CONTRACT FARMING AND RISKS FOR SMALLHOLDERS IN THE OIL PALM INDUSTRY IN INDONESIA

Der Wirtschaftswissenschaftlichen Fakultät der

Gottfried Wilhelm Leibniz Universität Hannover

zur Erlangung des akademischen Grades

Doktor der Wirtschaftswissenschaften

- Doctor rerum politicarum -

genehmigte Dissertation

von

Eko Ruddy Cahyadi, MSc

geboren am 13.12.1978 in Brebes, Indonesien

2013

Erstgutachter: Prof. Dr. Hermann Waibel
Institut für Entwicklungs- und Agrarökonomik
Wirtschaftswissenschaftliche Fakultät
der Gottfried Wilhelm Leibniz Universität Hannover

Zweigutacher: Prof. Dr. Ulrike Grote
Institut für Umweltökonomik und Welthandel
Wirtschaftswissenschaftliche Fakultät
der Gottfried Wilhelm Leibniz Universität Hannover

Tag der Promotion: 18.04.2013

ACKNOWLEDGEMENTS

I would like to thank a number of people for their invaluable support during my study.

First, my most grateful thanks go to my supervisor, Prof. Dr. Herman Waibel, for his constructive comments and continuous advice during my study. I particularly appreciate his academic spirit for directly supervising my field work in remote villages in Jambi by spending a couple of nights over there. I also thank to him for guiding me to get valuable chances and experiences during my study including for sending me to the IAAE conference in Brazil.

I would like to thank to Prof. Dr. Ulrike Grote as my second supervisor for her valuable comments and advice.

I express gratitude to the World Bank for the scholarship under Japan Indonesia Presidential Scholarship (JIPS) program that supports my study and living in Germany. I am also thankful to my employer, Bogor Agricultural University (IPB) for support and permission to study.

The implementation of the empirical works in Jambi province, Indonesia would not have been possible without supports from a number of persons and institutions. My appreciation goes to the Institute of Development and Agricultural Economics, University of Hannover for the financial support of this research project. The field work can be successfully implemented by collaboration with Jambi University. Thus, I am grateful to the Dean of Faculty of Agriculture, Jambi University, Prof. Zulkifli Alamsyah, for cooperation in providing potential candidates for enumerators and facilitating a seminar for discussing the results of this study with oil palm stakeholders in Jambi. Many thanks go to my enumerators, Dwi Wibowo, Deni Kusuma, Sujatmiko and Didik Samsun, for teamwork in data collection. Appreciations also I express to the two oil palm corporations where the field work took place, namely PT. Astra Agro Lestari Tbk and PT. Bakri Sumatra Plantation Tbk for cooperation. I am thankful to all village heads and cooperative heads in the study sites for their cooperation.

A note of thanks is expressed to all my colleagues at the Institute of Development and Agricultural Economics, University of Hannover for valuable comments, supports, and

friendly environment. I thank to Jan Meier for his assistance in dealing with database. To Mulu Amare, I am thankful for fruitful discussions not only about papers but also about living in Hannover. I am grateful to Priyanka Parvati for proof reading and English editing on some chapters. To Dr. Theda Godecke, I thank for her comments and assistance in translating the abstract in German version. My grateful also goes to Herr Florian Heinrichs that help me in formatting and lay outing this thesis. I also would like to thank to my colleagues who belong at the Institute of Environmental Economics and World Trade for support and friendship.

Finally, I am very indebted to my parents, my wife and my children that always support me with unconditional love.

ZUSAMMENFASSUNG

In den letzten drei Jahrzehnten, hat Indonesien eine immense Ausweitung der Palmölindustrie erlebt. Diese Entwicklung hat zwar zu wirtschaftlichem Wachstum und der ländlichen Entwicklung beigetragen aber die rapide Ausweitung der Palmölplantagen ging zumeist mit der Rodung des indonesischen Regenwaldes einher. Dies hat sowohl negative Auswirkungen auf die Umwelt, als auch auf die Ureinwohner, die als kleinbäuerliche Subsistenzbauern stark vom Regenwald abhängig sind. Ihre Lebensgrundlage wird durch die Ausweitung der Palmölplantagen bedroht. Die indonesische Regierung ermutigt daher diese kleinbäuerlichen Subsistenzfarmer, die in den Gegenden der Palmölplantagen leben, in die Palmölindustrie einzusteigen, indem sie den Vertragsanbau („Contract farming“) fördert. Auf der einen Seite ist dieser Versuch erfolgreich, da viele Kleinbauern ihr Land in Palmölplantagen umgewandelt haben, welche potentiell attraktive Renditen bieten. Auf der anderen Seite erreichen diese Kleinbauern oft nicht die Produktivität von großen Palmölfirmen, die moderne Technologien mit großen Mengen an Düngemitteln und Pestiziden verwenden. Hierdurch profitieren die Kleinbauern oft weniger von den Gewinnen in der Palmölindustrie als die großen Palmölfirmen. Diese Situation hat zu einer Erhöhung der Ungleichheit und manchmal auch zu sozialen Konflikten geführt. Die Einführung von Vertragsanbaumodellen ist eine Strategie der Regierung, die Beteiligung von Kleinbauern an den Gewinnen in der Palmölindustrie zu erhöhen und die Armut in den ländlichen Gebieten zu reduzieren. Allerdings birgt solch ein Vertrag das Problem von einer asymmetrischen Informationsverteilung woraus sich die Gefahr des Moral Hazard mit Bezug auf Effizienz und Fairness ergeben kann. Hieraus resultiert die Frage des Armut reduzierenden Effekts von solchen Vertragsanbaumodellen. Zudem ist die Palmölproduktion mit bestimmten Risiken wie Preisschwankungen und Krankheiten der Ölpalme verbunden. Während einige Studien aufzeigen, dass Vertragsanbau eine effektive Methode des Risikomanagements ist, ist die Rolle von Schocks und Risiken in der kleinbäuerlichen Palmölproduktion noch wenig untersucht worden.

Das Ziel dieser Arbeit ist es zu einem besseren Verständnis über den Einfluss von Vertragsanbau in der Palmölindustrie in Indonesien auf den Wohlstand von Kleinbauern beizutragen.

Es gibt drei spezielle Zielsetzungen, die in drei separaten Essays bearbeitet werden:

(1) Zu bewerten, ob und in welchem Ausmaß die Armen von Vertragsanbau profitieren,

(2) das Ausmaß der Vulnerabilität unter Palmöl Kleinbauern zu ermitteln und zu bewerten, ob Vertragsanbau eine effektive Methode ist die Vulnerabilität zu verringern und

(3) die Beziehung zwischen einer subjektiven Risikoeinschätzung, der Risikoeinstellung und dem Entscheidungsverhalten von Palmöl Kleinbauern zu untersuchen.

Die empirische Basis dieser Studie ist eine Haushaltsbefragung von 300 Palmöl Kleinbauern in der Provinz Jambi (Sumatra), eine der größten Palmöl produzierenden Provinzen Indonesiens.

Um den Einfluss von Vertragsanbau auf den Wohlstand von Kleinbauern zu bewerten, beginnt die Analyse mit einem Vergleich der Eigenschaften von Vertragsanbau-Kleinbauern und Kleinbauern ohne Vertragsanbauverträgen. Die Analyse zeigt, dass Vertragsanbau-Kleinbauern im Vergleich zu Kleinbauern ohne Vertag eine signifikant größere Landfläche besitzen und signifikant mehr Einkommen haben. Des Weiteren verwenden Vertragsanbau-Kleinbauern mehr Inputs und erzielen daher auch höhere Ernten. Um für versteckte Verzerrungen zu kontrollieren, wurde der Einfluss von Vertragsanbau auf das Einkommen mit einem zwei Stufen Treatment Effekt Model geschätzt. In der ersten Stufe wurde die Teilnahmeentscheidung mit Hilfe eines Probit Models geschätzt und die inverse Mills Ratio wurde in der zweiten Stufe als Regressor in das Einkommensmodell eingefügt. Die Ergebnisse zeigen, dass die Teilnahme am Vertragsanbau signifikant von dem Haushaltstyp (Haushalt mit Migrationsorientierung oder eingeborener Haushalt), dem Alter des Haushaltsvorstandes, der Größe der Palmöllandfläche und der Zeit seit Plantagengründung beeinflusst wird. Kontrolliert man für versteckte Verzerrungen, kann der positive Effekt von der Teilnahme am Vertragsanbau bestätigt werden. Eine weitere Schätzung zeigt allerdings, dass Kleinbauern mit einem geringeren Konsumlevel von solchen Verträgen benachteiligt sind. Eine mögliche Erklärung für den Ausschluss der Armen ist, dass Kredit- und Managementbedingungen oft die finanziellen und technischen Kapazitäten der Armen übersteigen. Von den Ergebnissen können daher die folgenden Empfehlungen für Politiker abgeleitet werden; wenn Vertragsanbau mehr pro-poor, also zugunsten der Armen, sein soll, dann ist Überarbeitung der existierenden Vertragsbedingungen nötig.

Um das Risiko zukünftig in Armut zu fallen zu berücksichtigen, wird in dem zweiten Essay das Konzept der Vulnerabilität angewendet. Die Analyse beginnt mit einer deskriptiven Beschreibung der Schocks, die Kleinbauern erlebt haben. Die Ergebnisse zeigen, dass Vertrags-Kleinbauern häufiger von Palmöl Schocks berichten als Kleinbauern ohne Vertrag, da erstere abhängiger von Palmöl sind. Im Durchschnitt trägt Palmöl für Vertrags-Kleinbauern zu 60 Prozent und für Kleinbauern ohne Vertrag zu 30 Prozent zum Haushaltseinkommen bei. Die Teilnahme am Vertragsanbau und die Wahrscheinlichkeit einen Schock zu erleben, wurde simultan mit einen Bivariaten Probit Model geschätzt, um Endogenität zu kontrollieren. Die Ergebnisse zeigen, dass Preisschocks durch die Teilnahme am Vertragsanbau reduziert werden können; dies ist allerdings nicht der Fall für Produktionsschocks. Dies suggeriert, dass der Preisanreiz des Vertragsanbaus effektiv ist während die technische Assistenz, die Palmölfirmen den Kleinbauern als Teil des Vertrages anbieten, weniger effektiv ist. In diesem Essay wird Vulnerabilität mit Hilfe des Asset basierten Vulnerabilitätskonzepts untersucht. Hierdurch können vier Armutstypologien unterschieden werden: (i) strukturell chronisch arm, (ii) strukturell schwankend arm, (iii) stochastisch schwankend arm und (iv) nicht arm. Die Ergebnisse zeigen, dass rund 40 Prozent der Kleinbauern als stochastisch schwankend arm eingestuft werden können. Dies bedeutet, dass diese Kleinbauern zum Befragungszeitpunkt nicht arm sind aber im Falle eines zukünftigen Schocks in Armut fallen könnten. Die Ergebnisse dieser Studie soll den Politikern signalisieren, dass es nicht ausreichend ist den Einfluss der Palmölentwicklung auf das Einkommenswachstum zu betrachten, sondern dass zukünftige Risiken berücksichtigt und adäquate Systeme der sozialen Sicherung für die Gemeinden in den Palmölgegenden entwickelt werden müssen.

In diesem Essay wird auch betrachtet, wie effektiv Vertragsanbau die Vulnerabilität reduzieren kann. Ein einfacher arithmetischer Mittelwerts Vergleich zeigt, dass Vertrags-Kleinbauern eine signifikant kleinere Wahrscheinlichkeit in Armut zu fallen aufweisen als Kleinbauern ohne Vertrag. Um für das Problem der Selektionsverzerrung zu kontrollieren, wurde die Methode des Propensity Score-Matchings angewendet. Die Ergebnisse zeigen, dass die Teilnahme am Vertragsanbau die Vulnerabilität nicht signifikant verringert. Ein Hauptgrund ist hierfür, dass hauptsächlich Haushalte mit einer größeren Vermögensausstattung am Vertragsanbau teilnehmen. Dieser Essay bestätigt daher die Ergebnisse des ersten; nämlich, dass eine Überarbeitung der

existierenden Vertragsbedingungen notwendig ist, um armen Haushalten die Teilnahme zu ermöglichen.

Der dritte Essay untersucht, ob die subjektive Risikoeinschätzung und die Risikoeinstellung der Kleinbauern ihre zukünftigen Investitionspläne beeinflusst. Um für unbeobachtbare Heterogenität zu kontorollieren, werden die subjektive Risikoeinschätzung und die zukünftigen Investitionspläne simultan mit einem Multivariaten Probit Model geschätzt. Dieses Model erlaubt die Koexistenz von zwei Portfolio Auswahlmöglichkeiten, nämlich die Möglichkeit zukünftig in Palmöl Betriebe oder in Nicht-Palmöl Betriebe zu investieren. Die Risiken, denen Kleinbauern ausgesetzt sind, können in drei Gruppen unterteilt werden: Palmöl Preisrisiken, Palmöl Produktionsrisiken und Risiken für Nicht-Palmöl Betriebe. Die Kleinbauern wurden nach der subjektiven Eintrittswahrscheinlichkeit für jede dieser Risiken befragt. Die Ergebnisse zeigen, dass die subjektive Risikoeinschätzung für alle Risiken von dazugehörigen Schockerlebnissen in der Vergangenheit beeinflusst wird. Eine andere wichtige Determinante ist die Vermögensausstattung. Genauer gesagt, Kleinbauern mit einer größerer Palmöllandfläche neigen dazu größere Risiken in der Palmölproduktion zu erwarten während Kleinbauern mit größeren Gummibaumlandflächen, Viehbeständen oder Vermögensgegenständen von Nicht-Palmöl Betrieben weniger pessimistisch sind. Die Ergebnisse des Investitionsmodels zeigen, dass der Plan in Palmöl zu investieren von negativen Erwartungen in Bezug auf Nicht-Palmöl Betriebe und von einer geringen Risikoaversion beeinflusst wird und daher unabhängig von der Risikoerwartungen in Bezug auf Palmöl zu sein scheint. Dementsprechend erhöht sich die Wahrscheinlichkeit in Nicht-Palmöl Betriebe zu investieren mit der Erwartung einen Palmölschock in der Zukunft zu erleben und ist allerdings unabhängig von der Risikoeinstellung. Da die Entscheidung für zukünftige Investitionsentscheidungen von der subjektiven Risikoeinschätzung beeinflusst wird, scheint die Tauglichkeit der Entscheidung, ob zukünftig in Palmöl Betriebe oder in Nicht-Palmöl Betriebe investiert wird, von der Qualität der subjektiven Risikoeinschätzung abzuhängen, d.h. ob die subjektiven Erwartungen mit der Realität übereinstimmen. Es wird Politikern daher empfohlen, die Kleinbauern zu unterstützen die Qualität ihrer subjektiven Erwartungen zu erhöhen, indem ihnen zum Beispiel akkurate und adäquate Informationen über Chancen und Risiken in der Palmöl- und Nicht-Palmölindustrie bereitgestellt werden.

Zusammenfassend zeigt die Doktorarbeit, dass Vertragsanbau in der Palmölindustrie den Kleinbauern Chancen eröffnet hat, ein höheres Einkommen zu erwirtschaften, aber auch dass die Armen oft nicht profitieren und der Großteil der Kleinbauern mit Armutsrisiken konfrontiert ist, welche nicht durch den Vertragsanbau reduziert werden können. Die Doktorarbeit unterstreicht daher die Notwendigkeit die existierenden Vertragsbedingungen zu überarbeiten, um mehr pro-poor zu werden und Risiken bei dem Design von armutsreduzierenden Maßnahmen zu berücksichtigen. Als nächster Schritt wird empfohlen, dass Umweltexternalitäten bei der Untersuchung der Vulnerabilität von Palmöl Kleinbauern berücksichtigt werden sollen.

Stichwörter: Vertragsanbau, Palmöl, Kleinbauern, Armut, Vulnerabilität, Risiken, Schocks

ABSTRACT

Indonesia has experienced a rapid oil palm expansion during the past three decades. This has contributed to economic growth and rural development. However, the rapid expansion of oil palm plantations was at the expense of rainforest areas. This raised concerns over the impact of this development on indigenous communities and the environment. Often oil palm plantations have replaced forest areas where forest-dependent communities live. Thus, their livelihoods as smallholder subsistence farmer became threatened. The government of Indonesia has encouraged smallholder farmers in the oil palm plantation areas to participate in the oil palm industry by promoting contractual arrangements with oil palm companies. On the one hand, this attempt has been successful. Many smallholders converted their land into oil palm plantations which offered attractive returns. On the other hand, subsistence smallholder farmers were often not in a position to achieve the productivity levels of the oil palm companies that applied modern technologies with high levels of fertilizers and pesticides. This has created a gap between the companies and the surrounding communities in the benefit shares of oil palm development. Therefore, inequality has increased and sometimes social conflicts have emerged. The implementation of contract farming schemes was the government's strategy to increase participation of smallholders in oil palm development in order to reduce poverty in rural areas. However, contract farming may suffer from asymmetric information and therefore moral hazard can emerges with regards to efficiency and fairness. This raises the question of the poverty reduction effect of such schemes. Furthermore the nature of oil palm has exposed smallholders to certain risks such as price volatility and diseases outbreak. While some studies suggest that contract farming can be an effective tool of risk management, the role of shocks and the poverty risks which are faced by oil palm smallholders demand further investigation.

The objective of this thesis is to improve the understanding of the effects of contract farming in the oil palm industry in Indonesia on smallholders' wellbeing. There are three specific research objectives which are addressed in three separate papers: (1) To assess if and to what extent the poor benefit from contract farming. (2) To assess the degree of vulnerability to poverty among oil palm smallholders and if contract farming is an effective measure to reduce vulnerability to poverty. (3) To investigate the

relationship between subjective risk expectation, risk attitude and decision making behavior among oil palm smallholders. The empirical base of this study is a household survey of 300 oil palm smallholders in the province of Jambi (Sumatra), one of the major oil palm producing provinces in Indonesia.

In assessing the impact of contract farming on the households' well-being, the analyses commences with a comparison of the characteristics of contract and non-contract smallholders. It was shown that contract smallholders have a significantly higher land size and income than non-contract smallholders. Moreover, contract smallholders apply higher inputs and therefore generate higher yields than non-contract smallholders. In order to control for hidden bias, the effect of contract participation on the households' income was estimated by a two steps treatment effect model. First, the participation decision was estimated by probit models and the inverse Mills ratio was calculated which was included in the second step as a regressor in the income model. The results show that contract participation is significantly associated with the type of household (a migrant or indigenous household), age of household head, size of oil palm plot, and the time of plantation establishment. After controlling for a hidden bias, the positive income effect of contract participation can be confirmed. However, a further investigation for the equity effect shows that poor smallholders are discriminated to benefit from such contract. One of the possible reasons for the exclusion of the poor is that loan conditions and management requirements are often beyond their financial and technical capacity. The results therefore convey the following message for policy makers; if they want contract farming to be more pro-poor a review of existing contractual schemes is necessary.

In order to take into account the risk of falling into poverty in the future, the concept of vulnerability to poverty is applied in the second paper. The analyses commences with a description of shocks experienced by smallholders. The results show that oil palm shocks are more extensively reported by contract smallholders than non-contract smallholders as the former are more dependent on oil palm. On average, oil palm contributes over 60 percent of household income of contract smallholders while it is only 30 percent for the non-contract smallholders. The contract participation and the likelihood of experiencing a shock are simultaneously estimated by using bivariate probit models in order to control for endogeneity. The results show that price shocks can be reduced by participation; however this is not the case for production shocks. This

suggests that the price incentive offered by the contract works effectively while the technical assistance that oil palm companies offer to smallholders as part of the contract is less effective. In the paper vulnerability to poverty is assessed by applying the asset based vulnerability concept. Based on the assessment, four poverty typologies are established, namely structural chronic, structural transient, stochastic transient and non-poor. The results suggest that about 40 percent of smallholders are classified as stochastically transient poor who are non-poor but could fall into poverty in the presence of shocks. Results of this study signal to policy makers that it is not enough to consider the effects of oil palm development on income growth but there is a need to take into account the future risks and develop appropriate social protection schemes for the communities in oil palm areas.

The paper also assesses the effectiveness of contract farming in reducing vulnerability to poverty. A simple mean comparison shows that contract smallholders are significantly less vulnerable than non-contract smallholders. In order to control for the selection bias a propensity score matching analysis was applied. The results show that contract participation does not significantly reduce vulnerability to poverty. The major reason is that mostly households with higher asset endowments participate in contract farming. Hence, the paper confirms the results of the first paper that there is a need to review the contract schemes conditions for asset poor households to participate.

The third paper examines whether subjective risk expectations and risk attitude influence the future plan of investments among oil palm smallholders in Indonesia. In order to control for unobservable heterogeneity, subjective risk expectations and the future plan of investment are simultaneously estimated by a multivariate probit model. Such model also allows the coexistence of two portfolio choices in the future plan, namely oil palm and non-oil palm enterprises. Risks which smallholders are confronted with can be classified into three major groups, namely oil palm price risk, oil palm production risk and non-oil palm business risk. Respondents are asked to subjectively assess their expectation towards each risk group, i.e. whether they expect to suffer from a certain risk in the future. Results show that the subjective expectation towards all risks is driven by corresponding shock experience in the past. Other important determinants are asset endowments. More precisely, smallholders with larger oil palm plots tend to expect larger risks in oil palm production while those with larger rubber plots, livestock and non-farm business assets tend to be less pessimistic. The results of the investment

plan model show that a plan for oil palm investment tends to be encouraged by pessimism in the non-oil palm enterprises and low risk aversion and seems to be independent of risk expectations in oil palm business itself. Accordingly, the likelihood to plan a non-oil palm investment increases with the expectation of experiencing an oil palm production shock in the future but is independent of risk aversion. As the future plan of investment seems to be driven by subjective risk expectations, the suitability of the portfolio choice depends on the quality of expectations, i.e. whether subjective expectations match the reality in the future. Hence, it is recommended to policy makers to assist smallholders in improving the quality of their risk expectations by for example supplying accurate and adequate information regarding prospects and risks of oil palm as well as non-oil palm enterprises.

