating in contract farming by 28, 63%. The results are in line with studies by Miyata (2009) and Maertens & Swinnen (2007). We therefore support argument that larger households tend to participate in labour intensive contract farming given more source of labour. Larger households may also participate in contract farming if this is the sole source of income probably due to social pressure posed by the size of the household.

**Visits by extension officers (evis)**

This variable was found to be statistically significant at 5% level given its p-value of 0.013. A unit increase in visits from the mean of 4 visits by extension officers will increase the predicted probability of tobacco contract farming participation by 5.72%. Thus as expected, the number of extension visits positively influence tobacco contract farming. Visits by extension officers are all that important as it highlights that farmers need the services of the agricultural experts. As noted by Bijman (2008), smallholder farmers may participate in tobacco contract farming as they lack technical knowhow. This means as the intensity of technical assistance offered by contracting firms increases, more farmers are likely to participate in tobacco contract farming. This can also
be explained in terms of reduced government extension services currently experienced in the country; hence farmers can only obtain these services by participating in contract production. Therefore, the positive relationship drawn from this study may indicate that farmers join contract farming so as to benefit from the extension services provided by contracting firms to its farmers.

**Farming Experience (Fyears)**

The study found out that farming experience as measured by years in tobacco farming is statistically significant at 1% level and has a negative impact on participation in contract farming. A 1 year increase after 5 years of tobacco farming is likely to decrease the probability of participation in tobacco contract farming by 4.38%, holding other covariates at their reference points.

Although in most studies farming experience was found to be insignificant, the results confirms the findings of Meshesha (2011) who also found experience to significantly influence contract farming. The negative relationship between experience and contract farming participation may be as a result of the higher returns realized in tobacco, such that farmers with more experience will be able to finance their tobacco farming without sourcing external assistance.

**Road Access (rdac)**

Access to main roads is statistically significant at 1% level given its p-value of 0.001. The study shows that if a farmer relocates from an area that has no access to main roads to where there is access to main roads, the predicted probability of participating in tobacco contract farming decreases by 46.91%. This may be explained by the fact that farmers will be able source alternative production and marketing channels and will be able to carry their own inputs and output easily. The study therefore concludes that a negative relationship exists between contract farming and road accessibility as posited by Michelson (2013) and Wainaina (2012).

**Ecological region (eco)**

Ecological region was found to be an important factor that explains participation in tobacco contract farming participation. Both dummies for ecological region 2 and 3 have a p-value of 0.0000 meaning that they are statistically significant at 1% level of significance. Comparing
participation in contract farming between farmers in region 1, 2 and 3, the study shows that there is difference in contract farming participation culminating from ecological region within which farming is practiced. The study shows that, if one move from region 1 to region 2, the probability of participating in contract farming will positively change by 73.24%, holding other factors at their reference point under column x in the table 4.10 above. If a farmer relocates to region 3 from region 1, his/her probability of participating in contract farming will only positively change by 43.10%. The study therefore supports other studies (Barett et al, 2011; Shaffril et al, 2010 and Frick et al, 1995) which concluded that contract farming is influenced by the region within which a farmer is situated.

**Credit Accessibility (ca)**

Credit accessibility has a negative impact on contract farming and is statistically significant at 5%. The study find out that, if one changes from having no access to credit to access to credit, the predicted probability of participating in contract farming decreases by 45.22%. As expected by the researcher, farmers with access to other sources of credit either in monetary terms or inputs are less likely to participate in contract farming than farmers without access. The results indicate that as farmers obtain alternative sources of financing their tobacco production, they are less likely to participate in contract farming. From this it can therefore be concluded that farmers participate in contract farming because they have no alternative sources of financing their tobacco farming activities.

**Asset Specificity (aspe)**

This variable is statistically significant at 1% level of significance. It is established from the study that, a dollar increase in assets fixed on tobacco production from a mean fixed asset value of $3 363.15 will increase the probability of participating in contract farming by 0.02 ent. The result supports the argument in theory by Williamson (1983) who argued that, as the value of specific assets increase, the parties to a contract are likely to enter into hold-up problem. As expected from theory, it can be concluded that the higher the value of assets specifically for tobacco production, the higher the chances of farmers to enter into contract farming for the assets to realise a positive value from this use.
4.6 Conclusion

Results from the logit model obtained in this study show that gender, farm size, off-farm income and education of the household head are insignificant explanatory variables in explaining contract farming participation by smallholder farmers. Rather, age, household size, experience, distance to main road, extension services, ecological region and credit access were found to significantly influence contract participation by smallholder farmers either at 1%, 5% or 10%. The negative relationship between contract participation and credit access justify one of the researcher’s questions that smallholder farmers may participate in contract farming only because they cannot access credit elsewhere. Also, asset specificity help explain why smallholder farmers participate in contract farming because some of the investments such as bans have no alternative use outside tobacco production. This variable was not included in most previous studies but in this study it proved important in explaining contract participation by smallholder farmers. Although gender in most studies reviewed was significant in explaining contract participation, in this study it was insignificant and this may be justified by the promotion of gender equality in all sectors of the country; hence women are equally participative in contract farming.
CHAPTER FIVE

FINDINGS, CONCLUSIONS AND POLICY IMPLICATIONS

5.0 INTRODUCTION

We present the study findings, conclusions and policy implications and recommendations in this chapter. It concludes by the study limitations and suggested areas of further study.

5.1 MAIN RESEARCH FINDINGS

The major objective of this research was to establish the factors that significantly influence small-scale farmers’ participation in contract farming. The research was motivated by the desire to understand the sharp increase in small-holder farmers participating in contract farming regardless allegations of exploitative behaviour and literature that found negative effects of contract farming on farmers. In an effort to establish the determinants of contract farming participation in Zimbabwe, cross-sectional data from farmers was collected during the 2012/2013 marketing season using self-administered questionnaire. Data on socio-economic variables that was derived from theoretical and empirical literature was collected from both contract and noncontract farmers. The hypothesized factors that determine participation in contract farming were economically tested using the logit model.

