TABLE OF CONTENTS

FOREWORD		v
THE AUTHOR		vii
ACKNOWLEDGEMENTS		vii
LIST OF TABLES		xiv
LIST OF FIGURES		xvi
LIST OF ABBREVIATIONS		xvii
1	INTRODUCTION	1
1.1	General Background	1
1.2	Problem Setting	6
1.3	Objectives of the Study	10
1.4	Hypotheses	11
1.5	Empirical Approach	12
1.6	Organisation of the Study	13
2	REVIEW OF AGRICULTURE AND POLICY IN ETHIOPIA	15
2.1	Ethiopian Economy: Structure and Growth Trends	15
2.1.1	Growth Trends in Major Sectors	16
2.1.2	Structure of Exports and Imports	18
2.2	Ethiopian Agriculture: State and Perspective	21
2.2.1	Present State	21
2.2.2	International Comparisons: Importance, Productivity and Input Use	22
2.3	Structure of Ethiopian Agriculture	25
2.3.1	Individual Peasant Farm Sector	25
2.3.2	Producers Co-operative Sector (PC)	27
2.3.3	State Farm Sector	28
2.4	Comparison of Performance in Peasant, PCs and State Farms	29
2.5	Comparison of Performance at Regional Level	32
2.6	Agricultural Policies In Ethiopia	35
2.6.1	Land Tenure System	36
2.6.2	Agricultural Marketing and Pricing Policy	38
2.6.3	The Pattern of Financial Resource Allocation	42
2.6.4	Agricultural Development Strategy	45
3	THE CASE STUDY REGION	49
3.1	General Features	50
3.2	Systems of Farming in Arssie Region	53
3.3	Risk and Agriculture in Arssie Region	56
3.4	The Survey Area - Chillalo Awraja	59
3.5	CADU/ARDU and Agricultural Development	61
4	METHODS AND STRUCTURE OF THE FIELD SURVEY	65
4.1	Survey Design	65
4.2	Sample Size and Sample Selection	68

4.2.1	Selection of Peasant Association	70
4.2.2	Selection of Sample Households	70
4.3	Training Enumerators and Pilot Study	71
4.4	Data Collection	71
4.5	Results of the Field Survey	74
4.5.1	Households and Labour Force	74
4.5.2	Land Holding and Land Use	76
4.5.3	Oxen and Livestock Raising	79
4.5.4	Usage of Modern Input	81
4.5.5	Farm Incomes and their Distribution	83
4.5.6	Major Problems of the Survey Areas	85
4.6	Concluding Remarks	87
5	METHODOLOGY	89
5.1	Concepts and Measurements of Productivity	89
5.2	Neo-Classical Production Functions and Optimisation Approach	92
5.3	Mathematical Programming based on Activity Approach	94
5.3.1	Limitations of Mathematical Programming Models	95
5.3.2	Previous Applications of MP Models to Peasant Agriculture	98
5.3.3	The Basic Model for our Study	99
5.4	A Review of Risk Programming Models	101
5.4.1	Mean-Variance (E-V) Analysis	103
5.4.2	Game Theory Approaches	106
5.4.3	Safety-First Models	107
5.4.4	Comparison of the Common Risk Models	110
5.5	A Quadratic Risk Programming Model for the Study Areas	112
5.6	Concluding Remarks	114
6	STRUCTURE OF THE MODEL	117
6.1	Objective Function	118
6.2	Constraints	121
6.2.1	Labour and Ox Power Constraints	122
6.2.2	Land Constraints	125
6.2.3	Operating Capital Constraints	126
6.2.4	Subsistence-Consumption Constraints	126
6.3	Data and Specification of the Model	127
6.4	Scenarios for Analysis	129
7	MODEL RESULTS AND DISCUSSION	135
7.1	Results of the Risk-Neutral Models	135
7.1.1	Optimum Farm Plans under Traditional Technology	136
7.1.2	Optimum Farm Plans under Improved Technology	140
7.2	Results of the Quadratic Risk Models	147
7.2.1	Expected Income and Risk Trade-offs under Traditional Technology	148
7.2.2	Expected Income and Risk Trade-offs under Improved Technology	157
7.2.3	Expected Income and Risk Trade-offs: the Case of Changes in Hectarage Constraint	170
7.3	Expected Gain-Confidence Limit (E-L) Criterion	177
7.4	Concluding Remarks	180

8 SUMMARY AND CONCLUSION 183
8.1 Summary of the Main Results 183
8.1.1 Summary of the Main Findings at Macro Level 184
8.1.2 Summary of the Main Findings at Farm Level 186
8.2 Conclusion and Policy Implications 190
8.3 Limitations and Suggestions for Future Research 195
8.3.1 Limitations 195
8.3.2 Suggestions for Future Research 197

REFERENCES 199

APPENDICES 217