In summary, this thesis shows that while contract farming in the oil palm industry has opened opportunities for smallholders to increase their income, the poor often fail to benefit and the majority of smallholders are still confronted with poverty risks which cannot be reduced by the contract schemes. Thus, this thesis underlines the need for reviewing the contract farming schemes in order to be more pro-poor and taking into account risks in designing poverty reduction policies. As a further step, it is recommended to take into account environmental externalities in assessing vulnerability of oil palm smallholders.

Keywords: contract farming, oil palm, smallholders, poverty, vulnerability to poverty, risks, shocks

TABLE OF CONTENTS

ACKNOWLEDGEMENTS iii

ZUSAMMENFASSUNG v

ABSTRACT x

TABLE OF CONTENTS xiv

LIST OF TABLES xvii

LIST OF FIGURES xix

LIST OF ABBREVIATIONS xx

CHAPTER 1

INTRODUCTION **1**

1.1. Background 1

1.2. Research objectives 3

1.3. Organization of the thesis 4

CHAPTER 2

OIL PALM DEVELOPMENT AND SMALLHOLDERS IN INDONESIA **7**

2.1. The nature of oil palm 7

2.2. The global demand for palm oil 8

2.3. The development of palm oil production in Indonesia 9

2.4. Socio-economic effects of oil palm expansion 10

2.5. Contractual arrangements between smallholders and oil palm companies 12

2.6. Previous studies on the impact of contract farming in the oil palm industry 16

2.7. Summary 18

CHAPTER 3

STUDY AREA AND DATA COLLECTION **19**

3.1. Study area 19

3.2. Sampling 21

3.3. Survey instrument 23

3.4. Implementation of data collection procedure 24

3.5. Summary 26

CHAPTER 4

THE WELL-BEING OF OIL PALM SMALLHOLDERS DURING EARLY PHASE OF OIL PALM DEVELOPMENT: THE CASE OF VILLAGE ARANG ARANG **27**

4.1. Introduction 27

4.2. Contractual arrangements between the companies and village households 28

4.3. Household characteristics 30

4.4. Household well-being 31

4.5. Poverty and inequality 36

4.6. Conclusions 40

CHAPTER 5

IS CONTRACT FARMING IN THE INDONESIAN OIL PALM INDUSTRY PRO-POOR? **43**

5.1. Introduction 43

5.2. Contract farming in the Indonesian oil palm industry 46

5.2.1. General overview 46

5.2.2. Operational Definitions 47

5.3. Theoretical Background 48

5.4. Methodology 50

5.5. Study area and data collection 53

5.6. Result and discussion 54

5.6.1. Descriptive statistics 54

5.6.2. Participation model 57

5.6.3. Income model 59

5.6.4. Incorporating poverty 61

5.7. Conclusions and recommendations 62

CHAPTER 6

CONTRACT FARMING AND VULNERABILITY TO POVERTY AMONG OIL PALM SMALLHOLDERS IN INDONESIA **65**

6.1. Introduction 65

6.2. Contract farming and smallholder producers 67

6.3. Conceptual framework 69

6.4. Methodology 71

6.5. Study area and data collection 76

6.6. Results and Discussion 77

6.6.1. Descriptive statistics 77

6.6.2. Econometric Analysis 81

6.7. Summary and Conclusions 92

CHAPTER 7

SUBJECTIVE RISK EXPECTATIONS AND FUTURE PLAN OF INVESTMENT AMONG OIL PALM SMALLHOLDERS IN INDONESIA **93**

7.1. Introduction 93

7.2. Conceptual framework and methodology 95

7.3. Study area and data collection 98

7.4. Results and discussion 99

7.4.1. Descriptive statistics 99

7.4.2. Econometric model 104

7.5. Conclusions and recommendations 110

CHAPTER 8

SYNTHESIS **111**

8.1. Key findings 112

8.2. Conclusions and policy implications 114

8.3. Recommendations for further research 116

REFERENCES **119**

APPENDIX **129**

HOUSEHOLD QUESTIONNAIRE

LIST OF TABLES

Table 2.1.	Summary of relative benefits and risks of contract smallholder and independent smallholder in oil palm production	14
Table 4.1.	Household characteristics in village Arang-arang	30
Table 4.2.	Income generated from various sources in village Arang-Arang, Muaro Jambi	31
Table 4.3.	Income classes of households in the village Arang arang	32
Table 4.4.	Poverty rates across different poverty lines	37
Table 5.1.	Comparison of means of household characteristics between contract and non-contract smallholders	55
Table 5.2.	Performance indicators on oil palm cultivation and production	56
Table 5.3.	The probit model of contract participation	58
Table 5.4.	Treatment effect model and OLS model	60
Table 6.1.	Responsibilities of oil palm company and smallholders under contractual arrangements	68
Table 6.2.	Typology of dynamic poverty	71
Table 6.3.	Comparison of means for the characteristics of contract and non-contract oil palm smallholders	79
Table 6.4.	Households reporting at least one shock during the past five years by shock type for contract and non-contract smallholders (in percent)	80
Table 6.5.	Magnitude of shocks by type of shocks and by type of smallholders	81
Table 6.6.	Univariate and bivariate probit estimations for different type of shocks	84
Table 6.7.	Per capita household consumption model using FGLS	85
Table 6.8.	Composition of vulnerability typology across different poverty lines	86
Table 6.9.	Comparison of composition in vulnerability typology between contract and non-contract smallholders using the $ 2 threshold	87
Table 6.10.	Mean comparison of vulnerability estimates between contract and non-contract smallholders	88
Table 6.11.	Participation model	88
Table 6.12.	The results of the covariate balancing test	90
Table 6.13.	Average Treatment Effect on the Treated (ATT) of participation	91
Table 6.14.	The results of sensitivity analysis	91

Table 7.1.	Characteristics of oil palm smallholders	100
Table 7.2.	Mean of characteristics of successful and less successful oil palm smallholders	101
Table 7.3.	Shock experiences and risk expectation between successful and less successful smallholders	102
Table 7.4.	Investment plan of successful and less successful smallholders	104
Table 7.5.	Investment plan and subjective risk expectation model	107

LIST OF FIGURES

Figure 2.1.	The price of palm oil between 1997 and 2012	8
Figure 2.2.	Oil palm plantation area covered by smallholding, state estate and private estate	13
Figure 3.1.	Map of study area	21
Figure 4.1.	Structure of household incomes	32
Figure 4.2.	Structure of household expenditures	33
Box 4.1	The illustration of a poor household	34
Box 4.2	The illustration of a non-poor household	35
Figure 4.3.	Consumption distribution in the Muaro Jambi site and the Merangin site	38
Figure 4.4.	Lorenz curve of household income	39
Figure 5.1.	Contractual arrangements between an oil palm company and smallholders as principal agent problem	49
Figure 6.1.	The structure of household incomes of contract and non-contract smallholders	78
Figure 6.2.	The distribution of propensity score densities	89
Figure 7.1.	The relationship between subjective risk expectation, risk attitude and investment plan	96
Figure 7.2.	The relationship between net income of oil palm (in log form) and oil palm size (ha)	101

LIST OF ABBREVIATIONS

ATT	Average Treatment Effect on the Treated
BoA	Bureau of Agriculture
BPS	Biro Pusat Statistik
CDF	Cumulative Distribution Function
EU	Europe Union
FAO	Food and Agriculture Organization
FFB	Fresh Fruit Bunch
FGLS	Feasible Generalized Least Squares
GDP	Gross Domestic Product
GDRP	Gross Domestic Regional Product
GoI	Government of Indonesia
Ha	Hectare
IDR	Indonesian Rupiah
IPOB	Indonesian Palm Oil Board
Kg	Kilogram
KKPA	Kredit Koperasi Primer Anggota
Km	Kilometer
MoA	Ministry of Agriculture
NES	Nucleus Estate Smallholders
OLS	Ordinary Least Squares
PIR	Perkebunan Inti Rakyat
PPP	Purchasing Power Parity
PSM	Propensity Score Matching
PT	Perseoran Terbatas (limited company)
RSPO	Roundtable Sustainable Palm Oil

TRANS	Transmigration program
UN	United Nations
USDA	United States Department of Agriculture
VEP	Vulnerability as Expected Poverty

CHAPTER 1
INTRODUCTION

1.1. Background

In the last three decades, the growing role of contract farming has attracted the interest of policy makers and researchers (e.g. Glover 1983; Glover 1987; Minot 1986; Glover and Kusterer 1990; da Silva 2005; Setboonsarng 2008). Contract farming especially in developing countries has been discussed controversially. On the one hand, it can govern linkages between agri-business companies and smallholders and thereby increase productivity of smallholders and reduce production and marketing risks through the provision of inputs, credits, technical assistance and guaranteed markets (Key and Runsten 1999). If properly implemented, contract farming schemes can be an important component of rural development policies and foster the integration of smallholders into the national economy (Glover 1987). On the other hand, there is the danger that contract farming is a means of exploiting cheap labor and transferring production risks to smallholders. Contract terms may be exploitative and smallholders may have to accept due to weak bargaining power (e.g. Setboonsarng 2008; Eaton and Sheperd 2001). Another concern is the exclusion of small and marginal farmers since companies prefer to work with the larger and more advanced producers (Little and Watts 1994). In this way, inequality in rural areas can increase.

Research on contract farming has been carried out for different commodities in many countries. Prominent examples are Simmon *et al.* (2005) for corn, rice, and broilers in Indonesia, Cai *et al.* (2002) for rice in Cambodia, Key and Runsten (1999) for frozen vegetable industry in Mexico, Singh (2002) with vegetable crops in India, Miyata *et al.* (2009) with apple and green union in China, and Porter and Howard (1997) who evaluated various contract schemes in Nigeria and South Africa.

The oil palm industry in Indonesia is a typical case where contract farming has been promoted by the government as a part of rural development policies. Contract farming

has facilitated the expansion of oil palm under smallholder farming from only 3 thousand ha in 1979 to about 3 million ha in 2010 (Ministry of Agriculture 2011).

In line with the literature on contract farming in general, recent studies in oil palm in Indonesia showed mixed results. On the one hand, income security to smallholders can be provided (Sheil *et al.* 2009). Education and health infrastructures for local communities surrounding the plantations are also facilitated by oil palm companies (Zen *et al*. 2005). On the other hand, contract schemes were criticized for the lack of clarity in land tenure, unfavorable contractual schemes, the lack of contractual compliance by the oil palm companies (Rist *et al.* 2010) and the lack of transparency in price determination (Maryadi *et al.* 2007).

There are several questions that remain with regards to contract farming in the oil palm industry in Indonesia. A major question is the poverty reduction impact of existing contract schemes. While the significant contribution of oil palm to household welfare and poverty alleviation was pointed out by some studies (e.g. Barlow *et al.* 2003; Zen *et al.* 2005; Susila 2004; the World Bank 2011), most of those studies did not clearly distinguish between the impact of the contractual arrangements and the impact of the introduction of oil palm plantations as such.

Another limitation of previous studies is that they applied the concept of static poverty analysis. The decrease in the poverty headcount has been labeled as a success story of the oil palm contract farming scheme. However, since oil palm generates not only higher return but also higher risks, a dynamic measure of poverty analysis that takes into account shocks and risks can improve our understanding of the pros and cons of contract farming.

A third research gap is the limited understanding of the decision making behavior oil palm smallholders; hence a more comprehensive study is needed. Especially the role of shocks experienced and risks expected as an influencing factor for long term decision making behavior needs to be studied in order to develop policy recommendations that are effective for sustainable rural development.

1.2. Research objectives

The overall objective of this study is to provide a better understanding of the impact of contract farming between smallholders and oil palm companies in Indonesia on the well-being of the rural population. The overall objective is being addressed in three specific research objectives as follows.

The first specific objective is to assess the impact of contract farming in the oil palm industry on smallholders' well-being and to examine whether and to what extent the poor benefited from contract farming. The rationale of this objective is that while contractual arrangements between agro-industry corporations and smallholders are promoted by the government as a part of rural development and poverty reduction policies there are good reasons to assume that the implementation of such arrangements differ with regards to efficiency and fairness. This has increased the concern over their impact on smallholders' well-being and poverty reduction.

The second specific objective is to assess vulnerability to poverty among oil palm smallholders as well as the effectiveness of contract farming in reducing the vulnerability. Using this concept it can be found out whether a smallholder that is currently not poor could fall into poverty in future because of shocks. By means of a forward looking concept taking into account shocks or risks in a poverty analysis the true prospect of oil palm smallholders' well-being can be captured.

The third objective is to better understand the relationship between subjective risk expectations, risk attitude and behavior towards risk, as revealed in the investment plans of oil palm smallholders. Having a better understanding on risk behavior could benefit policy makers in order to offer customized investment advices and design risk management policies which are in line with the realities of oil palm plantation schemes of the smallholders. As the smallholders are confronted with a risky replanting decision a comparison with other alternatives is needed.

1.3. Organization of the thesis

The thesis is organized in eight chapters. An overview of oil palm development and smallholding production in Indonesia is presented as an in-depth problem analysis in chapter two. Chapter two provides the base information required for the analyses presented in the next chapters. Relevant secondary data from official statistical sources that show the world market trends for palm oil, the contribution of oil palm for the Indonesian economy, and the production and the area of oil palm in Indonesia are described. This is completed with a narrative of oil palm development policies in Indonesia. A discussion of the contractual arrangements between oil palm companies and smallholders is presented accompanied with some observations in the study area. Previous studies on contract farming in the oil palm industry are also elaborated.

In chapter three, study area and data collection methodology is presented. This chapter describes the reasons for choosing Jambi province as the study area and the sampling procedure applied in the primary data collection for about 300 smallholders.

Chapter four describes a case study of oil palm community in a site where oil palm contract farming just commenced for few years. The livelihoods, well-being and poverty of households in this site are discussed. The socio economic conditions of this site are compared to those of another site where oil palm contract farming has been established for a long time. This chapter lays a scene for advanced empirical analyses presented in the next chapters.

Chapter five addresses the question whether contract farming in the oil palm industry in Indonesia is pro-poor. In the theoretical background contract farming is viewed from the perspective of a classic principal agent problem. Analyses presented in this chapter commence with a comparison of some characteristics between contract and non-contract smallholders. This is followed by an investigation for the determinants of contract participation and thereafter, the impact of contract farming on household income is assessed. A two steps treatment effects model taking into account unobservable factors is applied. Finally, the equity effect among smallholders based on the consumption poverty line is investigated. This chapter is based on the paper of “Is contract farming in the Indonesian oil palm industry pro-poor” published in *Journal of Southeast Asian Economies*, Vol.30, No. 1 (April 2013).

In chapter six, an assessment of vulnerability to poverty among oil palm smallholders is presented. This chapter also investigates the effectiveness of contract farming in reducing particular shocks and the vulnerability to poverty. Shocks analyzed here are classified into four major shocks, namely price shocks, production shocks, health and demographic shocks and other economic shocks. A comparison of experienced shocks and their magnitudes including perceived severity, potential income loss, and extra expenditure between contract and non-contract smallholders is presented. Taking into account endogeneity, bivariate probit models are employed to analyze the effect of contract participation on the likelihood of each experienced shock. The vulnerability to poverty is estimated by applying asset based approach in cross sectional data which was first introduced by Chiwaula *et al.* (2011). Based on the analysis, four poverty typologies, namely chronically poor, structurally transient poor, stochastically transient poor and non-poor are defined in order to delineate the structure of poverty of oil palm smallholder households. In the last part of the analysis, the effect of contract participation on vulnerability to poverty is evaluated by applying a propensity score matching model to take into account the selection bias. This chapter is based on the paper of "Contract farming and vulnerability to poverty among oil palm smallholders in Indonesia" which is invited to be resubmitted to *Journal of Development Studies* in 2013.

Chapter seven analyzes whether subjective risk expectations and risk attitude influence the decision making behavior with regards to the choices of planned investments. The analysis starts with a description of shocks experienced by smallholders and the risks they expect in the future together with a description of portfolio choices namely investments in oil palm and non-oil palm enterprises. A multivariate probit model is employed to simultaneously estimate the determinants of risk expectations and the portfolio choice of investment in order to deal with unobservable individual heterogeneity. This chapter based on the paper of "Subjective risk expectations and future plan of investment among oil palm smallholders" submitted to *Journal of Risk Research* in 2013.

Chapter eight submits a synthesis of the research by summarizing the results and drawing conclusion. In addition, recommendations for future research and policy design are given.

CHAPTER 2

OIL PALM DEVELOPMENT AND SMALLHOLDERS IN INDONESIA

This chapter provides insights on oil palm development and the role of smallholders in oil palm production in Indonesia. The chapter commences with a description of the nature of oil palm in order to better understand risks exposed by the crop. This is followed by a discussion of the global demand for palm oil in the vegetable oil market. Next the contribution of oil palm for Indonesian economy is presented together with a narrative of oil palm development and policies in the country. Included is a discussion on the pros and cons of the socio-economic impacts of oil palm development on local communities. This is followed by a discussion of contract farming between smallholders and oil palm companies including two cases of contract schemes in the study area. Finally, previous studies on oil palm contract farming are described. The analysis presented in this chapter mainly relies on secondary data from official statistical sources and the literature. Some casual observations are also added.

2.1. The nature of oil palm

Oil palm has some specific characteristics that may expose smallholders to certain risks. The price of palm oil in the global market is volatile as shown by Figure 2.1. During the Asian financial crisis between end of 1997 and 1998 the price of palm oil rose but then declined until 2000. The global food crisis in 2008 and the growing demand for plant oils from India and China led to an increase in the price up to three fold between 2001 and 2008. Thereafter the price declined due to oversupply and climbed again in early 2009. While overall the trend of price is positive and oil palm seems to be a prospective business, the price volatility can expose smallholders to an adverse risk that lead to prominent income shortfall.

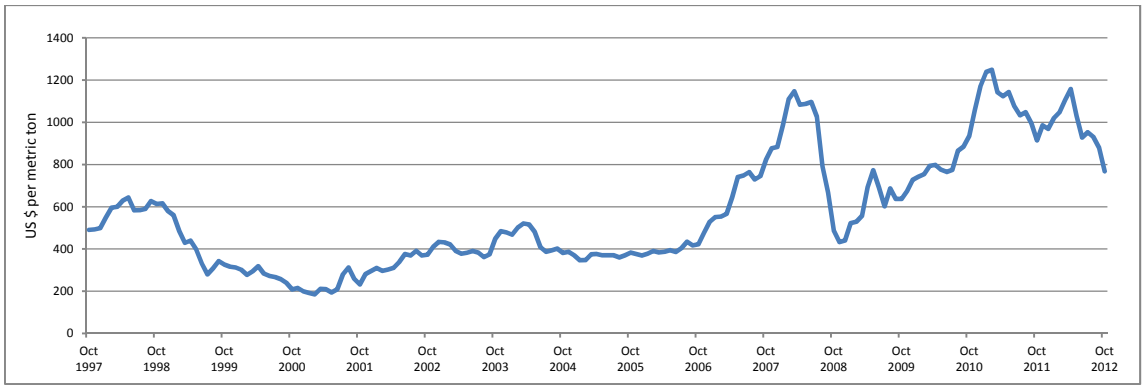

Figure 2.1. The price of palm oil between 1997 and 2012
Source: Adapted from www.indexmundi.com

Oil palm cannot be combined with other crops in later stages of tree age. It is a monoculture and therefore is at risk to pest attacks and diseases outbreaks. Oil palm plantations are also vulnerable to fires especially in peat land areas.

Oil palms have a life span of 25 years and the life cycle is characterized by the following phases. First, the immature phase or gestation period normally takes three or four years after planting. Afterwards, the trees begin flowering and producing little fruits up to the fifth year. Enough yields and positive cash flows can be produced between six to eight years while peak yields can be reached between 10 to 18 years of age. Thereafter, the yields are constant and gradually decline. After 25 years the trees would not be economically feasible and therefore should be replanted.

The crop is commonly harvested twice to three times a month. Once harvested, fruit deteriorates rapidly and must be processed within 48 hours. Beyond that period, the fruits may contain very high free fat acid that cannot be tolerated and lead to price reduction or rejection of the fruits.

2.2. The global demand for palm oil

Palm oil is one of major plant oils and which is the most widely produced and traded in the world. In 2011 the palm oil production reached 48 million tons while the export volume of palm oil attained 60 percent of total export volume of vegetable oil (USDA 2012). The significant role of palm oil in the vegetable oil market are often associated with the advantage of oil palm on productivity and production cost (Sheil *et al.* 2009). Compared to other oil crops, oil palm is at least five times more productive in terms of yield per hectare (The World Bank 2011). Oil palm is also cheaper than other crops to produce biodiesel (Hardter *et al.* 1997).

Palm oil is widely used for food and non-food applications. About 80 percent of the current palm oil production is consumed in the form of food such as cooking oil, margarine and an ingredient in packaged food. The rests are used for non-food applications including soaps, detergents, cosmetics, and pharmaceuticals.

In recent years the demand for palm oil is also growing with the global trend for biofuel usage. For example, China and EU have targeted biofuel blending mandates for 15 percent and 10 percent respectively by 2020 (FAO 2008). In order to satisfy such prospective demands, Sheil *et al.* (2009) estimated that an additional 5 million ha of oil palm plantation is needed.

2.3. The development of palm oil production in Indonesia

The growing global demand for palm oil has driven the rapid expansion of oil palm plantations in Indonesia from merely 295 thousand hectares in 1980 to almost 8 million hectares in 2010 (BPS 2011). Indonesia is the largest producer of palm oil in the world. It produced about 25.9 million metric ton in 2011 which was half of global palm oil production (USDA 2012). About half of the plantation area in 2010 is covered with of immature and young trees with less than ten years of age (BPS 2011). Based on such structure of plantation age, production may increase by 1.5 to 2 million tons a year over the next decade (USDA 2010). About 80 percent of national production is in Sumatra. In recent years oil palm has also expanded in Kalimantan, Sulawesi and Papua.

Oil palm is an important economic sector which generated export earnings about US $ 10.4 billion, contributed about 4.5 percent of GDP and employed over 3 million people in 2009 (USDA 2010). Some studies also claim that oil palm has contributed to poverty reduction in rural areas (The World Bank 2011; Susila 2004).