The general-to-specific modelling technique was used as was advocated by Hendry and Mizon (1990). In the study, the dependent variable was contract farming participation taking a value of one when a farmer participates in contract farming and zero when a farmer does not participate. The unrestricted model included age, education, marital status and gender of the household head, household size, experience (farming years), farm size, distance from main road, visits by extension officers, assets, off-farm income, access to other forms of credit and asset specificity. From the model results, age, household size, experience, access to credit, asset specificity and network access measured by distance to main road and access to main road were found to influence participation at least at 1%, 5% or 10%. Demographic factors, age and household size were significant at 1% level. The study also found that increased access to other sources of credit reduces the probability of farmer participation. The positive influence of asset specificity was
consistent with theory and the researcher’s expectation that farmers may participate in contract farming only to obtain value from these specific assets.

Ecological region variable shows that participation in contract farming is biased towards region 2 and 3 compared to region 1 where tobacco production conditions are more favorable. Although TIMB reports show a wide spread of tobacco production in all the five regions of the country, the results show that probability of participating in contract farming is higher for farmers in region 2 and 3. Road access variable results shows that as farmers’ relocate to areas with better road access, the chances of participating in contract farming decreases by 46.91%. Extension services were also found to positively influence tobacco contract farming participation.

Although critics of contract farming argue that it negatively impacts and exploits small-scale farmers, evidence provided in this study shows that farmers lack alternatives in terms of access to credit and extension services and hence will participate in contract farming as the only financial option at their disposal. Also the specificity nature of tobacco producing assets further exposes farmers with little resources and agricultural expertise, only to participate in contract farming.

The inclusion of asset specificity as a proxy for transaction cost variable, in the study also contributes to knowledge as indicated in the study. As shown in the results, the greater the degree of asset specificity, the greater the probability of participating in contract farming.

Generally it can be concluded that the results concurred with economic theory, the researcher’s expectation and/or evidence from other studies.

5.2 POLICY IMPLICATIONS AND RECOMMENDATIONS

From the study findings above, appropriate policy implications and recommendations can be drawn based on the variables that were found to influence contract farming participation. Policies are drawn considering that smallholder participation in contract farming is meant to involve them in commercialization of agriculture and is considered as a poverty reduction strategy by policymakers.
The positive relationship between contract farming participation and extension services suggests for policies that improve the provision of extension services by government. Strengthening the extension service can help to easily disseminate the required knowledge to increase tobacco productivity and ensure that farmers will not join exploitative contract farming arrangements solely for extension benefits. The research therefore advises public-private partnerships in extension services as farmers diversify into high-value commercial crops are encouraged. A policy that promotes the involvement of cooperatives, non-governmental organizations, extension agents, and local officials as intermediaries to provide services on behalf of the contracting firm with the incentive to serve small-scale farmers, help reduce the cost to the firm of working with small-scale farmers. This will promote small-scale involvement in development and increase the benefits to the small-scale farmers. Also, technical knowhow and information received by farmers will also be expanded to other crops, thus deriving greater benefits to the smallholder farmers.

The negative relationship between access to credit and tobacco contract farming participation suggests for policies that promote credit accessibility by smallholder farmers to reduce farmer exploitation by all powerful contracting firms. Increased and improved agricultural financing policies will mean that farmers may join contract farming without desperation of accessing credit as this may expose them to exploitative arrangements. Although Agri-bank is providing such services, it has not been reaching all rural areas; hence the coming into play of other similar service providers and the opening of branches in most parts of the rural areas closer to the farmers will enable most farmers to access credit. It will also help disseminate information on the available options to farmers and farmers as rational economic agents will be able to compare the costs and benefits of contract farming against alternatives.

The government has to resolve farmer problems of collateral security in order for them to have access to available lines of credit. Issuing title deeds to resettled smallholder farmers will enable them to source credit from other sources. In order to support growth in and beyond the agricultural sector, there is need to develop the financial services. Policies that include the design of rural financial services and credit facilities that move beyond the requirement for freehold title as collateral to new forms of credit should be encouraged.
As the results indicated that age and household size positively influence contract farming participation, policies that recognize the importance of older farmers in adopting agricultural initiatives are encouraged. However, this may serve as a warning of exploitative contracts arrangement as only the old and those with more family members are burdened socially. There is therefore need to ensure that the older members of the society and those with big family size are socially protected.

Ecological region variable displays an important policy implication from the results. Agricultural policies that suit regional demands should be devised rather than use a one policy suits all strategy. For instance, to promote contract farming in regions that receive fewer rains, an irrigation policy may be ideal. This policy will enable the expansion of contract farming to farmers in less favorable regions and promote the participation of smallholder farmers.

Policymakers should explore alternative approaches to enforcing contracts between buyers and seller as way to promote the productive use of tobacco specific assets. The establishment of advanced legal systems such as small-claims court in most parts of the country may help collect and disseminate information on noncompliance on the part of both farmers and contracting firms. The provision of better information about noncompliance will increase the incentives for farmers and firms to comply and help each party avoid high-risk business partners. This information makes it easier to punish both the farmer who violates the terms of his or her contract and the buyer who knowingly purchases tobacco from growers who have contracts with other companies.

Overall political and economic stability promotes development, implementation and evaluation of the policies. Therefore, the researcher calls for collaborative efforts by all economic agents, in terms of conditions and facilities, in the establishment of more contracting firms in all the rural communities in Zimbabwe. The performance of the parties involved in tobacco contract farming should be monitored closely by the government through the invisible hand phenomenon. Such arrangements should seek to prevent inefficient management, deceptive practices and regulatory inefficiencies by the various agents.
5.3 LIMITATIONS OF THE STUDY
There are possibilities of sample bias in this study as the sample size and distribution across contract and non-contracted farmers, provinces and districts do not proportionately represent that of the population. The extent to which market and price stability attract farmers to join contract farming was omitted from the empirical model estimated despite having been identified in theoretical model as potential determinants. The study was also done on very large scale; thus for Zimbabwe as a whole meaning that facts about districts and provinces are generalized. From a theoretical perspective, the study is limited in that there are no theories that directly discuss issues of participation in agricultural arrangements hence this study relied on models of contract farming. In supporting the theoretical models, empirical literature on tobacco contract farming participation was non-existent hence the study relied on contract farming participation of related crops of which some of them are very different from tobacco production such as poultry production. Further, the findings of the study were based on the responses of the respondents and hence the objectivity is limited to the honesty and memory power of the respondents. In addition, this study only focused determinants of participation in contract farming avoiding other important areas such as the impact of contract farming on household incomes.

5.4 AREAS OF FURTHER RESEARCH
The present research was an attempt to study the factors influencing participation of smallholder contract farmers in Zimbabwe. Further researches are encouraged on the same topic at district and provincial levels in order to efficiently and reliably guide agricultural policies. As contract farming is becoming a popular agricultural financing model, research should be extended on the impact of contract farming on household incomes. To bring more information to the interested growers, effort can be made to study the contract farming firms and their export procedures. Also a close examination of environmental and technological spillovers need to be considered. For instance the rate of tree cutting by tobacco growers far surpasses the rate of planting, thus long term consequences could be quite negative if these trends are not halted. Furthermore, since this study revealed that road access influence contract farming participation, studies can also be conducted to assess the impact of infrastructure development rural incomes.
REFERENCES


73


Keshavamurthy N.N. a study on contract farming in gherkin production University of Agricultural Sciences, Dharwad. M. Sc. (Agri.) Agricultural Extension Education, Dharwad


Meshesha, J.G (2011) Impact of contract farming on household income of smallholder farmers: The case of organic honey production in South West Ethiopia, Sheka Zone, Wageningen University and Research Centre


Minot, N.W. (1986). Contract Farming and its effects on small farmers in less developed countries. MSU International Development Papers. East Lansing, MI, Michigan State University, Department of Agricultural Economics


Sustainable Development in Africa (Volume 13, No.4, 2011) Clarion, Pennsylvania


Olomola, A. S (2010). Enhancing productivity, income and market access of rural producers in Africa: the case of contract farming in Nigeria. The Inaugural National Science Foundation (NSF) Joint Workshop of the African Economic Research Consortium (AERC) and the International Growth Centre (IGC) held in Mombassa, Kenya.


Randela, R., Alemu, Z.G, & Groenewald, J, A. (2010) Factors enhancing market participation by small-scale cotton farmers. Published online


Tobacco Industry and Marketing Board (TIMB) (2013). Department of Statistics, Boka Tobacco Floor Complex Waterfalls, Harare Zimbabwe


Woodend, J. (2003); Potential of Contract Farming as a Mechanism for the Commercialisation of Smallholder Agriculture: The Zimbabwe Case Study. Consultancy Report, FAO – AGSF, Rome

APPENDICES

Appendix a: Distribution of 2012/13 Production Season tobacco growers by Province and District