In the sixties oil palm plantations were under state control (*Perseroan Terbatas Perkebunan*) with an area of less than 200 000 ha. Since the early eighties the government stimulated the development of private estates and smallholder plantations through contract farming. Under the contract scheme so-called PIR/NES (*Perkebunan Inti Rakyat* or Nucleus Estate and Smallholder Scheme), private agribusiness companies established integrated oil palm plantations for their own (called as Nucleus) and also for smallholders (called as Plasma) on a credit basis. Since the PIR/NES scheme commenced, smallholder’s plantations have further expanded from 3 thousand hectares

in 1979 to 824 thousand hectares in 1997. The smallholder plantations spread mostly in Riau, South Sumatra, North Sumatra, Jambi and West Kalimantan (Vermeulen and Goad 2006).

In the mid-80s, as a response to the growing global demand for palm oil, about 5.5 million hectares areas largely covered by forests were reserved by the government to be converted into oil palm plantations. In order to increase national oil palm production concessions were also offered to the private sector. The government has subsidized the oil palm expansion mainly with cheap credits. As a result, the oil palm plantation area extensively expanded from about 600,000 hectares in 1985 to almost 2.8 million hectares in 1998 (BPS 2011). During financial crisis and instable political environment between 1998 and 2002 the oil palm development has slowed down.

Thereafter, economic and political reforms in Indonesia led to “pro oil palm” policies. In order to accelerate economic growth and crisis recovery the government endeavored to boost oil palm production through allocation of large land tracts to oil palm development, decentralization of land use licensing to provincial level, subsidized credit of plantation establishment for smallholders famers, and creating a favorable environment for foreign investment. As a result, during the first decade after the crisis the mature oil palm area rapidly expanded by 250 thousand ha annually while the palm oil production increased by 17 percent per year. In 2010 the allocation of oil palm area was 50 % for private corporations, 42 % for smallholders and the remainder for state companies (BPS 2011).

2.4. Socio-economic effects of oil palm expansion

The rapid oil palm expansion raises the question of its socio-economic effects on surrounding communities since most oil palm plantations are established on forested areas where forest dependent communities have lived since centuries. While the establishment of oil palm plantations offers new sources of income they are at the same time a threat to the indigenous communities who relied on natural resources as a source of livelihood (Sheil *et al.* 2006; Belcher *et al.* 2004).

Some studies emphasize the contribution of oil palm to household income. For example, Hardter *et al.* (1997) in a study in West Sumatra found that incomes of oil palm smallholders could be seven times higher than those of neighbors that engaged in traditional crops. In a study in Riau and South Sumatera, Susila (2004) showed that oil

palm generated on average 11 million IDR a year and contributed 60 percent of total household income. In another study in Jambi, Feintrenie *et al.* (2010) found that smallholders tend to convert large portions of their land into oil palm plantations. By applying land use profitability analysis, Feintrenie *et al.* (2010) showed that oil palm generates higher return to land and labor than rubber agro-forests and rice. Oil palm has been used by the government as a major vehicle of rural socio-economic improvement (Zen *et al.* 2005). In the context of poverty reduction, Susila (2004) reported that the poverty headcount of oil palm community was less than 10 percent while the Gini coefficient was around 0.36 that indicated fairly egalitarian income distribution. Poverty reduction effects of oil palm were also pointed out by the World Bank (2011). Furthermore, the World Bank (2011) showed that the poverty-reduction effects of oil palm production by smallholders are greater for districts where poor households are concentrated in agriculture.

On the other hand, several authors reported negative impact of oil palm project on rural communities including incidents of human right violation, land grabbing and ecosystem destruction (Marti 2008; Colchester and Jiwan 2006). While many smallholders benefited from the high returns of oil palm, the realization of benefits mainly depends on the roles played by district authorities and cooperatives (Rist *et al.* 2010) Furthermore, Rist *et al.* (2010) pointed out some potential conflicts frequently emerging in oil palm plantation development, namely the lack of clarity of the contracts signed between companies and smallholders, weak local government, the failure of the companies to meet either contractual or perceived obligations, and the lack of clarity over land tenure. Vermeulen and Goad (2006) reported that in 2000 every oil palm company in Sumatra had land disputes with local communities.

How much local communities can benefit from oil palm development depend on how much their rights on land ownership are recognized and how fair negotiations between companies and the communities are. Sheil *et al.* (2009) indicated that in order to more easily handle potential tenure conflicts companies tend to establish oil palm plantation on forested lands and peat lands rather than cleared areas. Forested lands are commonly claimed by only one or few villages; hence the negotiations become relatively simple by convincing key leaders in the villages to relinquish their land and accept some financial compensation. On the contrary, in deforested areas many individuals may move into an area and claim ownership so that the negotiations become more complicated. Marti

(2008) found that in many cases such negotiation process occurred under unequal bargaining power and lack of transparency.

The mixed results of those studies above suggest that the socio-economic impacts of oil palm expansion may depend on the involvement of smallholders and the role that they play in such development.

2.5. Contractual arrangements between smallholders and oil palm companies

Small farmers usually face two major constraints to engage in oil palm farming. First, establishing oil palm plantations, especially on forested land needs a start-up cost in order to conduct several activities such as land clearing, road building, planting, and maintenance for early years, which is often beyond the financial capacity of smallholders. Second, the gestation period of oil palms do not allow smallholders to generate a positive cash flow until the fifth year after planting.

Until 1978 oil palm development was engaged only by large scale companies either state or private corporations. Smallholders were firstly involved in oil palm production in 1979 when contract farming between agroindustry corporations and smallholders was augmented by the government. Through contract farming schemes the companies established integrated oil palm plots for smallholders on a credit basis and the smallholders were obliged to sell their oil palm fruits to the companies. In order to support the smallholders, subsidized credit were provided by the government. This measure has promoted the rapid expansion of oil palm smallholding area from just 3 thousand ha in 1979 to more than 3 million ha in 2010 and therefore positioned smallholders as a major player that owned about 40 percent of total oil palm plantations in Indonesia (MoA 2011). As a comparison, the expansion of oil palm plantations of smallholding estates, private estates and state farms is presented in Figure 2.2.

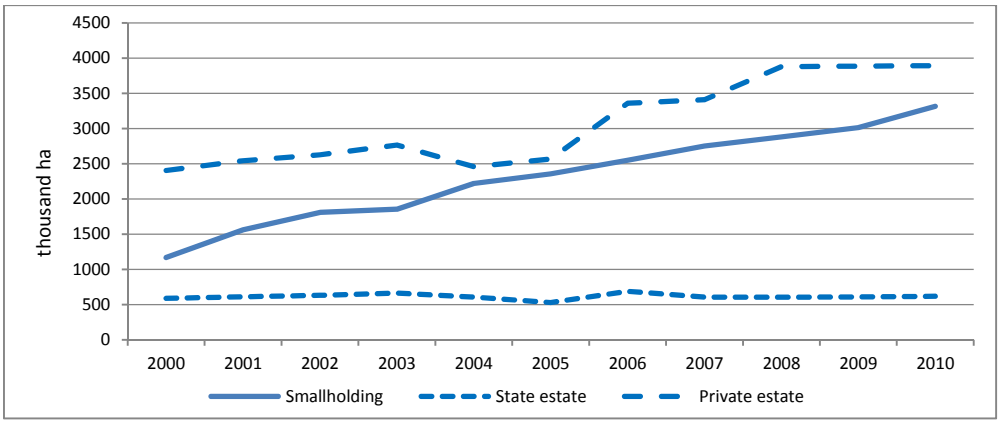

Figure 2.2. Oil palm plantation area covered by smallholding, state estate and private estate

Source: Adapted from MoA (2011)

Some smallholders prefer to become independent or non-contract smallholders. They are not restricted to produce in certain ways and are also free to seek the highest price in the spot market. Although they face larger barriers to enter the oil palm business they enjoy market opportunities from an overcapacity of processing facilities. Recently, there are many open markets for fresh fruit bunches in Indonesia due to the rapid proliferation of palm oil processing facilities.

Smallholders' plantations generally produce lower yields than large-scale plantations (Sheil *et al.* 2006). Some factors behind this are the use of uncertified seeds, incorrect planting techniques, incorrect agronomy management, and insufficient use of the proper type of fertilizer. Among those factors, the last factor is usually the largest constraint. Oil palm requires a lot of fertilizer, up to 950 kg per hectare and year, which makes fertilizer to be the major material cost with about 80 percent of annual operational costs (Pafenfus 2001).

Becoming either a contract smallholder or a non-contract smallholder is a choice that promotes benefits and risks. The relative benefits and risks of each choice are outlined in Table 2.1.

Table 2.1. Summary of relative benefits and risks of contract smallholder and independent smallholder in oil palm production

	Contract smallholder	Non-contract smallholder
Benefits	• Guaranteed market access • Easier access to inputs and credit • Easier access to new technologies in order to increase productivity	• Free to seek the highest prices • Flexible to shift labor and other inputs between oil palm and other crops depending on prices
Risks	• Promotes dependency on a single crop • Lost opportunity in case of price hike in spot market • Less flexibility in land use and labor allocation	• Risk that the mill will not buy the fresh fruit • Low access to credit and technology • Often viewed as unreliable product by the mill and therefore the fruits were bought at the lower price

Source: Adapted from Vermeulen and Goad (2006)

The contract allocates the distribution of risks among parties and therefore potentially reduces and introduces risks for smallholders. On the one hand, investment risks in plantation establishment and maintenance during gestation period can be transferred to the companies. On the other hand, smallholders bear the production risks although such risks might be reduced by the provision of technical assistance. Since contract farming links smallholders to a monoculture cropping system as well as an international commodity market, they are simultaneously exposed to higher risks including diseases outbreak and price volatility. Another concern is that the production requirement under the contract may encourage smallholders to specialize further in oil palm leading to high exposure to certain shocks.

Contract farming in the oil palm sector may have a number of problems differing from classic vertically integrated contract schemes in other agricultural sectors such as fresh fruit and vegetables. First, in most cases there is no detailed written contract except for credit repayment. The implementation of the contract relies on informal norms and trust among parties. Second, price determination is based closely on current market price while in some other sectors contract farmers may be protected from market fluctuations. Third, the company is commonly not only a processor (mill) but also a producer that has its own plantation. In an abundance harvest situation, this position may encourage the

company to prioritize its own fruits than those of the smallholders in order to deal with the 48 hours restriction of processing. Fourth, there is lack of clarity on the land tenure status that often overlaps among government, company, community and individuals.

Since commenced in 1979 up to now various contract farming schemes in the oil palm industry have been applied in Indonesia. The two major contract schemes are Nucleus Estate Smallholders (NES)/ *Perkebunan Inti Rakyat* (PIR) and KKPA (*Koperasi Kredit Primer Anggota*, which literally translates as Members' Primary Credit Co-operative). Following, those schemes accompanied with related observations in the study area are described.

The NES/PIR scheme was applied between 1978 and 2001 with financial support from the World Bank. Under this scheme, companies developed oil palm plots for smallholders in a Plasma area around their own plantation called a Nucleus. About 900 thousand ha of oil palm smallholdings were established under this scheme (Zen *et al.* 2005).

The scheme was often integrated into the resettlement/transmigration program that resettled people from high densely populated islands to less populated islands in order to achieve a more balanced demographic development, and therefore called also PIR TRANS. Such scheme was widely applied in transmigration areas, for example in Village of Rawa Jaya and Mentawak Baru in Jambi province where the study took place. In the early eighties, people, mainly from Java, were resettled to these locations. Under the transmigration program, each participant was facilitated by the government with 0.25 ha land for settlement and two allocated lands for staple food oriented agriculture that consisted of 1 ha cleared plot and 2.25 ha forested land. However, the implementation of the program in these villages was unsuccessful mainly due to lack of inputs, difficulties in marketing agricultural products, and inappropriate farming systems. Therefore, in the early nineties the government substituted the food crop oriented policy with contract farming for oil palm that involved the private sector.

Through contract farming a company offered smallholders to establish oil palm plots on their two ha forested land called plasma plots on credit basis. The plasma plots were fully controlled by the company during gestation period and afterwards taken over by the smallholders. During the gestation period, the smallholders suffered from low income but could compensate this by employment in the company's plantation.

In 1995 the government introduced a new scheme, namely KKPA as a general rural microfinance program. Under this scheme, cooperatives and farmer groups play a key role to coordinate smallholders in accessing and repaying credit installments. The village of Dusun Baru, which is included in this study, is a good example where the scheme was applied. In this village, the scheme aims to share oil palm benefits with indigenous people who lost their lands.

Some customary and individual lands of the indigenous people overlapped with the allocated lands of migrants and concession lands of the company that have been covered by oil palm plantation. In dealing with such disputes, the scheme assumed that the indigenous smallholders have relinquished their lands that varied from 2 to 10 ha to the company, and therefore they were compensated with 2 ha of well-established oil palm plots by the company. However, the scheme still obliged them to repay credit for the establishment and management cost.

The scheme also arranged that oil palm plots are controlled by the nucleus for the whole life span of oil palms. Smallholders can monitor all agronomy treatments and harvesting through the farmer group or the cooperative. They also can conduct those activities as paid laborers. The company hereby deducts production costs including costs of credit from the oil palm revenues and pays the remains to the smallholders. This study found that average net revenue left for smallholders was less than a half of the gross sales.

Differing from PIR TRANS, the debt under KKPA scheme puts burden on farmer group rather than individual smallholder. Hence, a smallholder should keep repaying until all debt of the farmer group has been fully repaid even if his individual debt actually has been completely repaid.

2.6. Previous studies on the impact of contract farming in the oil palm industry

Studies on the impact of contractual arrangement between large scale oil palm plantations and smallholders are diverse. A study by Daswir and Djafar (1988) in Province of Riau showed that the income of contract smallholders from oil palm and food crop in location with six years oil palm was 60 percent lower than the target of the government. Using data from the Province of South Sumatra, Salman and Wahyono (1998) found that on average the income of contract smallholders was just sufficient to cover subsistence needs and therefore more than 18 percent of them abandoned the land.

Nevertheless, a study by Girsang *et al.*(1995) in the province of North Sumatra and Riau revealed that NES/ PIR projects made a significant contribution to economic growth, indicated by the output multiplier that is higher than two and positive impact on farmers' income. Winoto *et al.* (1997) also reported a similar result for some NES in West Sumatra, Riau, South Sumatra, and West Kalimantan. A study by Susila (2004) in the District of Kampar (Riau) and District of Musi Banyuasin (South Sumatra) empirically demonstrated a significant contribution of NES oil palm in poverty alleviation indicated by the higher of NES participant's income than regional poverty line. Zen *et al.* (2005) showed that contract smallholders get higher productivity, higher factory gate price and higher net returns than independent smallholders but pay higher total costs.

On the other hand, Marti (2008) and Colchester and Jiwan (2006) reported that contractual arrangements trapped smallholders into a high debt for plantation establishment which had resulted in labor exploitation. Some reports pointed out the lack of transparency in determining price (Maryadi *et al.* 2004) and grading quality of oil palm fruits (Colchester and Jiwan 2006). In several cases, contract smallholders complained for receiving less productive plots, too far away plots, less planted palms and less technical support than promised (Marti *et al.* 2008; Colchester and Jiwan 2006).

For comparison, a study in Ghana and in the Philippines by Huddleston (2006) found that oil palm cultivation has the propensity to reward contract smallholders with increasing income and a better access to information, technology, knowledge, capital and credit, market, input, and other services. Another study in India by Owolarafe and Arumughan (2007) revealed that oil palm farmers made profit from the scheme of contractual arrangement but experienced major problems of pest infestation, water stress and lack of fund.

2.7. Summary

The rising demand for palm oil has fostered the rapid expansion of oil palm plantation area in Indonesia. To date the area is ten times of what is was 30 years ago. In spite of its significant contribution on economic growth, such rapid development has led to concerns over its impact on surrounding local communities. Inequality and social conflict often emerge between the communities and oil palm companies. The involvement of the communities on oil palm development was believed by the government as an effective way to improve their well-being and rural development.

The attempt of the government to increase participation of smallholders on oil palm production through contract farming has been successful. Smallholding has been rapidly growing and becoming a major player in oil palm production. This raises a question of to what extent the well-being of smallholders can be improved since at the same time they also are exposed to a number of risks. While some studies on oil palm contract farming have been carried out, robust empirical evidence that take into account risks is still sparse. Hence, this opens a discussion for a further investigation of contract farming, risks, and poverty among oil palm smallholders.

CHAPTER 3

STUDY AREA AND DATA COLLECTION

This chapter describes the study area and data collection methodology applied in order to generate the empirical basis of this study. Following is a description of the study area, sampling procedure, survey instrument, and implementation of data collection.

3.1. Study area

This study was conducted in Jambi province, Indonesia. The province is situated in the middle of Sumatra Island covering about 53,000 km^2 (see Figure 3.1 for a map of study area). The topography of the province is dominated by plain areas positioned between 3 and 87 meters above sea level. Jambi has tropical climate with rainfall ranging from 2000 mm to 3000 mm per year while the average temperature is at 27°C (BPS Jambi 2011). All those conditions are much favorable for growing oil palm.

In 2010 Jambi province had a total population of about 3 million with the majority living in rural areas. The population consists of several local ethnic groups, namely Malay, Javanese, Batak, Minangkabau and Kubu or Suku Anak Dalam who is considered as the earliest inhabitant in Jambi (BPS Jambi 2011).. Such multicultural population was formed by the transmigration project in the past that resettled many people from Java and Bali to this province. It is noted that the participants of this project were later encouraged by the government to participate in oil palm production under contract farming schemes.

The economy of Jambi is driven by the agricultural sector. In 2010 agriculture contributed the largest share on the Gross Domestic Regional Product (GDRP) (30 percent), followed by mining (18 percent), trade (14.5 percent), manufacturing industry (11 percent), services (9.5 percent), transportation and communication (6.5 percent), and construction (4.5 percent). The agricultural sector was also able to absorb more than a half of working people (BPS Jambi 2011).

The province recently enjoyed high economic growth that reached about 8.5 percent in 2011 (BPS Jambi 2012). However, some development problems still remain. The poverty headcount tends to decline but there is an increasing in the poverty gap and the poverty severity index (BPS Jambi 2012). This indicates that while some of the poor can escape from the poverty, the rest of the poor may become poorer. Another concern is about adverse environmental impact arising from mismanagement of natural resources. As a consequence of increasing forest loss, in which many forested areas were replaced by oil palm, some areas in Jambi suffer flood disasters almost every year.

In order to address the research objectives posted in chapter 1 and to represent the nature of the oil palm industry in Indonesia, Jambi province was selected for this research based on four criteria, namely (1) the relative importance of the province in the national oil palm production, (2) the relative importance of oil palm in the regional economic development, (3) the relative importance of smallholding in the regional oil palm production, and (4) the widespread of oil palm contract farming. Among 21 provinces producing oil palm in Indonesia, Jambi was the fifth largest producer that contributed 1.3 million tons or about 7 percent of national production in 2010. Jambi was also one of the provinces with the most rapid oil palm expansion that attained eleven-fold in the last two decades. In this province oil palm plays a significant role for economic growth and development. This sector contributed about 12 percent of the GDRP and absorbed at least 168 thousand households, positioned oil palm as the second most engaged crop by farmers after rubber (BoA 2009). In Jambi oil palms covered over 490 thousand ha area which is also the second largest area for estate crops after rubber (BPS Jambi 2011). In this province smallholders contributed 60 percent of regional oil palm production while private and state estates just contributed 34 percent and 6 percent respectively (BPS Jambi 2011). It is noted that about 60 percent of those smallholders were involved under contractual arrangements with oil palm agribusiness corporations either private or state companies (MoA 2011).

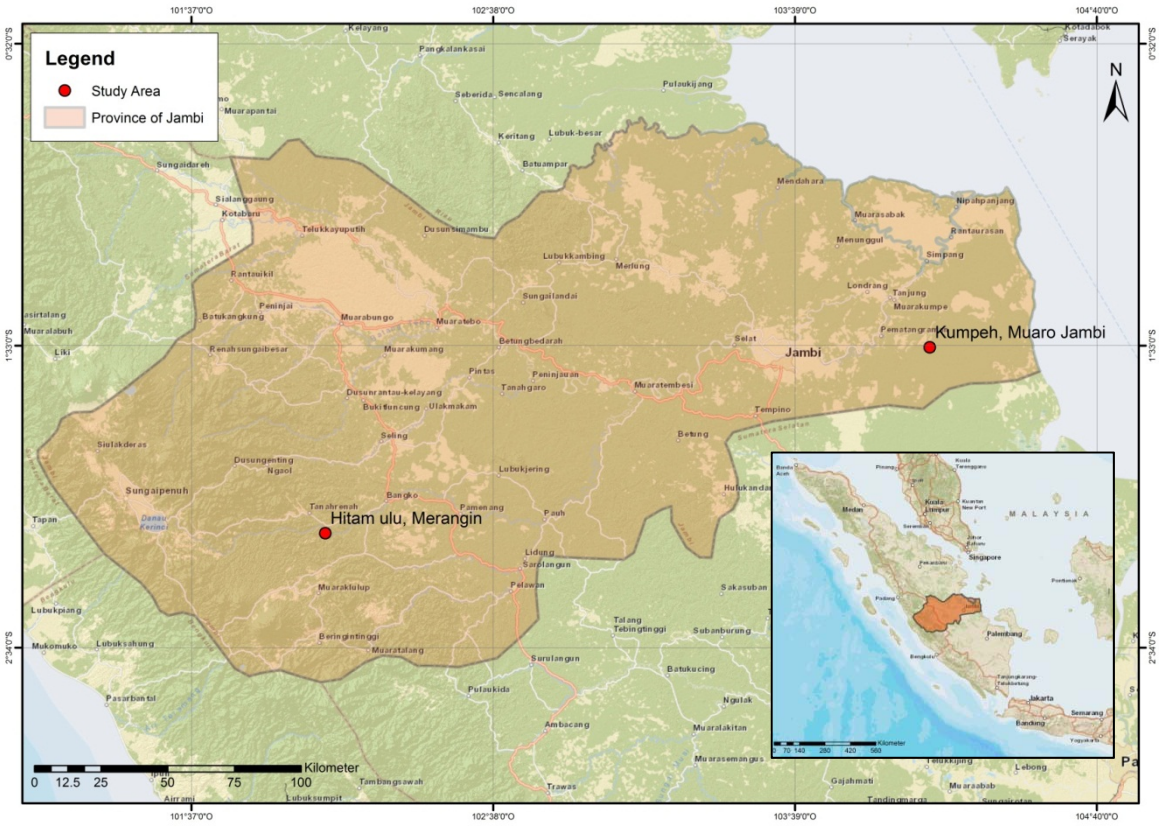

Figure 3.1. Map of study area

Source: Adapted after permission from www.esri.com

3.2. Sampling

A multi-stage sampling procedure was applied to select plantation sites, villages and households sequentially. *First,* two plantation sites where oil palm private companies made contractual arrangements with surrounding smallholders were selected. The sites are situated in two different districts, namely Muaro Jambi and Merangin (see the map of study area in Figure 3.1). Among other districts, Muaro Jambi and Merangin had the largest numbers of oil palm smallholders about 38 thousand and 42 thousand households respectively in 2008 (BoA 2009). The two sites were selected to capture the conditions of oil palm smallholders in terms of development phase and the contractual arrangements between smallholders and oil palm companies.