<table>
<thead>
<tr>
<th>Province</th>
<th>District</th>
<th>Non-Contracted</th>
<th>Contracted</th>
<th>Total</th>
<th>Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mashonaland Central</td>
<td>Pfura</td>
<td>3,351</td>
<td>1,915</td>
<td>5,266</td>
<td>28.02</td>
</tr>
<tr>
<td></td>
<td>Mazoe</td>
<td>2,355</td>
<td>1,693</td>
<td>4,048</td>
<td>21.54</td>
</tr>
<tr>
<td></td>
<td>Muzarabani</td>
<td>2,116</td>
<td>1,255</td>
<td>3,371</td>
<td>17.93</td>
</tr>
<tr>
<td></td>
<td>Bindura</td>
<td>1,004</td>
<td>1,060</td>
<td>2,064</td>
<td>10.98</td>
</tr>
<tr>
<td></td>
<td>Guruve</td>
<td>1,388</td>
<td>1,457</td>
<td>2,845</td>
<td>15.14</td>
</tr>
<tr>
<td></td>
<td>Chaminuka</td>
<td>386</td>
<td>753</td>
<td>1,139</td>
<td>6.06</td>
</tr>
<tr>
<td></td>
<td>Rushinga</td>
<td>46</td>
<td>18</td>
<td>64</td>
<td>0.34</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>10,646</strong></td>
<td><strong>8,151</strong></td>
<td><strong>18,797</strong></td>
<td><strong>100.00</strong></td>
</tr>
<tr>
<td>Mashonaland West</td>
<td>Hurungwe</td>
<td>7,996</td>
<td>5,946</td>
<td>13,942</td>
<td>75.00</td>
</tr>
<tr>
<td></td>
<td>Zvimba</td>
<td>1,686</td>
<td>779</td>
<td>2,465</td>
<td>13.26</td>
</tr>
<tr>
<td></td>
<td>Makonde</td>
<td>814</td>
<td>327</td>
<td>1,141</td>
<td>6.14</td>
</tr>
<tr>
<td></td>
<td>Chegutu</td>
<td>510</td>
<td>387</td>
<td>897</td>
<td>4.83</td>
</tr>
<tr>
<td></td>
<td>Kadoma</td>
<td>59</td>
<td>19</td>
<td>78</td>
<td>0.42</td>
</tr>
<tr>
<td></td>
<td>Kariba</td>
<td>35</td>
<td>31</td>
<td>66</td>
<td>0.36</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>11,100</strong></td>
<td><strong>7,489</strong></td>
<td><strong>18,589</strong></td>
<td><strong>100.00</strong></td>
</tr>
<tr>
<td>Manicaland</td>
<td>Makoni</td>
<td>4,826</td>
<td>2,990</td>
<td>7,816</td>
<td>64.98</td>
</tr>
<tr>
<td></td>
<td>Mutare</td>
<td>1,525</td>
<td>2,082</td>
<td>3,607</td>
<td>29.99</td>
</tr>
<tr>
<td></td>
<td>Chimanimani</td>
<td>149</td>
<td>91</td>
<td>240</td>
<td>2.00</td>
</tr>
<tr>
<td></td>
<td>Nyanga</td>
<td>119</td>
<td>21</td>
<td>140</td>
<td>1.16</td>
</tr>
<tr>
<td></td>
<td>Mutasa</td>
<td>98</td>
<td>29</td>
<td>127</td>
<td>1.06</td>
</tr>
<tr>
<td></td>
<td>Buhera</td>
<td>43</td>
<td>4</td>
<td>47</td>
<td>0.39</td>
</tr>
<tr>
<td></td>
<td>Chipinge</td>
<td>35</td>
<td>17</td>
<td>52</td>
<td>0.43</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>6,795</strong></td>
<td><strong>5,234</strong></td>
<td><strong>12,029</strong></td>
<td><strong>100.00</strong></td>
</tr>
<tr>
<td>Mashonaland East</td>
<td>Murehwa</td>
<td>1,665</td>
<td>955</td>
<td>2,620</td>
<td>25.06</td>
</tr>
<tr>
<td></td>
<td>Marondera</td>
<td>1,597</td>
<td>951</td>
<td>2,548</td>
<td>24.37</td>
</tr>
<tr>
<td></td>
<td>Hwedza</td>
<td>997</td>
<td>541</td>
<td>1,538</td>
<td>14.71</td>
</tr>
<tr>
<td></td>
<td>Chikomba</td>
<td>903</td>
<td>488</td>
<td>1,391</td>
<td>13.30</td>
</tr>
<tr>
<td></td>
<td>Mutoko</td>
<td>681</td>
<td>327</td>
<td>1,008</td>
<td>9.64</td>
</tr>
<tr>
<td>District</td>
<td>Number of Respondents</td>
<td>Percent</td>
<td>Cumulative Percentage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------</td>
<td>---------</td>
<td>-----------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seke</td>
<td>407</td>
<td>198</td>
<td>605</td>
<td>5.79</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goromonzi</td>
<td>361</td>
<td>239</td>
<td>600</td>
<td>5.74</td>
<td></td>
</tr>
<tr>
<td>Uzumba Maramba Pfungwe(UMP)</td>
<td>104</td>
<td>41</td>
<td>145</td>
<td>1.39</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6,715</strong></td>
<td><strong>3,740</strong></td>
<td><strong>10,455</strong></td>
<td><strong>100.00</strong></td>
<td></td>
</tr>
<tr>
<td>Midlands</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kwekwe</td>
<td>60</td>
<td>16</td>
<td>76</td>
<td>68.47</td>
<td></td>
</tr>
<tr>
<td>Gokwe</td>
<td>16</td>
<td>3</td>
<td>19</td>
<td>17.12</td>
<td></td>
</tr>
<tr>