The first site is situated in Kumpeh, Muaro Jambi district, about 20 km from the provincial capital. In this site a private oil palm company operates over 8000 ha plantation with a processing capacity of 30 tons per hour. This site includes only one village, namely Arang-arang since the company recently has made contractual arrangements with the village. Almost all households in the village are involved under

the contract. The oil palm plantations in this village mostly consisted of young and immature trees. Data of this site will be employed to present a case study in chapter 4.

The second site is located in Hitam Ulu, Merangin district, about 200 km west of Jambi City. This site is a group of villages surrounding large oil palm plantations controlled by a private company. Most villages were formed by migrant households from Java resettled here by the government under the transmigration program. In a separate place several villages have existed previously, formed by indigenous people. Since the early nineties the company has set up gradually over 15 thousands hectares oil palm plantation in total and installed an oil palm mill with a processing capacity of 60 tons per hour. Currently the plantations consist of trees with varied ages dominated by mature plantations. From the 15 thousand ha, only about 5 thousand ha are owned by the company while the larger rests are owned by about 6800 smallholders. The smallholders' parts were established by the company under contractual arrangements in order to meet the need of the mill. Data of this site are used for econometric analyses in order to address the three main research objectives.

At the Merangin site three villages were selected from 11 villages surrounding plantation based on three criteria, namely (1) representing varied distances from villages to the nucleus mill, (2) capturing indigenous and migrant villages, and (3) the willingness of village heads to co-operate. The names of selected villages are Rawa Jaya, Dusun Baru and Mentawak Baru. The distance between each village and the company's mill is about 10 km, 20 km and 50 km respectively. The former and the latest represent villages dominated by migrants from Java while the second represents indigenous village.

In the next stage of sampling procedure, 300 oil palm smallholders were randomly selected from the lists provided by each village head proportionally based on village population. The survey was conducted in 2010. During the course of data collection, 9 respondents had to be dropped from the original list due to different reasons including that they had moved out of the village, had died, or had no oil palm plot anymore. Finally, 291 households remain in the sample consisting of 46 households in the Muaro Jambi site and 245 households in the Merangin site. In the former, all sample households are contract smallholders while in the later our sample consists of 126 contract smallholders and 119 non-contract smallholders.

3.3. Survey instrument

In order to address the objectives of the study comprehensively, a structured questionnaire (see Appendix[1]) was designed to collect data especially on the following aspects: (1) household characteristics, (2) experienced shocks and expected risks, (3) land, (4) household incomes, (5) household consumption, (6) household assets (7) investment plan, and (8) participation on the oil palm contract farming. All information asked in the questionnaire referred to the period of 1st January to 31st December 2009. For shock and risk, however, the experiences during the past five years and the expectations of the next five years were also asked.

Basic household characteristics included household composition, age, education, and health of all household members was elaborated. A specific module for shocks was created to explore bad events experienced in the past, the perceived severity and the magnitude including amount of income loss, extra expenditure, and asset loss due to such shocks. Corresponding coping strategies were also investigated. In a separate page, potential risks were elaborated by asking the respondents their expectation on some negative events that may occur in the future.

In the land section, the respondents were asked to list land plots owned and to describe the corresponding size, actual use, tenure status, and distance to the homestead and the company's mill (particularly for oil palm plot). In addition, the type of crops planted in each plot, the planting year, the harvesting period and the production were also explored.

In order to be able to compute household incomes, data were collected from various income generating activities including agriculture, livestock, natural resource extraction, wage employment, and non-farm business or self-employment. There are also specific sections that look into production, sales and costs including input and hired labor in oil palm.

Data on household consumption were collected mainly of food and non-food expenditures, including consumption of own production on each on-farm and non-farm activities and the expense for severe sickness in separate modules. Household assets

[1] This questionnaire is modified from the household survey questionnaire of Vulnerability in Southeast Asia (DFG Research Unit FOR 756) with some additional sections on contract farming, oil palm production and investment plan

including both productive and non-productive assets were comprehensively investigated in a specific module. This was complemented by land and livestock asset in the other modules.

In order to investigate investment plans, the respondents were asked whether they plan a new investment in the near future and in what kinds of business. The final section of the questionnaire explores participation of oil palm smallholders in contract farming and types of contractual arrangement applied. Constraints experienced during past five years and expected in the next five years by smallholders are also investigated.

3.4. Implementation of data collection procedure

The data collection procedure was applied in the following steps. First, the pre-survey was conducted by the author from November to December 2009 in the two sites in order to understand the field situation. During the pre-survey the company's administrators, the village heads, the informal leaders and the cooperative heads were interviewed in order to better understand the conditions in the area and to be able to more precisely define the research problem. The output of the pre-survey is twofold. First, general information was collected on the historical background of oil palm contract farming applied in the area, the contract terms, the total size of oil palm plantation owned by the company and the smallholders respectively, the contract problems from both sides, and the characteristics of villages surrounding the plantation including village size, the number of oil palm households, the distance to the company's mill, the infrastructure facilities, and the ethnic or origin composition in the study sites. Such information was employed to decide which villages were representative to be selected in the survey and what relevant issues should be addressed in the survey instrument. Second, the lists of oil palm smallholders were gathered from each of the village heads. The lists were employed as a basis for applying random sampling procedure in household level.

As a second step, pre-testing of the questionnaire was conducted by the author with interviewing some oil palm households excluding the sample households. This procedure is employed to evaluate and to improve the questionnaire by eliminating, rephrasing and adding questions in order to achieve effective interview.

In a third step enumerators were recruited and trained before commencing the household survey. Four enumerators were selected from ten students and fresh graduates from Faculty of Agriculture of Jambi University that applied for this position

and were recommended by the Dean. All selected enumerators had their educational background in either agricultural economics or agriculture and had experience in conducting research surveys. Two days enumerator training was conducted in order to provide an understanding of the objectives, the procedures and the instrument of the survey. In addition, a basic concept of contract farming and some results of the pre-survey were also briefly presented to give the enumerators a first insight on the field situation. Before starting the formal survey the enumerators also performed a pre-testing of questionnaire, to detect remaining weakness on the questionnaire and to become more familiar with the interview. Thus, a minor revision was made and some difficulties in the interview technique were discussed.

Finally, the household survey was carried out from end of January to the beginning of March 2010. Considering the relative remoteness of the villages, the team spent the nights in the villages and conducted the survey village by village. The time for staying in a village varied from five to fifteen days depending on the number of sample households. By staying in the village additional observations which facilitated a better understanding of the socio-economic conditions in the villages were possible. This is useful for the interpretation of the results. The following survey procedure was adopted. First, the enumerators visited respondents to explain the survey objectives, persuade for cooperation and make an appointment for an interview. Second, the interview normally took place on the respondent's home in order to provide a comfortable atmosphere for a respondent to answer the questions. This also allowed the enumerators to directly check the situation of household such as household composition and asset endowments. Third, the household head was prioritized to be interviewed. In case the household head was not available, too old or sick, another adult, well-informed household member was used as respondent. About 95 percent of respondents in this survey were household heads while the rest were spouse or their offspring. It is noted that during interviews a household head was often accompanied by his wife in answering the questions, particularly for the section of household expenditures. This was considered to be an advantage since in the Jambi culture the wife takes care of the purchase of consumption items and therefore she knows better on such information. Fourth, the interview was conducted section by section. The enumerators briefly explained all the sections that will be asked, introduced the purpose of each section then went into detail. The interview normally took about three hours. Therefore, each enumerator interviewed two

respondents a day on average. Finally, after completing the interview the enumerators thanked and gave a small gift to the respondents for their cooperation.

3.5. Summary

This chapter lays out a comprehensive empirical basis for analyses in the study. The study took place in two sites, namely Muaro Jambi and Merangin in Jambi province. The Muaro Jambi site represents early phase of oil palm development while the Merangin site captures the advanced phase. Data of the former are used to construct a case study presented in chapter 4 while data of the later are employed to generate econometric analyses presented in chapter 5 to 7.

Data collected in the study mainly include general household characteristics, experienced shocks and expected risks, household incomes, household assets, household consumptions, investment plan in the near future, and oil palm production. Data for computing household income are detail collected from all income sources including agriculture, livestock, natural resource extraction, off-farm employment and non-farm self-employment/ business. Such data are employed in chapter 5 to assess the impact of contract farming on household income. Chapter 6 uses data on shocks, household consumption and household assets as a basis for assessing vulnerability to poverty among oil palm smallholders by applying the asset based approach. In chapter 7, data on risk expectation and investment plan were used to investigate planned investments.

CHAPTER 4

THE WELL-BEING OF OIL PALM SMALLHOLDERS DURING EARLY PHASE OF OIL PALM DEVELOPMENT: THE CASE OF VILLAGE ARANG ARANG

This chapter aims to better understand the socio-economic situation of smallholders when contract farming just commenced for few years. In this chapter the case of oil palm smallholders in the village Arang arang in the Muaro Jambi district is elaborated. This will set the scene for a more quantitative empirical analysis of the oil palm smallholder conditions in other areas of Jambi province where contract farming has been established for a long time already. Hence, this chapter complements more balanced pictures of oil palm smallholders in this thesis. In the last part of this chapter, a comparison of household well-being between the case at hand and the other site under advanced phase plantation is discussed.

4.1. Introduction

The well-being of oil palm households and the implementation of oil palm contract farming are diverse across plantation phases, natural conditions and locations. (Zen *et al.* 2005; Susila 2004; Sheil *et al*. 2006). While some literatures pointed out the high return of oil palm (e.g. Feintrenie *et al.* 2010; Hardter *et al.* 1997), smallholders may not earn adequate benefit during early phase of oil palm development. The nature of oil palm does not allow a positive cash flow during gestation period that may take four years after plantation establishment. In addition, as a monoculture system that mostly replaced forested areas, oil palm plantation may threaten old livelihoods of the surrounding community that relied on natural resources.

The situation of smallholders at the village Arang-arang can represent such condition and thus will be discussed as a case study. The land in the village was dominated by peat soil which was less suitable for traditional agriculture. Prior to the existence of oil palm companies the surrounding area was covered by peat swamp forests where major

livelihoods of households relied on. Today, those forests were replaced by large scale oil palm plantations. As a compensation for the surrounding communities, the companies were required by the government to also establish oil palm plantations for smallholders under contractual arrangements. However, such establishment just commenced in the last five years and has not delivered adequate economic benefits for smallholders.

The case study aims to provide informative analysis of the well-being of smallholders living during the early phase of oil palm development and thus could complement more balanced picture of oil palm smallholders' wellbeing in this thesis. This case study relies on the small sample data of 46 households that were randomly selected from the 400 households in the village.

4.2. Contractual arrangements between the companies and village households

In this section, contractual arrangements between the companies and the surrounding communities are described. There are two agribusiness companies, namely PT. NSP and PT. MAKIN that established oil palm plantations and made contractual arrangements with the communities in the village.

About 8000 ha of the land was conceded by the government to PT. NSP for establishing an oil palm plantation in this village. As a measure to support rural development, the government required the company to allocate 20 percent of the conceded land for establishing integrated oil palm plots for village households on a credit basis under contractual arrangements. Hence, each household was allocated to receive four ha oil palm plot.

Due to budget constraint the company developed oil palm plantations gradually and thus established its own plantation first before household plots. The establishment of the household plots just commenced in the last few years. Hence, when the company's plantation has already produced full productive capacity, the household plots were still in the gestation period and thus have not generated financial benefit yet. In order to allow the households for benefiting soon, the contract arranged benefit sharing that relied on the total production of the whole plantation including both the company's and the households' own with the 20:80 proportion for the households and the company respectively. Based on the contract scheme, the company was responsible to establish

and maintain oil palm plots for households. As a consequence, the company fully controlled over households' plots and directly harvested all oil palm fruits from those plots in order to meet the need of its mill. All establishment and production costs were charged to households as a debt that directly subtracted from the production share of households. Hence, the households received net income at the same amount given periodically by the company. Those plots can be taken over by the households after all credit installments are completely repaid. However, there was no clear written contractual arrangement regarding how long the plots will be controlled by the company and how much the total credit should be repaid by the households. The contract also suffered lack of clarity in price determination mechanism.

PT. MAKIN was another oil palm company that existed in this village prior to PT. NSP. The company was licensed by the government to establish and operate an oil palm plantation in this village in order to support the transmigration project. The project aimed to resettle people from high densely populated islands such as Java to less populated islands including Sumatra in order to achieve more balanced demographic development. In this project the government facilitated each participant household with home, one ha land for food crop and two ha land for oil palm. Such facilities were not only granted for migrants but also for indigenous households in this village in order to reduce potential conflicts among them. The company was required by the government to establish oil palm plots for those households on a credit basis under contractual arrangements. Based on the contract, the company established and controlled over household plots that allows for directly taking all oil palm fruit from those plots. The households receive net margin from the company after deducting for credit installment. Under this scheme the net margin for households relied solely on the production of their own plots. In order to support household living during gestation period, the households were involved and paid by the company to work in the oil palm plantation.

Hence, each household on average has six ha oil palm plots under contract schemes consisting of four ha oil palm plot under a contract scheme with the former company and two ha oil palm plot under another scheme with the later one.

4.3. Household characteristics

This section describes characteristics of households living under early phase oil palm development in order to better understand their livelihoods and socio-economic condition. Table 4.1 shows some household characteristics in the area. On average households consist of five household members, in which about 70 percent of them are potential laborers between 15 and 65 years old. About 17 percent of household are headed by woman. On average household heads are about 49 years and attained education for seven schooling years. Households are dominated by indigenous people with 8 percent migrants.

Agricultural assets among households are diverse. On average, each household mostly has about 6 ha oil palm that consists of four ha and two ha oil palm plots allocated and controlled by the two companies. The survey found different land allocations across households in which households whose any positions at either village committee or cooperative received more lands than others whose not. For either rubber or other crop, each household has about a half ha on average.

Table 4.1. Household characteristics in village Arang-arang

Household characteristics	Mean	St. Dev	Min	Max
Household size	4.8	1.9	1	10
Proportion of potential labor	0.71	0.24	0	1
Age of household head (years)	48.9	13.8	27	89
Education of household head (years)	6.9	3.1	0	15
Gender of household head	0.83	0.38	0	1
Origin dummy (1=migrant, 0=indigenous people)	0.09	0.28	0	1
Oil palm area (ha)	6.27	1.78	4	14
Rubber area (ha)	0.46	1.19	0	5
Other crop area (ha)	0.41	0.79	0	4
Livestock (IDR thousands)	747.00	3098.00	0	21000

Source: Oil palm household survey 2010 data

4.4. Household well-being

Households normally diversify incomes into some sources rather than relying on a single source. Table 4.2 shows various income sources engaged by households. As shown in Table 4.2, there are two specific sources that generate largest incomes, namely rubber and non-farm business. However, both sources just were engaged by limited households. Off-farm employment seems to be a livelihood that was widely engaged and able to produce relatively high income. It is noted that the companies widely offered households to work as a labor either in their plantations or in their mill. Among other sources, oil palm contributes relatively small income. The facts that most oil palms were planted on peat land and still on the young mature period may explain the low yield of oil palm..

Table 4.2. Income generated from various sources in village Arang-Arang, Muaro Jambi

Income sources	Household engaged (%)	Mean income	St. dev	Min	max
Oil palm	100	4212	2288	-3269	11942
Rubber	15	26393	21570	5760	60500
Other crops	28	15577	19873	-500	57175
Livestock	43	25	174	-479	400
Fishing	48	3990	5397	-140	18000
Employment	67	22506	13874	6000	63256
Self-employment	26	30477	23718	8350	98400
Total		38836	25760	4661	155956

Source: Oil palm household survey 2010 data

Figure 4.1 shows the share of each source on total household income. As shown by the figure, the contribution of oil palm on total household income is only 15 percent on an average. The largest share on household income is off-farm employment (39 percent), followed by non-farm business (21 percent). It is noted that most off-farm employment is labors in the companies' plantations while most non-farm business is middleman of oil palm fruit.

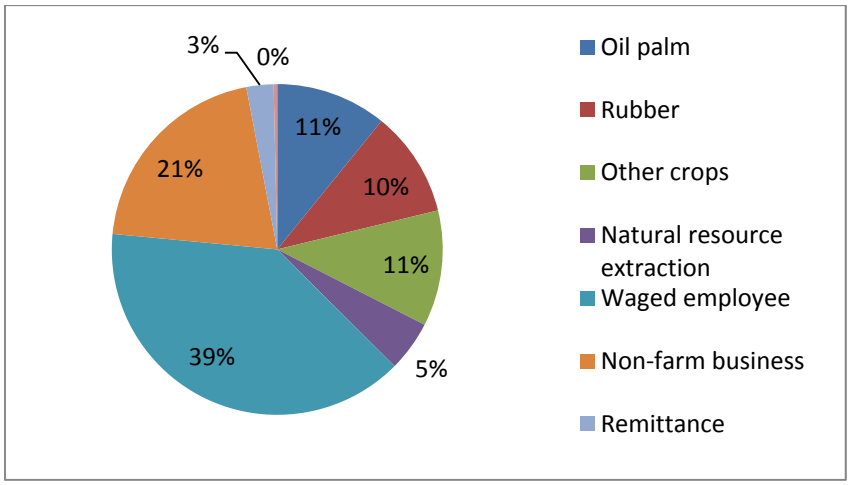

Figure 4.1. Structure of household incomes

Source: created from oil palm household survey 2010 data

Households can earn net income about IDR 39 million in total a year or IDR 8.6 million per capita on average. In Table 4.3, the distribution of per capita household incomes which are classified into four classes is presented. The average income places on the second highest income class with range from IDR 7 to 10 million. This indicates that more than a half of households have per capita income below the average. Such average may be overstated by few outliers with extremely high income. We find that there are two households that earn more than IDR 20 million per capita.

Table 4.3. Income classes of households in the village Arang arang

Per capita income (in IDR million)	Households (%)	Cumulative (%)
$x \leq 4$	15.2	15.2
$4 < x \leq 7$	34.8	50.0
$7 < x \leq 10$	21.7	71.7
> 10	28.3	100

Note : x is per capita household income

Source: Oil palm households survey data 201

Not all incomes were spent by households for consumption. The fluctuate of earnings that sometimes was unexpected may encourage households to be careful in spending in order to deal with shocks probably faced in the near future. Some households may also allocate some parts of their income for saving and investment. There was only IDR 4.2 million spent for consumption per captia on an average.

The structure of household expenditure is presented in Figure 4.2. The largest part of routine expenditure which is more than a half is allocated for food. This is followed by spending for transportation and communication (about 17 percent) and non-food including electricity, cloths, and personal care (15 percent).

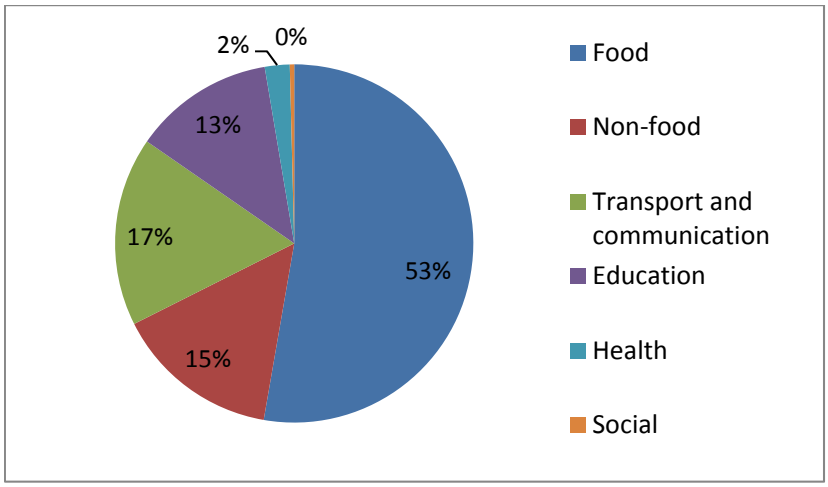

Figure 4.2. Structure of household expenditures

Source: created from oil palm household survey 2010 data

In order to better understand socio-economic situation among households, an illustration of two households with opposite wealth conditions is presented in Box 4.1 and Box 4.2 respectively. The former is very poor while the latter is much richer. The contribution of oil palm under contract schemes to household income for both households seems to be similar and very small. The later household was able to earn higher income from oil palm since he did not only rely on the contract schemes but also grow oil palm independently. Compared to the net income from oil palm plots under the schemes, the oil palm plot managed independently generated much higher net income per hectare. Such condition may influence household perception regarding the lack of transparency of the companies in oil palm management and production sharing.

Box 4.1. The illustration of a poor household

Muri (40 years) was a household head with five members. His education stopped at the first year of junior high school due to lack of fund. He had three children who all were still below 13 years. The first and second child was still schooling at a junior higher school and an elementary school respectively while the latest child has not enrolled school yet.

He engaged in tapping rubber and fishing. In 2009 from 1.5 ha of rubber plot that he owned, he was able to produce 720 kg rubber latex and earned IDR 5.7 million while from fishing he earned 6.6 million. As other households in the village, he was allocated totally six ha oil palm plots by the two companies under contract schemes. From the oil palm plots, about IDR 4 million was earned. Hence, total net household income that can be earned was about IDR 16 million or IDR 3.3 million per capita. Since the earnings fluctuated and sometimes was unexpected, Muri tend to be very careful is spending in order to anticipate unexpected shocks in the future. In 2009 the household spent for consumption only about IDR 2.4 million per capita in which more than a half was allocated for food. This number was lower than national poverty line. About 52 percent of monthly expenditure was allocated for food. The rest is spent for transportation and communication (25 percent), education (14 percent), and non-food items such as electricity and personal goods (9 percent).