<td>Mvuma</td>
<td>11</td>
<td>-</td>
<td>11</td>
<td>9.91</td>
<td></td>
</tr>
<tr>
<td>Chirumanzu</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>4.50</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>91</strong></td>
<td><strong>20</strong></td>
<td><strong>111</strong></td>
<td><strong>100.00</strong></td>
<td></td>
</tr>
<tr>
<td>Masvingo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bikita</td>
<td>15</td>
<td>-</td>
<td>15</td>
<td>23.44</td>
<td></td>
</tr>
<tr>
<td>Chiredzi</td>
<td>24</td>
<td>-</td>
<td>24</td>
<td>37.50</td>
<td></td>
</tr>
<tr>
<td>Gutu</td>
<td>11</td>
<td>2</td>
<td>13</td>
<td>20.31</td>
<td></td>
</tr>
<tr>
<td>Mwenezi</td>
<td>4</td>
<td>-</td>
<td>4</td>
<td>6.25</td>
<td></td>
</tr>
<tr>
<td>Zaka</td>
<td>3</td>
<td>-</td>
<td>3</td>
<td>4.69</td>
<td></td>
</tr>
<tr>
<td>Masvingo</td>
<td>5</td>
<td>-</td>
<td>5</td>
<td>7.81</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>62</strong></td>
<td><strong>2</strong></td>
<td><strong>64</strong></td>
<td><strong>100.00</strong></td>
<td></td>
</tr>
<tr>
<td>Matebeleland</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filabusi</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>35,410</strong></td>
<td><strong>24,637</strong></td>
<td><strong>60,047</strong></td>
<td><strong>-</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Source: TIMB 2013*
<table>
<thead>
<tr>
<th></th>
<th>Place</th>
<th>Type</th>
<th>Malaria Cases</th>
<th>Malaria Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Hurungwe</td>
<td>31</td>
<td>12.06</td>
<td>38.91</td>
</tr>
<tr>
<td>9</td>
<td>Zvimba</td>
<td>15</td>
<td>5.84</td>
<td>44.75</td>
</tr>
<tr>
<td>10</td>
<td>Makonde</td>
<td>11</td>
<td>4.28</td>
<td>49.03</td>
</tr>
<tr>
<td>11</td>
<td>Chegutu</td>
<td>5</td>
<td>1.95</td>
<td>50.97</td>
</tr>
<tr>
<td>12</td>
<td>Kadoma</td>
<td>1</td>
<td>0.39</td>
<td>51.36</td>
</tr>
<tr>
<td>13</td>
<td>Kariba</td>
<td>1</td>
<td>0.39</td>
<td>51.75</td>
</tr>
<tr>
<td>14</td>
<td>Makoni</td>
<td>19</td>
<td>7.39</td>
<td>59.14</td>
</tr>
<tr>
<td>15</td>
<td>Mutare</td>
<td>12</td>
<td>4.67</td>
<td>63.81</td>
</tr>
<tr>
<td>16</td>
<td>Chimanimani</td>
<td>5</td>
<td>1.95</td>
<td>65.76</td>
</tr>
<tr>
<td>17</td>
<td>Nyanga</td>
<td>2</td>
<td>0.78</td>
<td>66.54</td>
</tr>
<tr>
<td>18</td>
<td>Mutasa</td>
<td>1</td>
<td>0.39</td>
<td>66.93</td>
</tr>
<tr>
<td>19</td>
<td>Chipinge</td>
<td>4</td>
<td>1.56</td>
<td>68.48</td>
</tr>
<tr>
<td>20</td>
<td>Buhera</td>
<td>1</td>
<td>0.39</td>
<td>68.87</td>
</tr>
<tr>
<td>21</td>
<td>Murehwa</td>
<td>13</td>
<td>5.06</td>
<td>73.93</td>
</tr>
<tr>
<td>22</td>
<td>Marondera</td>
<td>13</td>
<td>5.06</td>
<td>78.99</td>
</tr>
<tr>
<td>23</td>
<td>Hwedza</td>
<td>6</td>
<td>2.33</td>
<td>81.32</td>
</tr>
<tr>
<td>24</td>
<td>Chikomba</td>
<td>3</td>
<td>1.17</td>
<td>82.49</td>
</tr>
<tr>
<td>25</td>
<td>Mutoko</td>
<td>2</td>
<td>0.78</td>
<td>83.27</td>
</tr>
<tr>
<td>26</td>
<td>Seke</td>
<td>2</td>
<td>0.78</td>
<td>84.05</td>
</tr>
<tr>
<td>27</td>
<td>Goromonzi</td>
<td>3</td>
<td>1.17</td>
<td>85.21</td>
</tr>
<tr>
<td>28</td>
<td>UMP</td>
<td>2</td>
<td>0.78</td>
<td>85.99</td>
</tr>
<tr>
<td>29</td>
<td>Kwekwe</td>
<td>12</td>
<td>4.67</td>
<td>90.66</td>
</tr>
<tr>
<td>30</td>
<td>Gokwe</td>
<td>5</td>
<td>1.95</td>
<td>92.61</td>
</tr>
<tr>
<td>31</td>
<td>Mvuma</td>
<td>2</td>
<td>0.78</td>
<td>93.39</td>
</tr>
<tr>
<td>Place</td>
<td>Count</td>
<td>Percent</td>
<td>Percentage</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>-------</td>
<td>---------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>Chirumanzi</td>
<td>2</td>
<td>0.78</td>
<td>94.16</td>
<td></td>
</tr>
<tr>
<td>Bikita</td>
<td>4</td>
<td>1.56</td>
<td>95.72</td>
<td></td>
</tr>
<tr>
<td>Chiredzi</td>
<td>6</td>
<td>2.33</td>
<td>98.05</td>
<td></td>
</tr>
<tr>
<td>Masvingo</td>
<td>3</td>
<td>1.17</td>
<td>99.22</td>
<td></td>
</tr>
<tr>
<td>Filabusi</td>
<td>2</td>
<td>0.78</td>
<td>100.00</td>
<td></td>
</tr>
</tbody>
</table>

**Total** 257 100.00
Appendix c: Estimation of unrestricted model

. xi:logit pat i.eco dft1 dft2 dft3 sex age ms i.hedu i.exp hsize fyears fsize rdac dist evis ca oy cear aspe

i.eco    _Ieco_1-3     (naturally coded; _Ieco_1 omitted)
i.hedu   _Ihedu_1-3   (naturally coded; _Ihedu_1 omitted)
i.exp    _Iexp_1-4     (naturally coded; _Iexp_1 omitted)

Iteration 0:  log likelihood = -176.31902
Iteration 1:  log likelihood = -45.410888
Iteration 2:  log likelihood = -41.707769
Iteration 3:  log likelihood = -36.181065
Iteration 4:  log likelihood = -35.695635
Iteration 5:  log likelihood = -35.686616
Iteration 6:  log likelihood = -35.686601
Iteration 7:  log likelihood = -35.686601

Logistic regression                     Number of obs  =      256
                                    LR chi2(23)  =    281.26
                                    Prob > chi2   =  0.0000

Log likelihood = -35.686601  Pseudo R2   =  0.7976
|          | Coef.  | Std. Err. | z      | P>|z| | [95% Conf. Interval] |
|----------|--------|-----------|--------|------|----------------------|
| _Ieco_2  | 2.769246 | 1.504149  | 1.84   | 0.066 | -1.788318 5.717324 |
| _Ieco_3  | 2.424281 | 1.829343  | 1.33   | 0.185 | -1.161165 6.009726 |
| dft1     | -0.5607618 | 2.583222 | -0.22  | 0.828 | -5.623783 4.50226  |
| dft2     | -1.752936 | 2.488104  | -0.70  | 0.481 | -6.629531 3.123659 |
| dft3     | -2.066206 | 2.470441  | -0.84  | 0.403 | -6.908181 2.775769 |
| sex      | -0.2217119 | 0.9054126 | -0.24  | 0.807 | -1.996288 1.552864 |
| age      | -0.1680999 | 0.0603659 | -2.78  | 0.005 | -2.864149 -.049785 |
| ms       | 1.722988 | 1.167463  | 1.48   | 0.140 | -.5651975 4.011174 |
| _Ihedu_2 | -0.5599095 | 0.9211961 | -0.61  | 0.543 | -2.365421 1.245602 |
| _Ihedu_3 | 1.598084 | 2.085217  | 0.77   | 0.443 | -2.488865 5.685034 |
| _Iexp_2  | 0.8424052 | 1.550704  | 0.54   | 0.587 | -2.196918 3.881728 |
| _Iexp_3  | -0.5621247 | 2.56889  | -0.22  | 0.827 | -5.597057 4.472807 |
| _Iexp_4  | 0.4698053 | 2.264905  | 0.21   | 0.836 | -3.969327 4.908937 |
| hsize    | 1.348208 | 0.3035003 | 4.44   | 0.000 | .7533587 1.943058 |
| fyears   | -0.361994 | 0.1482615 | -2.44  | 0.015 | -0.6525812 -.0714068 |
| fsize    | 0.1640854 | 0.2200359 | 0.75   | 0.456 | -0.2671769 .5953478 |
| rdac     | -2.748491 | 1.031759  | -2.66  | 0.008 | -4.770701 -.7262811 |
| dist     | -0.0808713 | 0.0496054 | -1.63  | 0.103 | -0.1780961 .0163534 |
| evis     | 0.2542028 | 0.1410446 | 1.80   | 0.072 | -.0222395 .5306451 |
| ca       | -3.1828 | 1.413012 | -2.25  | 0.024 | -5.952253 -.4133466 |
| oy       | -1.093582 | 0.8312592 | -1.32  | 0.188 | -2.72282 .535656 |
| cear     | -0.0000563 | 0.0007196 | -0.08  | 0.938 | -.0014666 .001354 |
| aspe     | 0.0009495 | 0.0002876 | 3.30   | 0.001 | .0003858 .0015132 |
Appendix d: Estimation of unrestricted model with odds ratios

. xi: logit pat i.eco age agesq hsize fyears rdac evis ca ass, or
i.eco      _Ieco_1-3   (naturally coded; _Ieco_1 omitted)
Iteration 0:  log likelihood = -177.10826
Iteration 1:  log likelihood = -56.770837
Iteration 2:  log likelihood = -52.960239
Iteration 3:  log likelihood = -52.320565
Iteration 4:  log likelihood = -52.312181
Iteration 5:  log likelihood = -52.312176

Logistic regression
Number of obs = 257
LR chi2(10) = 249.59
Prob > chi2 = 0.0000

Log likelihood = -52.312176  Pseudo R2 = 0.7046
|          | Odds Ratio | Std. Err. | z     | P>|z|  | [95% Conf. Interval] |
|----------|------------|-----------|-------|------|---------------------|
| _Ieco_2 | 41.98472   | 54.81716  | 2.86  | 0.004| 3.248807 542.5736   |
| _Ieco_3 | 36.73719   | 52.11439  | 2.54  | 0.011| 2.278319 592.376    |
| age      | .3938631   | .1194693  | -3.07 | 0.002| .2173466 7137359    |
| agesq    | 1.009505   | .0033028  | 2.89  | 0.004| 1.003053 1.016      |
| hsize    | 3.971433   | .8443074  | 6.49  | 0.000| 2.618098 6.024327   |
| fyears   | .8096452   | .071746   | -2.38 | 0.017| .6805598 .963215    |
| rdac     | .0858682   | .0500185  | -4.21 | 0.000| .027416 2.689431    |
| evis     | 1.317457   | .1262029  | 2.88  | 0.004| 1.091936 1.589554   |
| ca       | .1339607   | .1089501  | -2.47 | 0.013| .027208 .6595663    |
| ass      | 1.000252   | .0001012  | 2.49  | 0.013| 1.000054 1.00045    |
### Appendix e: Correlation matrix (Testing multicollinearity)