Muri's family experienced some prominent shocks in 2009. Flood disaster did not allow him to go for tapping rubber and fishing for three months and thus he suffered income shortfall about 4.8 million. Muri was also infected by Malaria virus that made him not able to work for one week.

Source: Oil palm households survey data 2010

Box 4.2. The illustration of a non-poor household

Saleh (42 years) was a government employee. He lived together with eight other household members, namely his wife, two sons, three daughters, one daughter in law, and one grandchild. The first son, Sayudin (22 years), has already married and worked as employee at the oil palm company's mill. The first daughter was 20 years and unemployed. She finished elementary school but did not continue the study. Each of her two sisters (19 years and 12 years) was still studying at a senior high school and an elementary school respectively. The second son, Apriansah (18 years) has completed education in a junior high school. Currently, he managed a business of Saleh's family in trading oil palm fruits. He bought oil palm fruits from smallholders in surrounding villages and sold the fruits to the company with certain margin. In order to support this business, Saleh invested a truck for transporting oil palm fruits.

In 2009 Saleh family earned net household income about IDR 156 million in total or IDR 17.3 million per capita. With such income, he became one of the few richest households in the village. The largest income contribution came from the business managed by Apriansah that generated about IDR 98 million. Her old brother, Sayudin that worked as employee at the company's mill earned salary about IDR 2 million a month. As a government employee, Saleh got salary about IDR 1.8 million monthly. In addition, after office hours he usually engaged in fishing three times a week and thus earned about IDR 1.8 million a year. As other households, Saleh received income from oil palm plots under contractual arrangement with the companies about IDR 4 million.. However, Saleh also grows oil palm independently in his own 0.25 ha land since 2005. On such land, he can produce 7.2 tons of oil palm fruits which can contribute net income about IDR 4.5 million a year.

While Saleh family was able to earn IDR 17.3 million per capita, he just spent about IDR 4 million per capita for consumption. The remaining income was accumulated as saving and working capital for the family business of oil palm fruit trading. About 51 percent of routine expenditure was spent for food, 29 percent for non-food items such as cloths and electricity, and 20 percent for transportation and communication.

Continue…

Source: Oil palm households survey data 2010

Box 4.2. The Illustration of a non-poor household (continued)

Saleh experienced some prominent shocks leading to either income shortfall or extra expenditure. Flood disaster experienced in 2009 did not allow him to harvest his oil palm for two months, thus he lost potential income around IDR 1.5 million. He also lost about IDR 1.8 million due to the severe fall of oil palm price in 2008. In 2009, his grandchild was born. In spite of this happiness, following the local culture Saleh's family must spend at least IDR 7.5 million to held cultural ceremony for this event. However, all those shocks were soon recovered since the household has several sources of income.

Source: Oil palm households survey data 2010

The large difference in total net income between the two households as described in Box 4.1 and Box 4.2 was contributed by the difference in main income sources. The former mainly relied on small rubber plot and fishing while the later relied on non-farm business and off-farm employment. The later has much larger asset endowments including a truck used to support a family business. The non-farm business, namely becoming agent of oil palm fruits allows the later household to generate extremely high income. When both households were hit by a covariate shock, namely flood disaster the former seems to suffer more while later household can recover from such shock soon since it has several and more secure sources of income.

4.5. Poverty and inequality

In this section, poverty and income inequality is analyzed. Based on the household consumption data three poverty analyses namely the headcount index, the poverty gap index and the poverty severity index are applied. The headcount index measures the proportion of the population living below poverty line. The poverty gap index measures the extent to which individuals fall below the poverty line and thus shows how depth the poor suffer below poverty. The poverty severity is the squares of the poverty gaps relative to the poverty line. This measure puts more weight on the position of the poorest, thus takes into account inequality among the poor. Furthermore, income inequality among households is analyzed by Lorenz curve and Gini index.

In order to make such analyses more meaningful, a comparison of poverty and inequality figures between the case study at hand representing an early phase plantation

and the other site representing an advanced phase plantation is also presented. Such comparison allows comprehensive understanding of poverty and inequality pictures in the oil palm communities. In this comparison, all sample households including both contract and non-contract smallholders are included in order to take into account spillover effect of contract schemes to non-contract smallholders.

The results of poverty analyses are detail presented in Table 4.4. The results show that in the early phase plantation area, poverty incidence still remains 20 percent even if the $ 1.25 poverty line is applied. On the contrary, with the same threshold the poverty headcount in the advanced phase plantation area is much lower and less than 10 percent. If the $ 2 poverty threshold was employed, more than a half of households living in the former site fall into poverty. The poverty gap of the former is also much higher than that of the later. This indicates that the poor in the former are poorer. Their consumptions are very deep below the poverty line and therefore a high cost or effort is required to help them out of the poverty. Taking into account inequality among the poor, the poverty of the poor in the former is also more severe than that of the later. All those indicate that poverty is still a major problem for households in the early phase of oil palm development.

Table 4.4. Poverty rates across different poverty lines

	The early phase (Muaro Jambi site)		The advanced phase (Merangin site)	
Poverty line	US $ 2 (PPP)	US $ 1.25 (PPP)	US $ 2 (PPP)	US $ 1.25 (PPP)
Poverty headcount (%)	56.52	19.57	35.92	6.53
Poverty gap index (%)	29.25	15.89	23.23	13.77
Poverty severity index	0.11	0.04	0.07	0.03

Source: computed from oil palm household survey 2010 data and BPS (2009)

In order to examine the dominance of poverty incidence in the early phase plantation over the advanced phase plantation, household consumption distribution of the two sites is analyzed. Figure 4.3 shows cumulative distribution functions (CDF) of household consumption of the two sites. The consumption distribution of the former is identified by the solid line while that of the later is identified by the dash line. Two vertical lines in the figure (z1 and z2) represent two different poverty lines, namely the $ 1.25 (PPP) and the $ 2 (PPP) respectively. The CDF for any given per capita consumption levels

gives the proportion of households who have consumption below that level. Therefore, if the consumption level is taken to be the poverty line *z*, the CDF gives the proportion of poor households.

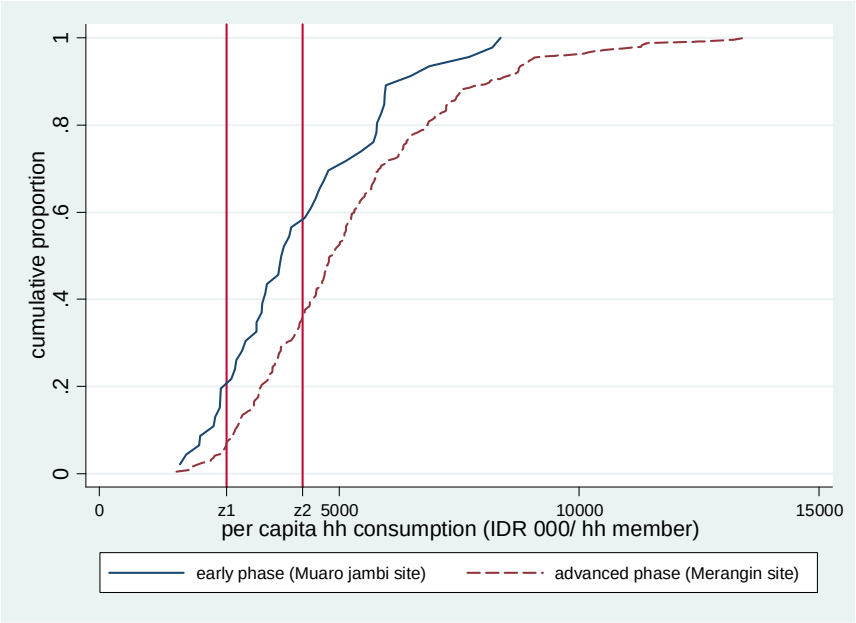

Figure 4.3. Consumption distribution in the Muaro Jambi site and the Merangin site
Source: generated from oil palm households survey data 2010

As shown by Figure 4.3, the CDF of consumption in the Muaro Jambi site is everywhere above the CDF of consumption in the Merangin site. This indicates that the poverty headcount is always higher in the former for any consumption poverty lines. This underlines the dominance of poverty headcount in the site where oil palm development just commenced over the overall consumption distribution.

How much poverty can be reduced by the oil palm development in this case is still difficult to be assessed since panel data are not available yet. However, the comparison with the advanced phase plantation above gives an intuition that oil palm contract farming may need a longer time to reduce poverty.

The oil palm contract schemes in the case at hand just left limited margin for households. While the company argued that the peat soil and the young oil palm are the reasons behind this problem, many households associated the lack of oil palm benefit with the lack of transparency of the company in oil palm production and management. This is not surprising since the contract schemes arranged that all household plots were

fully controlled by the companies and household just received net margin calculated by the companies.

Furthermore income distributions in the two sites are analyzed and compared to better understand inequality among households. In Figure 4.4, Lorenz curves of the two sites are presented. The income distribution of the Muaro Jambi site is identified by the solid line while that of the Merangin site is identified by the dash line.

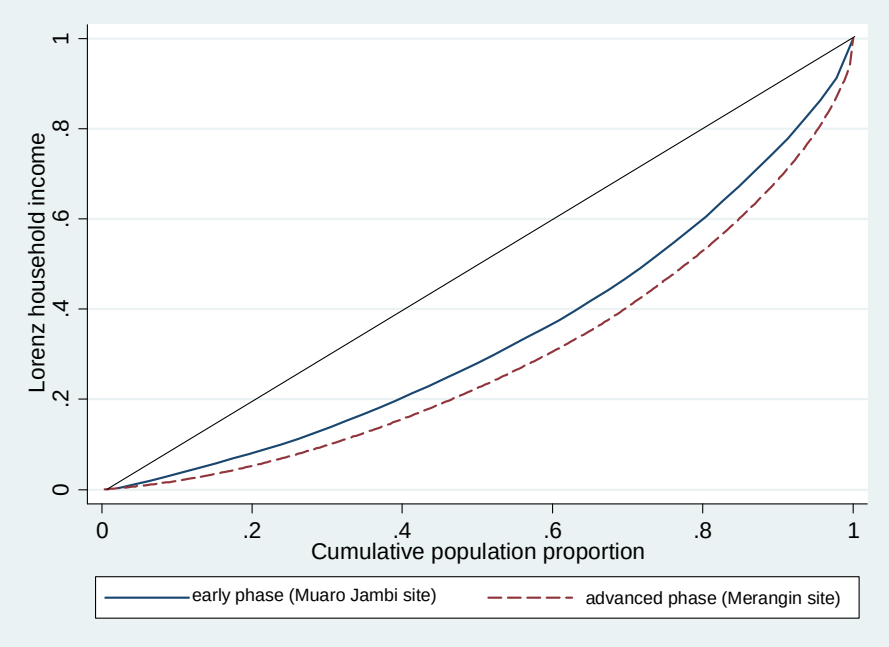

Figure 4.4. Lorenz curve of household income

Source: generated from oil palm households survey data 2010

The inequality is measured by Gini index computed as the ratio of area between the hypothetical 45° line and the curve over the area below the 45° line. The Gini index is ranging between 0 and 1 in which the higher the index the higher the inequality is.

Figure 4.4 shows that the Lorenz curve of income distribution in the Muaro Jambi site seems to be more close to the hypothetical 45° line, and thus the Gini index of early phase is smaller than that of the Merangin site. The computed Gini index of the former is 0.32 while that of the later site is 0.42. This suggests that household incomes are more equally distributed in the early phase plantation area than in the advanced phase one.

The more equal income distribution and the dominance of poverty incidence in the early phase plantation area suggest that households seem to have similar condition under poverty when oil palm contract farming just commenced. In the other site where oil

palm contract farming has been applied for a long time already there was less poverty but high inequality. This gives initial intuition that some households may benefit a lot but some others may fail to benefit from the contract; thus poverty can be reduced but the gap among household may increase.

4.6. Conclusions

Based on the case study above, lessons learned regarding socio-economic situations during early phase of oil palm development could be derived as following. Oil palm production is still low and therefore the contribution of oil palm income to household income is also relatively low. In order to survive, households relied on diversified livelihoods including fishing, tapping rubber, off-farm employment, and non-farm business. The off-farm employment seems to be mostly engaged and able to generate relatively high income. It is noted that many households were employed by the companies as labors in their plantations and mill.

The poverty analyses show that while oil palm contract schemes have been applied as a part of poverty reduction policies, a quite high poverty incidence still remained in this site. The dominance of poverty headcount in this site over the other site under advanced phase plantation is highlighted. The poor in this site are poorer and therefore much more effort is required to escape them from the poverty. On the other hand, the income of households in this site is more equally distributed. All these suggest that smallholders have relatively similar conditions under poverty when oil palm development just commenced. At the time their livelihoods that relied on natural resource were threaten by the existence of large oil palm plantations while the compensation from the oil palm contract schemes was still very limited.

While the young phase plantation and the peat soil condition could be a reason for the lack of oil palm benefit received by households, the contractual arrangements may also contribute to that problem. The success of the contract scheme in poverty reduction mainly depends on the fairness and the transparency of the companies in oil palm production and benefit sharing since the companies take over the management of all household plots while the households just received net margin from the companies. Hence, the contract schemes need to be reviewed and accompanied with a more situation specific policy. The contracts need to provide a mechanism in which households can access information about the actual costs and benefits in oil palm

production. The externalities of the oil palm plantations also need to be precisely assessed and taken into account to determine a minimum compensation for households in the village. In addition, more effective social protection policies especially in labor market intervention and social insurance should be applied in order to generate adequate alternative incomes and deal with risks during the gestation period.

CHAPTER 5

IS CONTRACT FARMING IN THE INDONESIAN OIL PALM INDUSTRY PRO-POOR? [1]

While the previous chapter has shown that smallholders in the advanced phase plantation area have much lower poverty incidence than those in the early phase planation area, the linkages between such better off, oil palm production and contract farming have not been established. Therefore, this chapter addresses that question and further examines whether the poor under advanced phase oil palm development can benefit from the contract scheme.

5.1. Introduction

Since the late eighties conversion of forest land to oil palm plantations has become an explicit policy of the Government of Indonesia (GoI) driven by better prospects in the world market for cooking oil, fats and more recently also bio-fuels. This development has been augmented by private sector investments by mostly large agro industry corporations. In order to make this development pro-poor the government has enforced the participation of smallholders in setting up new oil palm plantations. Corporations who want to invest in oil palm can obtain access to deforested public land only under the condition to involve the surrounding local communities. Agro industry companies have largely complied with these requirements. Around 40 percent of total national oil palm area is now either owned by smallholder farmers or under contractual arrangements with oil palm corporations (MoA 2011). In the province of Jambi, which is the study area used for this research, 28 percent of the oil palm area is owned by smallholders independently and 37.6 percent is under contractual arrangements with corporations (BoA of Jambi 2009).

[1] This chapter is based on the paper of: Cahyadi, E.R. and Waibel, H. 2013. Is Contract farming in the Indonesian oil palm industry pro-poor? Journal of Southeast Asian Economies, 30 (1), pp. 62-76. It has been presented at the International Conference of Agricultural Economists (ICAE) on 18 -24 August 2012 in Foz do Iguacu, Brazil.

A number of reports and studies have pointed out the benefits of oil palm development for smallholders. The sector has absorbed at least 3.7 million laborers (IPOB 2010). By comparing intensive plantation cropping in West Sumatra, Hardter *et al.* (1997) find that oil palm smallholders were able to earn seven times higher income than subsistence traditional crop farmers. In addition, Feintrenie *et al.* (2010) demonstrate that oil palm is able to generate higher returns to both land and labor than rubber or rice production.

Pafenfus (2001) identified lack of knowledge, high initial investment and a long pay off period as major barriers for smallholders to invest in oil palm production. One way to overcome these constraints is through the establishment of contractual arrangements between plantation companies and smallholders. Such contracts may include financial support for plantation development, quality control, price support and supply obligation (Zen *et al.* 2005; Vermeulen and Goad 2006).

On the other hand there is a debate in the literature on the pros and cons of contractual arrangement that is commonly used as a component of poverty reduction strategies and sustainable development (Setboonsarng 2008; Da Silva 2005; Eaton and Shepherd 2001; Baumann 2000). Some authors have found positive effects of contract in the oil palm industry such as more secure income (e.g. Sheil *et al.* 2009) and oil palm companies´ social responsibility related investments in health and education for local communities (e.g. Zen 2005). Other studies pointed to unequal benefit sharing (Glover 1984; Glover and Kusterer 1990; Warning and Key 2002), lack of clarity over land tenure prior to plantation development and changing land values, unfavorable contractual schemes, and lack of contractual compliance by oil palm companies. (Marti 2008; Colchester and Jiwan 2006; Rist *et al.* 2010) including lack of transparency in determining oil palm price under the dominance of companies (Maryadi *et al.* 2007). Contract farming has also been criticized because it can cause increased concentration of land ownership, social differentiation among producers and loss of independence for the growers (Echanove and Steffen 2005).

In other sectors such as rice, vegetables or fruits (Kumar and Kumar 2008; Singh 2002; Miyata *et al.* 2009; Setboornsang *et al.* 2008; Simmons *et al.* 2005; Patrick 2004; Chang *et al.* 2006; Sharma 2008; Nagaraj *et al.* 2008; Echanove and Steffen 2005; Sáenz-Segura 2006; Key and Runsten 1999), and oil palm in other countries, e.g. Ghana and in the

Philippines (Huddleston 2006) studies of contract farming have been carried out. However, there is a lack of rigorous, quantitative studies on the impact of contract farming on income of smallholders engaged in oil palm and its effects on rural poverty reduction in Indonesia.

The overall objective of the paper is to investigate the impact of contractual arrangements on the well-being of smallholders and its implication for rural poverty reduction in Indonesia.

The paper has four specific objectives:

1. To understand the difference in characteristics between contract smallholders and non-contract smallholders and to identify the specific components of the contractual arrangements responsible for the difference.
2. To identify the factors that explain why smallholders participate in a contract scheme with a private oil palm corporation.
3. To assess the impact of contractual schemes on the household income of smallholders.
4. To examine whether the poor benefited from the contractual arrangement

The paper proceeds as follows. In section two the contractual arrangements currently existing in the Indonesian oil palm industry are explained in order to facilitate the specification of an appropriate impact model. Next, the analytical framework and the methodology of this study are described respectively. This is followed by the data collection framework in section five. Section six presents the results, including descriptive statistics and a detailed discussion of results of the econometric models. Finally, in section seven, conclusions are drawn and policy recommendations are submitted.

5.2. Contract farming in the Indonesian oil palm industry

5.2.1. General overview

The basic concept of contract farming in the oil palm industry is a co-operation between two parties, namely plantation companies (nucleus) and oil palm smallholders (contract smallholder) to secure the supply of Fresh Fruit Bunch (FFB) with particular quality standard to the nucleus mill. Furthermore, the nucleus provides technical assistance and inputs of seed stock, fertilizers and pesticides, on a loan basis, sometimes partially subsidized by the government.

The contractual arrangements commonly involve three parties, i.e. a bank as creditor, the nucleus as plantation developer, and the smallholder as borrower. Oil palm cultivation, particularly for integrated nucleus plasma plantation in a very large area needs a high investment. Several activities such as land clearing, road building, planting, and maintenance for early years demand advanced technology, which cannot be handled efficiently by individual smallholders. Through this scheme, the nucleus supports all those, calculates all raised costs, and subtracts them directly from the revenue after oil palm plot yield as credit repayment to the bank. As a consequence, smallholders are required to sell their production to the mill of nucleus.

To illustrate the problem described above we undertake a case study for two typical contract schemes, namely PIR TRANS and KKPA. The former, which had started in the nineteen eighties, was integrated into the government resettlement program called “transmigration” that resettled people from the highly densely populated islands, especially from Java, to the less populated islands such as Sumatra and Kalimantan. The KKPA scheme was introduced in the nineties with the aim to give cooperatives a more important role in intermediating between companies and smallholders.

Previous studies (e.g. Vermeulen and Goad 2006) identified a number of problems in the contract schemes, such as no detailed written contract, no price protection and no clear land tenure status. Uncertainty in these contract components was due to the absence of government standards. In addition, due to the long gestation period of oil palm plantations smallholders face liquidity constraints. Hence, there is a need for alternative sources of livelihood to meet consumption needs during the establishment phase of the oil palm

plantations. Another disadvantage of the contract arrangements is the long term nature of the contracts (25 years) which is based on the expected life span of the plantation. Once a decision is made to join the contract the smallholder will be bound by the contract for a long period.

The alternative for a smallholder oil palm producer is to stay independent. Although the high initial investment costs is a disincentive to enter the oil palm business and market the product, the widespread establishment of independent processing mills have created a new market for smallholders (Pafenfus 2001). Obviously some smallholders are willing to take up additional price risk.

5.2.2. Operational Definitions

It is useful to specify several terms related to contract farming industry used in this paper. Relying on the "Roundtable on Sustainable Palm Oil" (RSPO)[2] definition (Vermeulen and Goad 2006), smallholders in this study are defined as family-based enterprises producing palm oil from less than 50 hectares of land. A contract smallholder is one who has at least one oil palm plot planted by the oil palm corporation and cultivated with support measures of the oil palm company as specified in the contract. A plot which is under such arrangement is called a plasma plot. On the contrary a non-plasma plot is one which is planted and cultivated independently. A contract smallholder can have plasma and non-plasma plots, which is a potential source of conflict and increases transaction costs on part of the contracting party.

These definitions enter our analysis by making comparisons between contract and non-contract smallholders on the one hand and plasma and non-plasma plots on the other hand.

[2] An international multi-stakeholder organization and certification scheme for sustainable palm oil production.