<table>
<thead>
<tr>
<th></th>
<th>pat</th>
<th>eco</th>
<th>sex</th>
<th>age</th>
<th>ms</th>
<th>edu</th>
<th>hsz</th>
<th>fyr</th>
<th>fsz</th>
<th>rdac</th>
<th>dist</th>
<th>evis</th>
<th>ca</th>
<th>oy</th>
<th>cy</th>
<th>ass</th>
<th>asp</th>
</tr>
</thead>
<tbody>
<tr>
<td>pat</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>eco</td>
<td>0.16</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sex</td>
<td>-0.30</td>
<td>0.06</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>age</td>
<td>0.12</td>
<td>0.07</td>
<td>-0.18</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ms</td>
<td>0.30</td>
<td>0.16</td>
<td>-0.22</td>
<td>0.16</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>edu</td>
<td>-0.18</td>
<td>-0.19</td>
<td>-0.14</td>
<td>-0.11</td>
<td>-0.11</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>exp</td>
<td>-0.15</td>
<td>-0.16</td>
<td>0.01</td>
<td>-0.23</td>
<td>-0.16</td>
<td>0.61</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hsz</td>
<td>0.67</td>
<td>0.14</td>
<td>-0.31</td>
<td>0.40</td>
<td>0.32</td>
<td>-0.13</td>
<td>-0.19</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fyr</td>
<td>-0.04</td>
<td>0.25</td>
<td>0.05</td>
<td>0.24</td>
<td>0.00</td>
<td>-0.08</td>
<td>-0.08</td>
<td>0.13</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fsz</td>
<td>0.16</td>
<td>0.09</td>
<td>-0.06</td>
<td>0.30</td>
<td>0.02</td>
<td>0.10</td>
<td>0.05</td>
<td>0.29</td>
<td>0.31</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rdac</td>
<td>-0.45</td>
<td>-0.01</td>
<td>0.14</td>
<td>-0.06</td>
<td>-0.10</td>
<td>0.18</td>
<td>0.15</td>
<td>-0.29</td>
<td>0.03</td>
<td>-0.09</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dist</td>
<td>-0.04</td>
<td>-0.15</td>
<td>-0.04</td>
<td>-0.28</td>
<td>-0.14</td>
<td>0.26</td>
<td>0.37</td>
<td>-0.09</td>
<td>-0.23</td>
<td>0.06</td>
<td>-0.10</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>evis</td>
<td>0.38</td>
<td>-0.04</td>
<td>-0.11</td>
<td>0.03</td>
<td>0.12</td>
<td>-0.15</td>
<td>-0.11</td>
<td>0.25</td>
<td>-0.16</td>
<td>-0.13</td>
<td>-0.14</td>
<td>-0.04</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ca</td>
<td>-0.13</td>
<td>-0.09</td>
<td>-0.07</td>
<td>0.12</td>
<td>-0.14</td>
<td>0.21</td>
<td>0.14</td>
<td>-0.01</td>
<td>0.02</td>
<td>0.10</td>
<td>-0.02</td>
<td>0.36</td>
<td>-0.09</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>oy</td>
<td>-0.26</td>
<td>-0.05</td>
<td>0.17</td>
<td>-0.10</td>
<td>-0.14</td>
<td>0.09</td>
<td>0.09</td>
<td>-0.26</td>
<td>-0.07</td>
<td>-0.07</td>
<td>0.10</td>
<td>-0.02</td>
<td>-0.07</td>
<td>-0.04</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cy</td>
<td>-0.10</td>
<td>0.07</td>
<td>0.08</td>
<td>-0.13</td>
<td>-0.15</td>
<td>0.24</td>
<td>0.24</td>
<td>-0.01</td>
<td>0.10</td>
<td>0.24</td>
<td>0.13</td>
<td>0.37</td>
<td>-0.10</td>
<td>0.40</td>
<td>0.13</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>ass</td>
<td>0.20</td>
<td>0.16</td>
<td>-0.15</td>
<td>0.10</td>
<td>0.04</td>
<td>0.06</td>
<td>0.00</td>
<td>0.30</td>
<td>0.56</td>
<td>0.20</td>
<td>-0.02</td>
<td>-0.04</td>
<td>0.04</td>
<td>0.13</td>
<td>-0.13</td>
<td>0.17</td>
<td>1.00</td>
</tr>
<tr>
<td>asp</td>
<td>0.45</td>
<td>0.12</td>
<td>-0.23</td>
<td>0.17</td>
<td>0.12</td>
<td>-0.05</td>
<td>-0.10</td>
<td>0.45</td>
<td>0.46</td>
<td>0.20</td>
<td>-0.21</td>
<td>0.02</td>
<td>0.17</td>
<td>0.11</td>
<td>-0.25</td>
<td>0.11</td>
<td>0.82</td>
</tr>
</tbody>
</table>

### Appendix f: Heteroskedasticity test

96
| pat | Coef. | Std. Err. | t     | P>|t| | [95% Conf. Interval] |
|-----|-------|-----------|-------|-----|------------------|
| _Ieco_2 | .2761963 | .0710175 | 3.89 | 0.000 | .1362746 .4161181 |
| _Ieco_3 | .2484659 | .0815917 | 3.05 | 0.003 | .0877106 .4092212 |
| dft1 | .0452313 | .1022175 | 0.44 | 0.659 | -.156162 .2466246 |
| dft2 | -.1655271 | .1107978 | -1.49 | 0.137 | -.3838255 .0527713 |
| dft3 | -.092843 | .1048927 | -0.89 | 0.377 | -.2995071 .113821 |
| sex | -.0736864 | .0454545 | -1.62 | 0.106 | -.1632428 .01587 |
| age | -.006637 | .0022247 | -2.98 | 0.003 | -.0110203 -.0022538 |
| ms | .0841892 | .0580785 | 1.45 | 0.149 | -.0302395 .1986178 |
| _Ihedu_2 | -.0144286 | .0455671 | -0.32 | 0.752 | -.1042069 .0753497 |
| _Ihedu_3 | .0318688 | .093257 | 0.34 | 0.733 | -.15187 .2156077 |
| _Iexp_2 | .1590181 | .0673186 | 2.36 | 0.019 | .0263843 .291652 |
| _Iexp_3 | .0983598 | .1147839 | 0.86 | 0.392 | -.1277922 .3245119 |
| _Iexp_4 | .0021017 | .1098419 | 0.02 | 0.985 | -.2143134 .2185169 |
| hsize | .0856352 | .0109965 | 7.79 | 0.000 | .0639695 .107301 |
| fyears | -.0313263 | .0052779 | -5.94 | 0.000 | -.041725 -.0209276 |
| fsize | .0056442 | .0081163 | 0.70 | 0.487 | -.010347 .0216354 |
| rdac | -.2354738 | .0412374 | -5.71 | 0.000 | -.3167213 -.1542262 |
| dist | -.0013628 | .002586 | -0.53 | 0.599 | -.0064578 .0037322 |
| evis | .0150828 | .0064246 | 2.35 | 0.020 | .0024248 .0277407 |
| ca | -.1359406 | .0505004 | -2.69 | 0.008 | -.2354387 -.0364425 |
| oy | -.0549906 | .0391251 | -1.41 | 0.161 | -.1320765 .0220952 |
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of pat

\[
\chi^2(1) = 0.07
\]

\[
\text{Prob} > \chi^2 = 0.7896 \text{ (evidence of homoskedasticity)}
\]

**Appendix g: Misspecification test Results**

( 1) [pat]yf2 = 0

\[
\chi^2( 1) = 0.17
\]

\[
\text{Prob} > \chi^2 = 0.6817 \text{ (evidence of non-existent of misspecification)}
\]
**Appendix h: Marginal effects after logit**

\[ y = \text{Pr}(\text{pat}) \text{ (predict)} \]

\[ = .70296547 \]

| variable | dy(dx) | Std. Err. | z   | P>|z| | [ 95% C.I.] | X      |
|----------|--------|-----------|-----|-----|-------------|--------|
| _Ieco_2*| .6915672 | .20531 | 3.37 | 0.001 |.289177 - 1.09396 | .719844 |
| _Ieco_3*| .4041057 | .15213 | 2.66 | 0.008 |.105929 - .702282 | .190661 |
| age      | -.0165717 | .00795 | -2.08 | 0.037 | -.032161 - .000982 | 41.4786 |
| hsize    | .2493301 | .05238 | 4.76 | 0.000 |.14667 - .35199 | 5.02335 |
| fyears   | -.0531645 | .02481 | -2.14 | 0.032 | -.101795 - .004534 | 5.86576 |
| rdac*    | -.4244941 | .11087 | -3.83 | 0.000 |-.641803 - .207185 | .525292 |
| evis     | .0515676 | .02078 | 2.48 | 0.013 |.010847 - .092288 | 4.89105 |
| ca*      | -.6834728 | .16414 | -4.16 | 0.000 |-.100519 - .36176 | .245136 |
| aspe     | .0001935 | .00005 | 4.28 | 0.000 |.000105 - .000282 | 3363.15 |

(*) dy/dx is for discrete change of dummy variable from 0 to 1
### Appendixi: MFX with distance

xi:logit pat i.eco age hsize fyears rdac dist evis ca aspe

i.eco  _Ieco_1-3  (naturally coded; _Ieco_1 omitted)

Logistic regression  Number of obs  =  257

|                      | Coef.   | Std. Err. |   z    | P>|z|  | [95% Conf. Interval] |
|----------------------|---------|-----------|--------|------|----------------------|
| pat                  |         |           |        |      |                      |
| _Ieco_2              | 3.620787| 1.716856  | 2.11   | 0.035| 0.255811  6.985762   |
| _Ieco_3              | 3.439093| 1.820477  | 1.89   | 0.059| -0.1289766  7.007163 |
| age                  | -0.1020718| 0.0415851| -2.45  | 0.014| -.1835771 -.0205666 |
| hsize                | 1.232509| 0.2223105| 5.54   | 0.000| 0.7967884 1.66823    |
| fyears               | -0.2801058| 0.1081263| -2.59  | 0.010| -.4920294 -.0681821 |
| rdac                 | -2.149389| 0.6466171| -3.32  | 0.001| -3.416735 -.8820427 |
| dist                 | -0.0731656| 0.0440479| -1.66  | 0.097| -0.1594979 0.0131667 |
| evis                 | 0.2367161| 0.0957111| 2.47   | 0.013| 0.0491257 0.4243064  |
| ca                   | -2.780521| 1.174793  | -2.37  | 0.018| -5.083073 -0.4779679 |
| aspe                 | 0.0009741| 0.0002177| 4.47   | 0.000| 0.0005474 0.0014007  |
| _cons                | -4.69965| 2.313884  | -2.03  | 0.042| -9.23478  1.645196   |

LR chi2(10)  =  267.16
Prob > chi2  =  0.0000
Log likelihood = -43.528878  Pseudo R²  =  0.7542
Appendix j: Household Survey Questionnaire

UNIVERSITY OF ZIMBABWE
FACULTY OF SOCIAL STUDIES
DEPARTMENT OF ECONOMICS
DETERMINANTS OF SMALLHOLDER TOBACCO CONTRACT FARMING PARTICIPATION IN ZIMBABWE

Household Survey Questionnaire:
Code_____________ Province____________________
District____________ Region____________________
Farming scale [i] small-scale communal [ii] communal [ii] A1

Contracted (1)/ non-contracted (2)_________ Date of Interview____________________

HOUSEHOLD CHARACTERISTICS

Respondent:
2. What is the age of the household head? _________ Years
3. Marital status of household head?
4. What is the highest level of education of the household head? _________
   [i] no school
   [ii] Primary____ [iii] Secondary____
   [iv] A’ level____ [v] College/ University____
   [v] Other Specify ___________________________
5. Do you have expertise in agriculture? If yes at what level, tick below the level of education attained
   [i] Zimbabwe Tobacco farmers’ association certificate.
   [ii] National Certificate
   [iii] Diploma in Agriculture

101
6. How many are you in household size .................................................persons
7. How long have you been farming tobacco? ...................................years
8. How big is your farm? (hectares) ..............................................
9. Do you have access to main roads? [i] Yes [ii] No
10. How many kilometres do you travel to get to the nearest road? .............
11. How many visits by extension officers do you receive per season? ..............
12. Do you have access to credit other than contract farming? [i] Yes [ii] No
13. Do you have other sources of income other than farm income? [i] Yes  [ii] No
14. If yes to Question 16, on average, how much do you earn per year .................
15. How much have you invested in tobacco producing assets? ..........................
16. Of these assets, what is the approximate value of assets used in tobacco production alone, with little/ no other use if you move to other crop production? ..............................

Thank you very much. GOD blesses you.