5.3. Theoretical Background

In this section we analyze contract farming from the perspective of contract theory in order to derive the hypotheses of the paper. Contractual arrangements between an oil palm corporation and smallholder farmers can be understood as a classic principal agent problem. Bargaining power is allocated to the principal who can generate a "take it or leave it" situation with one or more agents (Salanie 2005; Bolton and Dewatripont 2005). In the case at hand, the oil palm company acts as the principal who sets the contract terms according to government regulations. Smallholders can choose to participate in the contractual arrangements or operate independently. Two factors that influence the conditions of the "principal agent game" are: (a) the plantation management scheme and (b) the market situation for fresh fruit oil palm. Under (a) there are two possibilities: (1) the oil palm company takes over the management of the smallholder plot and compensates the owner for his labor and land or (2) smallholders manage their own plot according to contractual arrangements with the company which includes the sales of the oil palm produce to the contracting company. Potential conflicts from contractual arrangements arise because of asymmetric information (Key and Runsten 1999). Either party must consider the existence of hidden characteristics and hidden intentions of the respective other party. The oil palm company is unsure about the performance of the smallholder and the latter can be faced with non-transparent contractual conditions. Existing power structure and available choices will tend to increase the likelihood of the hidden intention problem as shown in Figure 5.1. In Figure 5.1 we combine market structure (competition) and management arrangements (company managed versus smallholder contracts) to illustrate the principal agent problem. In a competitive market situation (1st column) and when the oil palm land is managed by the smallholder, there is an incentive for moral hazard by the smallholder who may sell parts of the produce outside the contract. Hence the company has to counter that with in offering better contractual conditions, which will raise its costs. In case of company-managed plots the problem could be adverse selection as it will be less attractive for the more advanced smallholders to join the scheme.

In the case of no market competition (column 2) the only possibility that exists for a smallholder to obtain additional benefits is to undermine the production technology requirements of the contracting company. Hence in such situation the company must intensify its monitoring activities and put more pressure on smallholders. Therefore it will be more difficult for poorer and technologically less advanced smallholder farmers to meet the requirement of the scheme.

In a monopsonistic market situation the power balance is skewed towards the company in case of company managed smallholder plots which the risk of exploitation of smallholders is high, which has potentially negative effects on the poorer smallholders.

Market/Management Scheme	**Market Competition**	**No market competition**
Oil palm plot managed by smallholder	Moral hazard by smallholder	High monitoring cost
Oil palm plot managed by company	Adverse selection	Moral hazard by company

Figure 5.1. Contractual arrangements between an oil palm company and smallholders as principal agent problem
Source: own illustration

The fact that oil palm contract farming between smallholders and companies is the policy of the GoI, as explained in section 2 of the paper, does not significantly change the institutional conditions. The company is likely to exert some informational advantages with regards to technology and management issues including production costs over both the government and the smallholders. Hence, based on these theoretical considerations the hypothesis could be drawn that “contractual arrangements discriminate against the well-being of certain types of smallholder farmers.” In the next section the methodology to investigate this hypothesis is explained.

5.4. Methodology

In this section we explain the methodology used to answer the four specific objectives as stated in section 1. Firstly, descriptive statistics are presented to better understand the difference of characteristics between participants and non-participants. This also allows us to identify the specific elements of the contractual arrangements that are responsible for the difference. Secondly, in order to analyze factors associated to contract participation, the participation decision is estimated by a probit model. The general form of the participation model is expressed as follows:

PARTICIP= f(AGE, HSIZE, PPL, EDU, ALAND, STAY, PALM, RUB, OCROP, OFFF, PLANTP1, PLANTP2, MIGRANT) (1)

Participation is the dependent variable formulated as a zero-one variable. Age of household head (AGE) is a reflection of the notion that risk aversion may grow with age and therefore older people may choose reducing risky investments by joining the contract scheme in oil palm. Household size (HSIZE) and labor capacity that is defined as the ratio of working age members to all household members (PPL) is included as some authors (e.g. Raynold 2000, cited in Echanove and Steffen 2005; Glover 1987) found that contract farming tends to exploit unpaid family labor. Educational attainment of household head represented by schooling years (EDU) is expected to positively affect participation.

Furthermore a dummy variable that captures whether a smallholder receives allocated land for housing and farming from the government (ALAND) is included. This variable represents the arrangements made by the government for participants of the national transmigration program that could make them feel obliged to join contract farming. The time in years that a household stays in the village (STAY) is included to capture the social capital effect of contract participation. As supported by some literatures (e.g. Glover 1984; Glover 1987; Key and Runsten 1999) the scale variables, such as the size of oil palm area (PALM), the size of rubber area (RUB) and the size of other crop area (OCROP) are also likely to affect contract participation in different directions. PALM is expected to have a positive sign due to economies of scale while RUB and OCROP may discourage participation. Likewise, engagement in off-farm activities (OFFF) is expected to negatively affect participation.

It is noted that the contract schemes were offered by the nucleus company in two periods of time, i.e. 1989 - 1994 and 1995 - 2000. Meanwhile, the condition for a smallholder to join a contract scheme is that the plantation must be in an early stage of development and therefore potential adopters differ between the two periods. This difference was captured by dummy variables of the planting period, i.e. PLANTP1 and PLANTP2, showing the respective periods in which the smallholders entered the contract schemes.

We also include a dummy variable for migrant (MIGRANT) since our sample consists of migrants and indigenous or local people. These two groups differ in terms of their cropping system. Indigenous people have a long tradition of rubber production while migrants tend to be less attached to a specific crop.

Thirdly, in order to assess the impact of contract farming for household welfare across different income categories, we use total net household income[3] as outcome variable. The impact of participation is estimated by two models, namely an Ordinary Least Squares (OLS) model and a two stage treatment effects model. OLS is used to estimate outcome as a function of household characteristics, technical parameters of the oil palm plantation and a dummy variable for contract participation. The validity of this model depends on the assumption that there is no endogeneity problem, which will arise if participation is driven by unobservable factors (e.g. risk aversion, entrepreneurial ability, etc.) that affect the outcome of the participation decision. A two stage treatment effect model is employed to correct for this endogeneity.

The general form of the income model is stated as follows:

$$INCOME = f(AGE, AGE^2, HSIZE, PPL, EDU, ALAND, STAY, PALM, RUB, OCROP, OPAGE, OPAGE^2, OFFF, PARTICIP) \quad (2)$$

Total household income (INCOME) as dependent variable is computed as total net revenue from any sources of on-farm and off-farm income in 2009. Some of the explanatory variables included in the participation model may be also able to explain income, albeit for

[3] If contract farming draws labor and land away from other activities, focusing on crop income or the gross margins of the contracted crop may overstate the impact on household well-being. Total household income includes all net incomes that were earned from any sources both on farm and off-farm.

a different rationale. AGE is included to represent experience in generating income for the household. The squared term captures the effect that such ability may decline at older age. Potential labor capacity that is expected to positively affect income is captured by HSIZE and PPL. EDU is included to capture knowledge that is expected to be positively associated with income

As a variable that captures support of the government for facilitating smallholders with productive asset, ALAND is included and expected to have a positive income effect. STAY is included to capture social capital, which based on many literatures (e.g. Groot *et al.* 2006 and Maluccio *et al.* 1999), we hypothesize to have a positive income effect. In order to reveal the effect of different crops and income sources the variables PALM, RUB, OCROP, and OFFF are included. In addition, two technical parameters on oil palm production namely oil palm age (OPAGE) and its squared term ($OPAGE^2$) are included to represent the time-dependent productivity of the oil palm plantations. Finally, contract participation (PARTICIP) is included to measure the effect of contract farming.

In a formal notation the model can be expressed as:

$$Y_i = \beta X_i + \delta I_i + \mu_i \quad (3)$$

$$Ii^* = \alpha Z_i + \varepsilon_i \quad (4)$$

for $I_i = 1$ if $I_i^* > 0$, otherwise $I_i = 0$

where Y_i is the outcome, i.e. total household income, X_i are household characteristics and technical parameters of oil palm production, I_i is a dummy for contract participation where $I_i=1$ if one participates in the contract and $I_i=0$ otherwise, and Z_i is a vector of variables attributable to participation.

Endogeneity exists if ε_i in equation (4) is correlated with μ_i in equation (3). By using a two-stage procedure and assuming a joint normal error distribution, endogeneneity can be corrected. First, participation will be estimated by means of a probit model that allows us to calculate the inverse Mills ratio for each observation. Second, this ratio will be included as a regressor in the income model.

As identifying variables in treatment effect regression we use PLANTP1, PLANTP2 and MIGRANT, which are expected to affect participation but not necessarily income.

Fourthly, we examine whether the contract is poverty sensitive by incorporating a poverty variable into the model. We classify our sample into two groups, namely poor and non-poor households based on per capita household consumption with a threshold of the $ 2 international poverty line at 2005 PPP. The two critical questions addressed in this analysis are: (i) whether poor smallholders are discriminated by contract conditions to join the contract and (ii) whether poor smallholders significantly benefit if they join the contract scheme.

The first question is examined by introducing a poverty dummy (POOR) in the participation model (the first stage of treatment effect model). We assign a value of 1 for poor household, and zero otherwise. We expect that a poor smallholder is less likely to participate in the contract.

The second question is examined by including POOR and an interaction dummy variable between poverty status (POOR) and participation (PARTICIP) in outcome model (the second stage of treatment effects model) in order to estimate the effect of poverty and participation all together. For checking robustness, we also run two separated models for the poor group and the non-poor group. We expect that participation has different impact for different groups.

5.5. Study area and data collection

Data were collected through a household survey in Merangin regency, Jambi province. In total the survey involved 245 oil palm smallholders consisting of 126 contract smallholders and 119 non-contract smallholders spreading in three villages surrounded by a nucleus company.

A multistage sampling procedure was employed in this study. Firstly, an oil palm nucleus company covering 15,441 hectares in District of Merangin was selected as study area, because it represented several stages of oil palm growth. Secondly, three villages were selected based on the criteria distance from production sites to the location of the oil palm mill referring to near (10 km), medium (20 km) and far distance (50 km). Thirdly, households were sampled randomly with probability proportional to the number of oil palm growers in each of villages.

Interviews have been carried out by using a modularly structured questionnaire. The major modules are household characteristics, shocks, crops, livestock, natural extraction, off-farm, household expenditures and oil palm. In the section on oil palm, details of production and inputs were asked as well as participation in the contractual arrangement and the problems faced by smallholders during the past five years.

5.6. Result and discussion

5.6.1. Descriptive statistics

The characteristics of contract and non-contract smallholders are shown in Table 5.1. Sampled households are composed of four individuals on average, out of which at least seventy percent are potential workers (between 15 and 65 years). At least 86 percent of them are headed by migrants. This fact strongly relates to history of the communities and transmigration program (i.e. national program to resettle people from Java to less populated island with several incentives) which was widely promoted by government in the eighties.

Household heads of contract participants are six years older than those of non-participant on average. There is no significant difference in the highest attained education level of household head with six years schooling on an average in both groups. Contract smallholders can be distinguished clearly from non-contract smallholders in their endowments and total assets. Contract smallholders have almost sixty percent larger total land size, two times larger oil palm plot size, and two times higher total land value. However, there is no significant difference between contract and non-contract smallholders in their endowments of rubber plot size, other crop size, and livestock asset.

It is shown that on average contract smallholders earn four times higher net revenue from oil palm than non-contract smallholders. However, both groups do not differ significantly in terms of their net revenue from rubber, other crops, livestock, and off-farm activities.

Table 5.1. Comparison of means of household characteristics between contract and non-contract smallholders

	Non-contract	Contract	T stat
Household characteristics			
Household size (no. of person)	4.20	4.33	-0.70
Age of household head (years)	45.75	52.10	-4.04***
Proportion of potential labor (15-65 y)	0.70	0.74	-1.28
Migrant dummy (1: migrant 0:indigenous/ local)	0.85	0.87	-0.36
Allocated land by government (1: received ; 0: not received)	0.24	0.55	-5.08***
Asset holding			
Total land size (hectare)	2.88	4.59	-4.70***
Oil palm area (hectare)	1.58	3.51	-9.01***
Rubber area (hectare)	0.71	0.65	0.25
Other crops area (hectare)	0.07	0.08	-0.27
Total land value (IDR)[1])	165,916.00	355,798.00	-8.99***
Livestock asset value (IDR)	2,704.00	2,999.00	-0.24
Total asset value (IDR 000)	229,359.00	477,129.00	-9.60***
Age of oil palm (years)	7.36	16.84	-18.94***
Income (per household)			
Net income of on farm (IDR)	17,753.00	50,469.00	-6.19***
Net revenue of oil palm (IDR)	9,475.00	41,002.00	-6.60***
Net revenue of rubber (IDR)	7,165.00	9,178.00	-0.727
Net revenue of other crops (IDR)	54.00	91.00	-0.22
Net revenue of livestock (IDR)	187.00	139.00	0.29
Net revenue of natural extraction (IDR)	893.00	59.00	1.72*
Net income of off-farm (IDR)	13,330.00	12,102.00	0.53
Total net income (IDR)	31,411.00	62,671.00	-4.83
Source off-farm income (1: have 0: no have)	0.78	0.57	3.58***

Note: * $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$; 1) Indonesian Rupees (IDR) are given in units of thousand
Source: own calculation

Descriptive statistics of several performance indicators related to oil palm cultivation and production are presented in Table 5.2. It shows, for example, that contract smallholders use of input per hectare is almost double that of non-contract smallholder. However, they also obtain a higher price of IDR 106/ kg on average, which contributes to twenty percent higher net revenue from oil palm per hectare than the non-contract smallholders. The results also show that contract smallholders appear to be more dependent on oil palm with 70 percent of their income from this activity.

It is important to note that the contractual arrangements require smallholders to apply the technology of the company only in the plasma plot. However, in the survey we found that almost half of the contract smallholders also have non-plasma plots. In the survey we asked farmers about yields in both types of plots. In order to assess the yield effect of contract farming, we thus made two comparisons: (i) the difference in yield between plasma plot and non-plasma plot owned by the contract smallholders and (ii) the difference in yield on non-plasma plot owned by the contract smallholder and those owned by the non-contract smallholders.

Table 5.2. Performance indicators on oil palm cultivation and production

Variables	Contract smallholder			Non-contract smallholder			T stat
	Obs	Mean	SD	Obs	Mean	SD	
Input per ha (IDR 000/ ha)	126	3300	2124	119	1618	2219.71	6.05***
Yield of plasma plot (tonnes/ ha)	126	15.27	4.59	-	-	-	6.19***a
Yield of non-plasma plot (tonnes/ ha)	52	13.31	6.03	99	13.45	6.04	-0.14
Received Price (IDR)	126	1087	197.96	99	981	164.99	4.30***
Yield of net oil palm revenue (IDR 000/ ha)	126	11649	7242.37	99	9508	8010.88	2.15**
Share oil palm to total net income	126	0.71	0.28	119	0.30	0.41	9,32***

a)Comparison between yield of plasma plot owned by contract smallholders and yield of non-plasma plot owned by non-contract smallholders, * $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$

Source: own calculation

The results suggest that contract smallholders tend to achieve higher oil palm yields especially in their plasma plots. Comparing plasma and non-plasma plots, we find that oil

palm yield of plasma plots is significantly higher than that of non-plasma plots owned by the same smallholder. Similarly, on average, the yield of plasma plots owned by contract smallholders is 2 tons per hectare higher than the yield of non-plasma plots owned by non-contract smallholders. Comparing the yield of non-plasma plots owned by contract smallholders with those of non-contract smallholders there is no significant difference. This suggests that there is no measurable spillover effect on non-plasma plots. One of the possible reasons is the use of unguaranteed seeds in non-plasma plots due to the higher price and the scarcity of guaranteed seeds in open market.

5.6.2. Participation model

By using a probit model, the probability of participation in the contract scheme is estimated. The results reveal that only five variables affect participation significantly (see Table 5.3). Age of household head (AGE) has a significant and positive impact on participation. This fits our hypothesis that an older household head may be more risk averse to grow oil palm independently and therefore tends to join the contract as a safer investment option.

Further, the coefficient for migrant dummy (MIGRANT) is significantly negative. It means that a migrant is less likely to participate in the contract than an indigenous smallholder. Indigenous households have a long tradition in growing especially rubber. Hence, they may be more reluctant to adopt oil palm without incentives which can come from contract farming.

The results reveal that smallholders with larger oil palm plots are more likely to participate in the contract. This is plausible because the resulting scale effects reduce the costs of the contractual arrangement. Meanwhile, size of rubber area, size of other crop area and the engagement in off-farm activities are not significant determinants of participation.

Table 5.3. The probit model of contract participation

Variable	Var. Code	Coef.
Age of household head	AGE	0.03**
Household size	HSIZE	0.07
Proportion of potential labor 15-65 y	PPL	0.68
Education of household head	EDU	0.01
Allocated land from the government	ALAND	-0.29
Length of stay in the village	STAY	-0.01
Migrant dummy	MIGRANT	-1.11**
Size of all palm plots	PALM	0.29***
Size of rubber plots	RUB	-0.03
Size of other crops plots	OCROP	-0.01
Source of off-farm income	OFFF	-0.33
Period of planted year 1989-1994	PLANTY1	3.26***
Period of planted year 1995-2000	PLANTY2	1.63***
Constant		-3.44
Number of observations	245	
Prob> chi^2	0.00	
Pseudo R^2	0.64	

* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$
Source: own calculation

Finally, the results show that planting periods significantly affect participation. A smallholder that planted oil palm in the period of 1989 to 1994 or 1995 to 2000 is much more likely to join the contract than a smallholder who planted after 2000, i.e. the participation likelihood in the first period is higher than that in the second period. This suggests that the match in time between planting period and the contract offered by the company is a significant determinant of participation. This also indicates that the time for joining the contract is driven more by the company's plan than the smallholders' initiative.

Other variables such as education of household head, household size, proportion of potential labor, and allocated land are not significant determinants of participation.

5.6.3. Income model

In the income model, we use natural log of net household income as a dependent variable. For better comparison, both the OLS model and the treatment effects model are presented in Table 5.4. The results from both models show that contract farming has a positive impact on household income but there is a considerable difference in the level of significance and the magnitude of the estimated effects. The effect estimated by OLS is significant at the 5% level, while the effect estimated by the treatment effects model is significant at the 10% level (see column 3 and 4 in Table 5.4). Because the treatment effects model can control for selection bias, its results may be more reliable.

The results reveal that the coefficient of participation in the treatment effects model is almost double than the coefficient in OLS. Since the parameter *rho* in the treatment effects model differs from zero and has a negative sign a hidden bias may exist and can affect income and participation in the opposite direction. The OLS model cannot account for hidden bias which can lead to an underestimation of the magnitude of the coefficient. Both models suggest that household income is positively and significantly affected by growing rubber and engaging in off-farm activities. Adding one hectare of rubber will increase household income by 7 percent and engaging in off-farm activities results in a 35 percent increase. In comparison an additional area unit of oil palm contributes to a 17 percent increase in household income, while the duration of staying in the village, which can be seen as a proxy for social capital raises income by one percent for every additional year of staying in the village.

We also find that household size and age positively (although at decreasing rate of increase) affects household income. There is no significant effect generated by education of household head, proportion of potential labor in the household and whether a household received allocated land or not from the government. The results show that while household income can be increased by contract participation other factors are more important. Therefore, the equity effects of participation in the contract among different groups of smallholders are further analyzed.

Table 5.4. Treatment effect model and OLS model

Variable code	Treatment effects model		OLS	Treatment effect model including a poverty dummy		Treatment effect model for Poor Group		Treatment effect model for Non-poor group	
	1st stage Participation	2nd stage Income	Income	1st stage Participation	2nd stage Income	1st stage Participation	2nd stage Income	1st stage participation	2nd stage Income
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
AGE	0.03**	0.04**	0.04**	0.03**	0.04**	0.04	0.04	0.04**	0.02
AGE^2		-0.00**	-0.00**		-0.00**		-0.00		-0.00
HSIZE	0.07	0.07***	0.07***	0.11	0.09***	-0.11	0.07	0.33**	0.09***
PPL	0.68	-0.16	-0.14	0.66	-0.16	-1.40	-0.23	1.07	-0.18
EDU	0.01	-0.01	-0.01	-0.00	-0.02	-0.03	-0.04*	-0.03	-0.01
ALAND	-0.29	-0.05	-0.06	-0.28	-0.03	-0.69	-0.21	-0.32	0.03
STAY	-0.01	0.01**	0.01**	-0.01	0.01**	0.02	0.012*	-0.02	0.01*
MIGRANT	-1.11**			-1.23**		0.63		-1.73**	
PALM	0.29***	0.16***	0.16***	0.27***	0.14***	0.82**	0.29***	0.23**	0.14***
RUB	-0.03	0.07***	0.07***	-0.03	0.07***	0.10	0.11**	-0.14	0.05*
OCROP	-0.01	0.07	0.07	-0.04	0.05	1.87	-1.08**	-0.07	0.10
OPAGE		0.02	0.02	0.02	0.02		0.03		-0.00
$OPAGE^2$		-0.00	-0.00	-0.00	-0.00		0.00		-0.00
OFFF	-0.33	0.31***	0.31***	-0.29	0.33***	0.37	0.28	-0.34	0.36***
PLANTY1	3.26***			3.27***		3.51***		3.50***	
PLANTY2	1.63***			1.68***		1.41		1.98***	
PARTICIP		0.47*	0.28**		0.50**		-0.86*		0.63**
POOR				-0.42	-0.28***				
POOR*PARTICIP					-0.01				
Constant	-3.44***	8.19***	8.10***	-3.22***	8.33***	-5.03**	8.05	-4.15**	8.74***
Lambda		-0.12			-0.15		0.63**		-0.19
Rho		-0.22			-0.28		1.00		-0.36
No of observation	245	245	245	245		88	88	157	157
Adj R^2			0.45						
Prob > F			0.00						
Prob > Chi^2		0.00					0.00		0.00

* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$

Source: own calculation

5.6.4. Incorporating poverty

By using the 2 $ (PPP) poverty line, we find that 11.8 % of sampled households are categorized as poor. This ratio is below the poverty head count ratio in Indonesia that is 50.6% in 2009 (http://data.worldbank.org/indicator/SI.POV.2DAY).

By introducing a dummy variable for poverty (expressed in terms of consumption poverty) in the first stage of the treatment effects model (see column 5 in Table 5.4), we find that poor smallholders are not significantly discriminated from the contractual arrangements. This is not surprising because to join the contract is not difficult and initially do not require high administrative costs. While all necessary investments are pre-financed by the company this puts a high debt burden on the smallholder. On the other hand households with less land are discriminated to participate in the contractual arrangement as indicated by the significantly positive coefficients of oil palm area in all participation models. This is plausible because participation in contract requires a smallholder to have at least 2 hectares land for oil palm plantation establishment.

In the treatment effects model we can show that overall contract participation has a positive income effect, while being poor has a negative effect. We also included an interaction term between poor and participation which was negative but not significant (see column 6 in Table 5.4).Therefore to further explore this effect we run two separate models for the poor and the non-poor. The results reveal that there are different effects of participation for different groups of smallholders (see column 8 and 10 in Table 5.4). The treatment effects model shows that the effect of participation on household income is significantly positive for non-poor households but negative for poor households. This indicates that contract farming may benefit the better-off smallholders who can meet the requirements of contract farming.

5.7. Conclusions and recommendations

In summarizing the results of this study, we return to the four specific objectives formulated in section 1. First, we find differences in the socio economic characteristics between contract and non-contract smallholders. Household income, total land size and total asset of contract smallholders are almost double than those of non-contract smallholders. We also find that the contract smallholders apply higher inputs and consequently have higher yields. Second, our probit analysis reveals that contract participation is significantly associated with the age of household head, indigenous, size of oil palm plot, and particular planting period. The contractual arrangement is more likely to be adopted by an indigenous household than by a migrant who may be a better entrepreneur. Considering production scale, a smallholder with a larger oil palm plot is more likely to join the contract. Also, a smallholder who planted oil palm between 1989 and 1994 is more likely to participate in the contract than a smallholder who planted after this period. In the early period the company was more pro-active in order to meet the Government of Indonesia requirements for plantation establishment.

Third, we can say that overall, contract farming in the Indonesian oil palm industry has positive effects for smallholders in terms of their household income. However, there are also other important factors that influence income such as the household's engagement in off-farm activities, the size of oil palm and rubber area, and social capital. This suggests that the benefits from contractual arrangements vary considerably depending on household type.

Fourth, whether or not contract farming also benefits the poor has been investigated by incorporating poverty into the model. The results show that although we found no evidence that poor smallholders are discriminated from participating in the contract, in one of the models the effect of participation on household income was negative. Running separate models for poor and non-poor households shows that that only for the latter group a significantly positive income effect can be shown. One reason for a negative poverty effect could be that while the costs for joining the contract may be attractive, loan conditions and management requirements may often be beyond the financial and technical capacity of the poor.

Our results therefore convey a message for policy makers and agro industry companies, which is to review the contractual schemes. Survey results show that the higher price of input, particularly fertilizer, has become one of the main problems in the past five years. Providing subsidized inputs after the gestation period for poor smallholders should be considered. The high rate of loan repayment imposed by the company with strict enforcement by directly deducting the payments from oil palm sales ignores the vulnerabilities of the poor.

The fact that no spill-over effect from plasma to non-plasma plots was found is linked to the credit scheme provided by the company. Credits are limited to the period of plantation establishment but smallholders are bound by the contract to follow high standard production technologies with high levels of inputs. Hence, smallholders may be forced to pay more attention on their plasma plots while neglecting their non-plasma plots. It is proposed that the government should assess the adequacy of the existing support scheme in order to increase the impact of contract farming on smallholders.

Finally, although contractual arrangements may benefit smallholders this can also make them to become more vulnerable to external shocks due to increasing dependence on oil palm. Our survey shows that around 70 percent of their total household income is received from oil palm. This question is subject to further analysis.

CHAPTER 6

CONTRACT FARMING AND VULNERABILITY TO POVERTY AMONG OIL PALM SMALLHOLDERS IN INDONESIA [1]

While the previous chapter has raised the question of shocks and vulnerability of oil palm smallholders, this chapter addresses that question and further investigates the effectiveness of contract farming in reducing vulnerability to poverty.

6.1. Introduction

With the rise in global demand for palm oil the area planted to oil palm in Indonesia has grown from just about a quarter of million ha in 1980 to almost 8 million ha in 2010 (MoA, 2011). This expansion has been associated with deforestation which has raised concern over its impact on forest dependent communities (Sheil *et al.* 2006; Belcher *et al.* 2004). These communities are at risk of losing their main source of livelihood which is food and other non-food products from natural resources. In order to make them to benefit from oil palm development the Government of Indonesia (GoI) has promoted contract farming schemes between smallholders and oil palm agri-business companies as a part of poverty reduction policies. According to Ministry of Agriculture statistics in 2009 about 42 percent of oil palm plantations were owned by smallholders (MoA 2011).

There are pros and cons of oil palm development and area expansion. On the one hand, Feintrenie *et al.* (2010) showed that oil palm generated higher returns to land and labor than other crops such as rubber or rice. Hardter *et al.* (1997) suggested that oil palm increased net income of smallholders to be seven times that of their neighbors who rely on subsistence production of food crops. In addition, the significant contribution of oil palm to economic growth, household welfare and poverty alleviation was pointed out by some studies such as Barlow *et al.* (2003), Zen *et al.* (2005), the World Bank (2011),

[1] This chapter is based on the paper of: Cahyadi, E.R. and Waibel, H. 2012. Contract farming and vulnerability to poverty among oil palm smallholders in Indonesia. The paper has been invited to be resubmitted to Journal of Development Studies. It has been presented at Tropentag, 19-21 September 2012 in Gottingen, Germany.

and World Growth (2011). Susila (2004) in a study in Sumatra revealed that the poverty headcount in oil palm communities was less than 10 percent. The World Bank (2011) showed that a 1 percent increase in oil palm production area can contribute to a reduction of between 0.15 to 0.25 percentage points of the head count ratio.

On the other hand, oil palm producing households are vulnerable. Their income is exposed to the volatility of oil palm markets and environmental shocks. For instance, the fall of palm oil price in the global market in 2008 from US$ 1146 to US$ 433 per metric ton as reported by Index Mundi (2010) has severely hit oil palm households. As a monoculture cropping system oil palm is also susceptible to various pest and disease outbreaks. The high dependency of households on oil palm with more than 63 percent share in household income (Susila 2004) could exacerbate the impact of those shocks. In addition, oil palm smallholders are also exposed to other shocks, such as health and other economic shocks.

Considering the risks faced by smallholders call for a forward-looking dynamic poverty concept since static poverty assessments can be misleading in the presence of shocks and risks. Hence this paper contributes to the existing literature on the well-being of oil palm smallholders by applying an asset based vulnerability to poverty concept.

Although contract farming has been widely used by farmers as a risk management measure (Hennessey and Lawrence 1999; Minot 1986), the effectiveness of this option in reducing particular risks and future poverty in the oil palm communities is still little known. Hence this paper aims to contribute to a better understanding on the effects of contract farming on the risk to fall into poverty. The paper shows that there is a need to make contract farming arrangements in oil palm production to become more pro-poor.

The paper has four specific objectives:

(1) To assess the role of different types of shocks for oil palm smallholders.
(2) To examine the role of contract participation on the likelihood of a household experiencing particular shocks.
(3) To estimate smallholders' asset-based vulnerability to poverty.
(4) To assess the impact of contractual arrangements on smallholders' vulnerability to poverty.

The paper is organized as follows. The next section provides a literature review of contract farming in developing countries and looks at some studies in Indonesia. In section three the asset-based vulnerability concept is introduced as our conceptual framework. The fourth section outlines the methodology applied to address our four objectives. This is followed by a description of the study area and the data collection procedure. Section six presents the results and the final section concludes the paper together with some policy recommendations.

6.2. Contract farming and smallholder producers

The literature on contract farming as a component of poverty reduction strategies and sustainable development in developing countries has produced mixed results (Setboonsarng 2008; da Silva 2005; Eaton and Shepherd 2001; Baumann 2000). On the one hand contract farming was shown to increase income of small farmers (Miyata *et al.*, 2009; Warning and Key 2002), and generate higher profits (Cai *et al.* 2008), to reduce income volatility (Bellemare 2010), and yielding high returns to capital (Simmons *et al.* 2005) as well as positive labor market effects (Winters *et al.* 2008).

On the other hand several authors in earlier studies found that it can lead to unfair benefit sharing (Glover and Kusterer 1990; Warning and Key 2002). Glover (1984) observed that companies prefer to work with the larger and more advanced farmers. It was also found that contract farming can cause increased concentration of land ownership, social differentiation and dominance in decision making of the companies over small scale farmers (Echanove and Stefen 2005). Overall, Key and Runsten (1999) submitted that whether or not contract farming has a positive effect on rural development strongly depends on the types of farmers involved in the contractual arrangements.

The contrasting results on the merits of contract farming in the literature in general are mirrored in recent studies on oil palm in Indonesia. For example, Sheil *et al.* (2009) found that contractual arrangements can provide income security to smallholders and Zen (2005) showed that oil palm companies have provided social services (e.g. in health and education) for local communities surrounding the plantation. However, Rist *et al.* (2010) pointed to the lack of clarity in land tenure, unfavorable contractual schemes, and lack of contractual compliance by the oil palm companies. Maryadi *et al.* (2007) in a study of South Sumatra found that there was a lack of transparency in the

methodology for determining oil palm price believed to be in favor of the companies. Therefore the question to what extent existing contractual arrangements in the Indonesian oil palm industry are pro-poor seems to be highly relevant.

In order to formulate a testable hypothesis, in Table 6.1 we outline briefly the core elements of the contract scheme between the oil palm company and the smallholder farmers in our study area.

Table 6.1. Responsibilities of oil palm company and smallholders under contractual arrangements

Company	Smallholders
1) Establish smallholder oil palm plot on credit basis 2) Provide production inputs on credit basis during gestation period 3) Provide technical assistance free of charge 4) Buy fresh fruits output from oil palm plot established by the company at a premium price for a defined level of quality. The price is oriented at provincial price committee's recommendation	1) Sell output from established oil palm plot to the company during entire life span of the plantation 2) Follow technical production standards according to company specification 3) Repay the credit to company in kind, i.e. through fresh fruit produce based on harvesting periods

Source: own compilation based on personal communication with company manager, farmer leaders and cooperative.

There is no written format of the contractual arrangement specifying the responsibilities of both parties. Only the credit contract is in a written document. It specifies the amount of the loan and the repayment scheme. It is specified that loan repayment is in kind that is through oil palm produce from the plots established by the company at a price determined by the company. The fresh fruit price which the company decides is derived upon recommendation from a provincial price committee although this procedure is not specified in the credit contract. The provincial committee takes into consideration the world market price for palm oil, the conversion ratio of fresh fruit into palm oil depending on plantation age, transportation costs, processing costs, and the company's overhead costs. The contract is subject to a number of potential fallacies, namely that the price determination mechanisms is difficult to understand for the smallholders and

furthermore since the credit is paid in kind the amount of interest paid and the remaining debt is unknown to the smallholder. Another problem for smallholders is that the quality grading which determines the price premium is performed by the company. On the other hand the company faces difficulties to make the smallholders implement prescribed production technologies and determine the output of the oil palm plot.

The summary of past experiences with contract farming from the literature suggests that in theory contract faming could reduce the financial and technical risk of smallholder farmers. On the other hand the discussion of contractual arrangements in oil palm in Indonesia has shown that there are also potential risks especially for the less endowed farmers. Therefore the vulnerability measures used in this paper can provide further insights on the impact of contract farming schemes in the Indonesian oil palm industry.

In the next section the vulnerability to poverty framework as applied to the case of contract farming in the oil palm industry in Indonesia is introduced.

6.3. Conceptual framework

In this section, we explain the asset based vulnerability concept, which together with the literature review on contract farming in the previous section can provide the basis for establishing the hypothesis of this study.

Past poverty studies mostly took a static perspective and have ignored the role of shocks and risks which are core to the concept of vulnerability to poverty (UN 2005; the World Bank 2006; Balisacan *et al.* 2002). While there has been a growing theoretical literature on vulnerability measurement (Chaudhuri *et al.* 2002; Chaudhuri 2003; Hoddinott and Quisumbing 2003; Calvo and Dercon 2005; Christiansen and Subbarrao 2005; Ligon and Schechter 2003; Günther and Harttgen 2009; Povel 2011; Chiwaula *et al.* 2011). However, empirical application is still sparse. In this study, we draw on a survey among oil palm producers in Sumatra, Indonesia that has been designed to measure the factors which are expected to affect vulnerability to poverty.

Although we have only cross-section data, following Chaudhuri *et al.* (2002) and Christiansen and Subbarrao (2005) we can estimate consumption variability over time assuming that it mirrors consumption variability across households. We use the vulnerability as expected poverty (VEP) concept that was defined as probability of a

household to fall below poverty line in the near future, regardless of whether it is currently poor or not (Chaudhuri *et al.*, 2002). Formally, vulnerability can be stated as:

$$V_{ht} = \Pr\left(C_{h,t+1} \leq z\right) \quad (1)$$

where $C_{h,t+1}$ is the household's welfare at time t + 1 and z is the poverty line threshold. Vulnerability could be affected by the presence of shocks that can cause income or consumption shortfall. In order to smooth its consumption a household may apply a set of coping strategies. In the presence of particular covariate shocks such as a drop in product prices or yield loss due to pest or other natural factors, income shortfall could be exacerbated by the high share of oil palm in household income.

In this paper we use the asset-based vulnerability approach as introduced by Chiwaula *et al.* (2011) who first applied this idea to fisheries communities in Africa. To introduce the asset based vulnerability concept to the problem at hand we establish a functional relationship between smallholder household consumption and total household assets taking into account risk. Hence, expected consumption $\hat{E}(C_h)$ and its standard deviation $\sqrt{\hat{V}(C_h)}$ of a household *h* are related to household assets (A) and other control variables. In the presence of risks, the consumption will stochastically vary with a range between $\hat{E}(C) - \sqrt{\hat{V}(C)}$ and $\hat{E}(C) + \sqrt{\hat{V}(C)}$.

Defining both consumption (z) and an asset poverty line (A_T) allows establishing a typology of expected poverty as summarized in Table 6.2. The asset poverty line (A_T) defines the total amount of assets necessary for a household to reach a consumption level above z under normal conditions, i.e. $\hat{E}(C_h)$ is equal to z. In case of a positive shock the minimum asset level is A_{T0}. Below that level of asset a household would be called chronically poor because even favourable conditions are insufficient for the household to escape poverty. In case of a negative shock the minimum level of asset must go up to A_{T1}. Above A_{T1} a household could be defined as "never poor" where even in the case of negative shocks he is still able to keep consumption not fall below poverty line. The variation in the asset poverty line then allows distinguishing between two types of transient poverty, namely structural and stochastic. The former is a situation, where based on household assets ($A_{T0}<A<A_T$) the household cannot surpass the poverty line unless a positive shock occurs. The latter refers to a situation where a household has sufficient asset ($A_T<A<A_{T1}$) but a negative shock can cause consumption to fall below z.

Table 6.2. Typology of dynamic poverty

Expected Consumption	Household assets (A)			
	$A \leq A_{T0}$	$A_{T0} < A \leq A_T$	$A_T < A < A_{TI}$	$A > A_{TI}$
$\hat{E}(C_h) < z$	Structural chronic poor	Structural transient poor		
$\hat{E}(C_h) > z$			Stochastic transient poor	Never poor

Source: based on Chiwaula *et al.* (2011)

Based on asset based vulnerability concept the allocation of a smallholder to a certain type of poverty is expected to be driven by the presence of risks and the household's asset endowment. The former affects how strong the income fluctuates and influences the variation of consumption while the later affects the coping ability to keep consumption levels constant. In our case households are highly exposed to covariate risks which directly or indirectly relate to oil palm. Some particular risks could be reduced while some could be increased by contract farming since the contract allocates the distribution of risks between the company and its smallholders.

Hence, in the light of the discussion above, the central hypothesis of this paper is that "contract farming has the potential to reduce particular risks; while the effectiveness of such arrangements for reducing vulnerability to poverty will depend on other factors too namely the asset endowment of households."

6.4. Methodology

In order to investigate the research objectives stated the analysis is carried out in four steps. *First,* relevant descriptive statistics that show the dependency of households on oil palm production, the incidences of oil palm shocks, and the magnitude of the impact of each shock are presented.

Second, we examine the factors that influence the probability of a household to experience a shock. We classify shocks into four categories, namely price shock, production shock, other economic shocks, and health and demographic shock. The former two directly relates to oil palm and is called "oil palm shocks" while the latter two does not and is called "non-oil palm shocks". Contract participation is expected to have an impact on the experience of those shocks as previously explained in section 2.

We define S_{hi} as probability of a smallholder *h* self-reporting a shock *i* that was experienced during the past five years. Such probability could be estimated by using a probit model in equation (2) where S_{hi} is the dependent variable with the value of one if an oil palm smallholder experienced a shock during the past five years and zero, otherwise. Shock experience S_{hi} is expected to be affected by household and farm characteristics X_h, contract participation P_h and error term μ_h.

However, estimating the effect of participation in contract farming on the likelihood of shock experience by using such a model could be misleading since such likelihood and participation decision could be interrelated. It is noted that contract participation P_h is not randomly assigned but determined by a set of driving forces as shown in equation (3).

$$S_{hi}^{*} = \alpha X_h + \delta P_h + \mu_h \tag{2}$$

$$S_{hi} = 1 \; if \; S_{hi}^{*} > 0, \; otherwise \;\; 0$$

$$P_h^{*} = \beta X_h + \varepsilon_h \tag{3}$$

$$P_h = 1 \; if \; P_h^{*} > 0, \; otherwise \; 0$$

Participation in contract farming is formulated as a zero-one variable which depends on a broad set of observable covariates including household and farm characteristics X_h as well as unobservable ε_h. If error terms (ε_h and μ_h) in both equations are correlated, using a separate probit model leads to biased estimates (Arendt and Holm 2006). In order to test and control for such endogeneity, bivariate probit models are applied using predicted participation as variable in the second equation by assuming a jointly bivariate normal error distribution (Freedman and Sekhon 2010).

For covariates of the shock experience model, age of household head is included to capture the notion that the fear of a shock may grow with age and therefore older people may tend to report a shock. In order to capture demographic structure of household we include education of household head defined as schooling years, household size and labor capacity defined as proportion of the number of household members aged between 15 and 65 years old to the total number of household members. Since our sample consists of migrant and indigenous people while the origin of smallholders may

influence self-reported shock, a dummy of migrant is included where we give value of 1 for a migrant, and zero, otherwise. The length of time (in years) a household has stayed in the area is included as a proxy of potential ability for adapting and dealing with environment and shocks in such area. We also include land size for oil palm, rubber and other crops in order to capture the scale effect of each type of crop. Oil palm age is included as a technical parameter that theoretically determines the nature of oil palm production cycle (Ismail and Mamat 2002). We expect that oil palm age is positively associated with the likelihood of experiencing oil palm shocks. Engagement in livestock, natural resources extraction (logging, fishing and hunting), wage employment and non-farm business are included because such activities expose a smallholder to particular risks. Finally, a dummy for contract participation P_h is included to capture the effect of contract farming. As theoretically argued by Bauman (2000), we expect that contract participation reduces the probability of experiencing a shock, particularly for oil palm shocks.

In the contract participation model (equation 3), covariates used are similar to those in the shock experience model (equation 2). However we add two dummy variables that capture whether a household planted oil palm during an earlier (1989 – 1994) or later (1995 – 2000) period. In these two periods the frame conditions under which contract farming was introduced differed. These variables are expected to affect participation but can be assumed to be independent of shock occurrence.

Third, vulnerability of smallholders to poverty is estimated by applying the asset based approach as described in section two. In this paper we use per capita consumption as a measure of household welfare and the $ 2 international poverty line (PPP) as a threshold. We also check sensitivity of the results to other poverty thresholds (the $ 1.25 PPP and national poverty line). The vulnerability to consumption poverty of a household is then formalized as follows:

$$V_h = \Pr(C_h \le z) = \begin{cases} 0 & if \left[\hat{E}(C) - \sqrt{\hat{V}(C)}\right] \ge z \\ \dfrac{z - \left[\hat{E}(C_h) - \sqrt{\hat{V}(C_h)}\right]}{2\sqrt{\hat{V}(C)}} & if \left[\hat{E}(C_h) - \sqrt{\hat{V}(C_h)}\right] < z < \left[\hat{E}(C_h) + \sqrt{\hat{V}(C_h)}\right] \\ 1 & if \left[\hat{E}(C_h) + \sqrt{\hat{V}(C_h)}\right] \le z \end{cases} \quad (4)$$

In equation (4) we define vulnerability V_h as the probability of a household's expected consumption will fall below the poverty line $\Pr(C_h \le z)$. Hence, the range of vulnerability estimates is defined from zero to one. The vulnerability of chronically poor households is one since their consumption level can be expected to be always below the poverty line even in the best case $\left[\hat{E}(C_h) + \sqrt{\hat{V}(C_h)}\right]$. Conversely, vulnerability is zero for households whose consumption levels are not expected to fall below the poverty line even in case of shocks $\left[\hat{E}(C_h) - \sqrt{\hat{V}(C_h)}\right]$ based on the variance assumption applied. Vulnerability between greater than zero and less than one is corresponding with transient poverty. Vulnerability for transient poor households is calculated by dividing the difference between the poverty line (z) and the minimum level of consumption for a given asset with the range in consumption corresponding to two times the standard deviation $2\sqrt{\hat{V}(C)}$ of the expected consumption $\hat{E}(C)$.

We specify per capita household consumption as a function of asset and other household characteristics following a stochastic process as below:

$$\ln C_h = \gamma X_h + \eta_h \quad (5)$$

Where $\ln C_h$ is log per capita consumption, X_h is a set of household and farm characteristics including assets endowment and η_h is a mean-zero disturbance term that capture shocks contributing to difference in per capita consumption. Following Chaudhuri *et al.* (2002), we estimate expected consumption and variance of consumption by using the three steps feasible generalized least squares (FGLS) procedure.

In this model, we include the value of assets differentiated by income generating activities as well as non-productive assets. Following Chiwaula *et al.* (2011) for the former we include agricultural land size, and the value of livestock, natural resources extraction equipment, and asset for non-farm business. Considering the importance of oil palm and rubber, agricultural land is differentiated into areas for oil palm, rubber, and other crops. For non-productive assets we include the value of house and other major items like the electricity generator, etc. as these items are expected to affect household expenditures especially for electricity, fuel, and communication. Further technical specifications for oil palm have been included such as age of oil palm stands. In addition, we add a dummy variable for engagement in wage employment. For household characteristics, education of household head, age of household head, origin of household head (migrant or indigenous), household size and labor capacity are included to capture the human capital and demographic structure of households. We also include the length of time (in years) that a household stay in the area as a proxy of social capital variable that is expected to have positive effect (Grootaert 1999).

Fourth, the effect of contract farming on vulnerability to poverty was assessed. A propensity score matching (PSM) analysis was applied in order to deal with selection bias that potentially arise since participation is not randomly assigned (Caliendo and Kopeinig 2008). Propensity score is defined as the possibility of smallholder to participate in the contract conditional on covariate X. This is expressed as:

$$P(X) = \Pr(P = 1 \mid X) \tag{6}$$

The effect of participation is estimated as Average Treatment on the Treated (ATT) below:

$$T_{ATT} = E_{P(X)|P=1}\{E[Y(1) \mid P = 1, P(X)] - E[Y(0) \mid P = 0, P(X)]\} \tag{7}$$

Where $E[Y(1) \mid P = 1, P(X)]$ is the expected outcome of contract smallholders which participate conditional on covariate X while $E[Y(0) \mid P = 0, P(X)]$ is the expected outcome of equivalent non-contract smallholders which are assumed as the expected outcome of contract smallholders if they had not taken part in the contract. The PSM estimator is simply the mean difference in outcome over the common support, appropriately weighted by the propensity score distribution of participants.

The propensity score was computed by a probit model with the same covariates as those discussed for equation (3). In this study we explore the use of three matching algorithms, namely nearest neighbor, caliper and kernel matching. The common support condition was imposed in order to ensure that any combination of characteristics observed in the participant group can also be observed in the control group. We also performed a balancing test to check whether the matching procedure is able to balance the distribution of characteristics in both participant and control group which allows us to choose the most appropriate matching method.

6.5. Study area and data

Our study took place in the district of Merangin, province of Jambi, Indonesia. Our study was located in the area of a large-scale private corporation engaged in planting and processing oil palm covering some 15 thousands hectares plantation in total and involving more than 6800 smallholders under contractual arrangements. We are interested to take this area as a case study since the total oil palm area owned by smallholders is almost twice larger than that owned by the company. This indicates some degree of dependency of the company on smallholders in securing supply of oil palm fruit. The location was selected since it represents different stages of plantation development and captures different origins of smallholders including migrants and indigenous people.

Oil palm contract farming was first introduced in the study area in 1989 under a scheme promoted by the government which was called NES-TRANS (nucleus estate smallholders integrated with transmigration program). This scheme offered credit for oil palm plantation establishment with subsidized interest rate to households that had migrated to this area under the national transmigration program. Migrants from Java that came to the study area before oil palm development relied on rice and other food crops. The failure of the transmigration project due to poor infrastructure, lack of input, difficulties in marketing agricultural products, and inappropriate farming systems (Susila 1991) prompted the government to modify the program by enforcing contract farming for high value crops such as oil palm and involving private sector.

Among the eleven villages surrounding the plantation area we selected three villages based on the following criteria: (1) distance to the oil palm mill (10 km, 20 km, and 50 km from the mill), (2) origin of village population (indigenous and migrants), and (3)

willingness of village heads to cooperate. A household survey was carried out in January and February 2010. The sample size is 245 households consisting of 126 contract smallholders and 119 non-contract smallholders. Households were randomly selected from the list of oil palm smallholders provided by the respective village heads. The survey instrument consists of several modules, namely household characteristics; income generating activities, including crop and livestock production, natural resource extraction, off farm employment and non-farm self-employment. To be able to calculate vulnerability levels of the smallholder households, detailed accounts of consumption expenditures and household assets were included. Also a section of shocks experienced during the past five years which included the year when the event occurred, subjective assessment of the severity of shocks and their impact as well as corresponding coping actions, and expected risks during the next five years, were elaborated.

6.6. Results and Discussion

We first describe the economics of smallholder in the study area comparing between contract and non-contract farmers. In the second section we present the results of our models.

6.6.1. Descriptive statistics

In the following we present the composition of household income, the shocks experienced and the impact of each shock on income loss or extra expenditure. Figure 6.1 shows the share of income by source for oil palm contract and non-contract smallholders respectively. The results reveal that for contract smallholders, oil palm is the major income source with over 60 % of household income, followed by rubber (15 %), wage employment (10 %) and self-employment (9 %). For non-contract smallholders, off-farm wage employment has the highest share with 31 %, slightly higher than oil palm (30 %) followed by rubber (23 %) and non-farm business (11 %). The structure of income of the contract smallholders indicates some level of dependency on oil palm. On the other hand, since the economy in that area is dominated by oil palm, off-farm wage employment and self-employment are directly or indirectly dependent on oil palm; hence non-contract farmers also could be exposed to oil palm shocks. For example, wage labor that includes employment in the plantation and the mill was reported by sixty percent of non-contract smallholders. While non-farm business that

includes middleman and transportation services for oil palm fruit was reported by three percent of the non-contract smallholders.

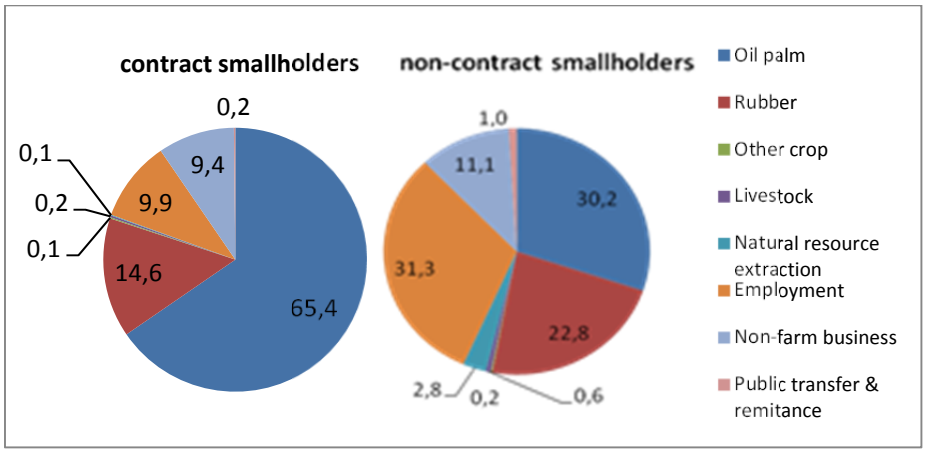

Figure 6.1. The structure of household incomes of contract and non-contract smallholders

Source: created from the oil palm household survey 2010 data

In Table 6.3 household characteristics are compared between contract and non–contract smallholders using t-test. We find significant differences for about half of the characteristics, most of them among household assets and for net income. Total asset, total land size, oil palm area, and non-productive assets of contract smallholders are almost double than those of non-contract smallholders. Likewise, non-farm business assets of contract smallholders are significantly higher and are almost four times larger than those of non-contract smallholders. No significant difference was found in other farming activities. The difference in assets owned indicates that coping capacity of non-contract smallholders might be lower.

Table 6.3. Comparison of means for the characteristics of contract and non-contract oil palm smallholders

Household characteristics	Contract	Non-contract	T stat
Household size	4.33	4.20	0.70
Age of household head (years)	52.10	45.75	4.04***
Education of household head	5.93	5.83	0.30
Number of working age household members	3.17	2.90	1.59
The length of staying in the area	24.94	23.38	1.03
Total land size (hectare)	4.59	2.88	4.70***
Oil palm area (hectare)	3.51	1.58	9.01***
Rubber area (hectare)	0.65	0.71	-0.25
Other crops area (hectare)	0.08	0.07	0.27
Livestock asset (IDR 000)	2999.00	2704.00	0.24
Asset for natural resources extraction (IDR 000)	104.00	40.00	1.74*
Non-farm business asset (IDR 000)	5610.00	1056.00	1.71*
Non-productive asset (IDR 000)	111,985.00	58,790.00	6.57***
Total asset value (IDR 000)	477,129.00	229,359.00	9.60***
Total net income (IDR 000)	62,671.00	31,411.00	4.83***

Note : * p≤ 0.1, ** p≤ 0.05, *** p≤ 0.01, IDR 000: thousands Indonesian Rupiah
Source : calculated from the oil palm household survey 2010 data.

In Table 6.4 we compare shock occurrence between contract and non-contract smallholders for different types of shocks, namely price and production shocks related to oil palm as well as health, demographic and economic shocks which are not related to oil palm production. Oil palm price shocks refer to a sudden and significant drop in oil palm prices. Such event was reported by almost all respondents to have taken place during the past five years. Production shocks are mainly the drop in oil palm yield that can occur before the onset of the rainy season but also refers to such events like the unavailability of fertilizer, pest outbreaks, theft and fire. For health and demographic shocks, we include illness of household members, accident, death of household head or household members and persons unexpectedly joining the household. For economic shocks, loss of job, collapse of non-farm business and livestock diseases are included. For oil palm related shocks we can see clear differences between the two groups. In both cases a higher percentage of contract households had experienced such shocks. For health and demographic shocks the results are opposite. More non-contract households were exposed to illness, largely attributable to a virus disease that especially occurred

among the poorer households who tend to spend less on sanitation. For other economic shocks the results are similar.

Table 6.4. Households reporting at least one shock during the past five years by shock type for contract and non-contract smallholders (in percent)

Types of shock	Contract smallholders	Non-contract smallholders	Total
Price shock	**95.2**	**73.9**	**86.9**
Production shock	**89.7**	**63.9**	**77.1**
Production drop in transition period	89.7	63.0	73.5
Strong pest attack	26.1	31.9	28.2
Fire in oil palm	2.3	1.7	2.0
Theft of oil palm fruit	16.7	9.2	13.9
Scarcity of fertilizer	46.8	47.1	46.9
Health and demographic shocks	**57.1**	**77.3**	**66.9**
Illness	46.0	67.2	56.3
Accident	8.3	16.0	10.6
Death of household head or member	3.2	4.0	3.3
Birth or person join with household	27.0	35.3	31
Other economic shocks	**26.2**	**26.9**	**26.5**
Job loss in off-farm and non-farm	2.4	1.7	2
Collapse of non-farm business	3.2	1.7	2.5
Livestock diseases	22.2	25.2	23.7

Source: calculated from the oil palm household survey 2010 data

In Table 6.5 (columns 3 to 6) we compare frequency, perceived severity, income loss and extra expenditure of shocks incurred by a household during the past five years across types of shocks and types of smallholders. No big difference can be observed in shock frequency and perceived severity. However average income loss differs between the two groups and among shock types. Drop in oil palm prices can affect contract farmers twice as much as non-contractors while for production shocks the ratio is almost 3:1. Although less pronounced, the direction of difference is the same for health and demographic as well as for other economic shocks. On the other hand contractors spend more money on coping actions to respond to the production shocks and the health and demographic shocks. Once again Table 6.5 underlines the dependency of contract smallholders on oil palm.

Table 6.5. Magnitude of shocks by type of shocks and by type of smallholders

Types of shock	Types of smallholder	Freq.	Perceived severity*	Average income loss (IDR 000)	Average extra expenditure (IDR 000)
(1)	(2)	(3)	(4)	(5)	(6)
Price shock	Contractor	1.2	3.0	10928.4	0
	Non-contractor	0.9	3.0	4009.5	0
Production shock	Contractor	2.2	2.7	10716.5	188.0
	Non-contractor	1.5	2.7	3838.5	84.2
Health and	Contractor	2.2	2.3	1152.5	3919.0
demographic shock	Non-contractor	2.3	2.3	491.1	2748.7
Other economic	Contractor	1.2	2.6	1772.7	42.9
shock	Non-contractor	1.2	2.5	1201.7	1409.4

* based on subjective assessment scale: 1 low, 2 medium, 3 high and 4 very high
Source: calculated from the oil palm household survey 2010 data

Based on the discussions above, we highlight the dependency of contract smallholders on oil palm that lead to more oil palm shocks reported. Conversely, non-contract smallholders that tend to have more diversified income portfolios and report more non-oil palm shocks.

6.6.2. Econometric Analysis

Likelihood of shock occurrence

While the descriptive statistics illustrate some observable differences between contract and non-contract smallholders we attempt to establish association by applying the models outlined in section 4. In this section, we examine whether contract participation is associated with the probability of shock occurrence.

We report results of both the univariate and bivariate probit model respectively for each type of shocks in Table 6.6 since we find that endogeneity exists for some but not for all the shock types. In the price shock model, we find significantly positive correlation between random disturbances of participation and self-reported price shock as shown by ρ, hence the probit model tends to underestimate the effect while the bivariate probit is able to correct for such bias (see column 2 and 3 in Table 6.6). The results show that participation significantly reduces probability of experiencing price shocks. This could

be an indication that the arrangement of price premium under the contract is helpful for smallholders, particularly when price in the spot market extremely falls. Experiencing price shocks is positively associated with household size, oil palm age and oil palm area as well as the attention given to the management of other business. Education however works in the opposite direction.

For production shocks, the probit model still could be used since we do not find significant coefficient of endogeneity in the bivariate probit model (see column 4 and 5 in Table 6.6). The results show that the effect of participation is not significant. This could be an indication that technical assistance by the company under a contractual arrangement is not always effective in reducing such likelihood. However production shocks are also influenced by natural conditions which are beyond the control of the farmers. The size of oil palm area and the oil palm age are positively associated with the likelihood of experiencing production shocks since both variables reflect capacity of oil palm production. We also find that a migrant is more likely to report production shock than an indigenous farmer.

For health and demographic shocks, since endogeneity is not significant, we still could use the probit model that produces similar results compared to the bivariate probit model (see column 6 and 7 in Table 6.6). Results show that contract participation is negatively associated with such shock. One possible reason is that participation may reduce the workload of household members in the oil palm plantation since the management of the household's oil palm plot was taken over by the company or the household has employed waged labor. As we expected, a smallholder that stayed longer in the study area is less likely to experience such shock because he might be more adaptive with the surrounding environment. The results also show that a migrant is less likely to experience such shock than an indigenous farmer. On the other hand, household size and natural resources extraction are positively significant increasing the likelihood of a health shock. Health problems[2] could be related to the location of natural resource extraction activities (swamps and creeks) where vector-borne human diseases are common.

In the model for other economic shocks, endogeneity is significant as indicated by ρ; hence, the bivariate probit model is better employed for controlling such endogeneity

[2] There was a "Chikungunya" epidemic virus outbreak in some villages surrounding the plantation in 2008. This virus is transmitted to human by mosquitoes.

while the univariate probit model produces biased estimates (see column 8 and 9 in Table 6.6). The results underline the significant effect of participation in reducing the likelihood of experiencing such shock. The notion that contractual arrangement is an insurance mechanism in the oil palm industry may encourage a smallholder to allocate more resources on oil palm and just spend little rest on other engaged economic activities. Hence, a bad event on such activities is less likely to be reported as a shock by a contract smallholder. The results show that "livestock" is significantly positive since such shocks are more likely to occur more among households whose income portfolios diversified into other income generating activities. Results presented in Table 6.4 underline this finding as the vast majority of such shocks are livestock diseases. As we expected, age of household head is positively associated with self-reported shocks. We also find that a household with older oil palm stands are more likely to experience such shocks. Since harvesting and maintenance activities for older oil palm plantation become more difficult and demanding a smallholder may pay less attention on other engaged economic activities lead to higher probability of collapse in such business.

Table 6.6. Univariate and bivariate probit estimations for different type of shocks

	Price shock		**Production shock**		**Health and demographic shock**		**Other economic shock**	
Variables	Probit	Biprobit	Probit	Biprobit	Probit	Biprobit	Probit	Biprobit
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Age of hh	0.022*	0.028**	0.002	0.005	-0.009	-0.007	0.012	0.014*
Education of hh	-0.102**	-0.194**	-0.016	-0.015	-0.042	-0.039	-0.014	-0.009
Household size	0.208*	0.193*	-0.048	-0.039	0.130*	0.131**	0.103	0.106
Labor capacity	-0.414	-0.358	0.121	0.169	-0.423	-0.387	0.497	0.557
Origin dummy	0.113	-0,170	0.905*	0.724	-0.880*	-0.990*	-0.364	-0.687
Length of stay	-0.009	-0,010	0.009	0.008	-0.027**	-0.027**	-0.010	-0.011
Oil palm area	0.213*	0.260**	0.165*	0.207**	0.071	0.095*	0.053	0.097
Rubber area	-0.017	-0.024	0.056	0.050	0.051	0.047	-0.019	-0.016
Other crop area	0.192	0.146	0.092	0.081	-0.100	-0.097	0.134	0.134
Oil palm age	0.233***	0.254***	0.097***	0.123***	0.051	0.075	0.017	0.074**
Livestock	-0.041	0.009	0.012	0.003	0.039	0.031	1.319***	1.189***
NR extraction	-0.261	-0.304	0.224	0.205	0.471*	0.460*	0.347	0.334
Employment	0.432	0.258	0.031	-0.028	0.027	-0.071	0.092	-0.048
Non-farm	0.736*	0.673*	0.402	0.378	0.169	0.159	0.407*	0.320
Participation	-1.357**	-2.359***	-0.220	-0.840	-1.134***	-1.601**	-0.288	-1.354***
Constant	-2.209**	-2.236	-1.653*	-1.780*	1.953	1.808*	-2.652***	-2.593***
Participation								
Age of hh		0.029**		0.030**		0.030**		0.029**
Education of hh		0.001		0.001		0.011		-0.003
Household size		0.099		0.070		0.100		0.090
Labor capacity		0.893		0.866		0.852		0.922
Origin dummy		-0.846		-1.108**		-1.077*		-0.975*
Stay in the area		0.001		-0.009		-0.008		-0.007
Allocated land		-0.312		-0.296		-0.368		-0.449
Oil palm area		0.305***		0.298***		0.307***		0.297***
Rubber area		-0.052		-0.041		-0.053		-0.041
Other crop area		-0.063		-0.031		-0.004		-0.027
Planting period 1		3.349***		3.331***		3.348***		3.498***
Planting period 2		1.528***		1.603***		1.739***		1.899***
Employment		-0.523*		-0.460		-0.601**		-0.629**
Non-farm		0.067		0.121		0.047		0.128
Constant		-3.894***		-3.545***		-3.745***		-3.779***
ρ		1.057**		0.439		0.326		0.935**
Number observation	245	245	245	245	245	245	245	245
Prob > chi^2	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Pseudo R^2	0.431		0.243		0.120		0.201	

Note : * p≤ 0.1, ** p≤ 0.05, *** p≤ 0.01 hh: household head

Source : calculated from the oil palm household survey 2010 data

Vulnerability to poverty

In this section, vulnerability to poverty among oil palm smallholders is assessed by employing the procedure discussed in section 3. In Table 6.7 we present the results of the second stage (variance regression) and the last stage (consumption regression) of three stages FGLS. The results highlight that assets in a broad meaning including productive assets (land size for oil palm, natural resource extraction equipment, and non-farm business assets), non-productive assets, and human capital assets (education of household head and labor capacity) are positively associated with expected household consumption which is a factor that reduces vulnerability to poverty. As shown by Table 6.7 column 4, the reduction in consumption variation is significantly affected by the size of oil palm plot.

Table 6.7. Per capita household consumption model using FGLS

	Expected log per capita consumption		Variance of consumption	
Variables	Coef.	Std. Err.	Coef	Std. Err
1	2	3	4	5
Age of household head	0.000	0.002	0.003	0.001
Education of household head	0.022 ***	0.007	-0.001	0.002
Household size	-0.096 ***	0.013	-0.001	0.005
Labor capacity	0.171 *	0.092	0.013	0.033
The length of stay	0.002	0.002	0.000	0.001
Origin dummy	0.082	0.093	-0.018	0.033
Oil palm area	0.038 ***	0.011	-0.007**	0.003
Rubber area	0.003	0.010	-0.005	0.004
Other crop area	0.068	0.052	0.013	0.020
Oil palm age	0.008 **	0.004	0.001	0.001
Ln livestock asset	0.003	0.005	-0.000	0.002
Ln asset for natural extraction	0.019 *	0.011	0.000	0.004
Ln non-farm business asset	0.023 ***	0.006	0.001	0.002
Ln non-productive asset	0.121 ***	0.027	0.005	0.009
Employment	-0.068	0.041	0.005	0.014
Constant	6.948 ***	0.329	-0.053	0.117
Number of observation	245		245	
R^2	0.509		0.050	
Prob > F	0.000		0.681	

Note : * p≤ 0.1, ** p≤ 0.05, *** p≤ 0.01

Source : calculated from the oil palm household survey 2010 data.

Furthermore, vulnerability of each household was estimated by the expected consumption and its variance in the model above. Following the asset based vulnerability concept we classify households into four types of expected poverty as shown in Table 6.8. Using the $ 2 poverty line PPP we find that households who are

structurally-chronic poor are the minority with only 7 percent of sample, quite similar with the poverty head count ratio using the US $ 1.25 poverty line (PPP). The results underline that the majority of household (42 percent) are stochastically- transient poor, that is they are expected to be non-poor but the occurrence of negative shocks could push them back to poverty. Almost one-fourth of the sample households are structurally-transient poor which cannot escape poverty unless positive shocks occur. The remaining group (29 %) belongs to the group of non-poor households who are expected to stay out of poverty even in the case of negative shocks. We check sensitivity of the results to different poverty thresholds (the $ 2 PPP, the $ 1.25 PPP and the national poverty line). As shown by Table 6.8, the composition is sensitive for structural chronic, structural transient and non-poor but is less sensitive for the stochastic transient group. If we use the $ 1.25 threshold, structural chronic are not found anymore, the composition of structural transient extremely decrease from 23 to 1 percent while "never poor" increase twofold. However, the share of stochastic transient is similar (about 40 percent). Even if we use the national poverty line which is the lowest threshold, the composition of stochastic-transient is still high (above 30 percent). Here we highlight the persistence of large stochastic-transient across different poverty lines, which is importance in the policy context.

Table 6.8. Composition of vulnerability typology across different poverty lines

		Composition in each level (%)		
Types of vulnerability	VEP	$ 2 PPP	$ 1.25 PPP	National poverty
Structural-chronic	1	7.3	0.0	0.0
Structural-transient	0.5≤VEP<1	23.3	1.2	0.8
Stochastic-transient	0<VEP<0.5	42.5	40.4	31.0
Non poor	0	26.9	58.4	68.2
Total		100	100	100

Source : calculated from the oil palm household survey 2010 data.

From a policy perspective the stochastically transient group is most relevant as it indicates that although most oil palm smallholders are expected to be non-poor from a static poverty perspective many could fall back into poverty in the case of shocks. This is the main message of this study. Hence we complement previous studies on oil palm household's wellbeing (Susila 2004; the World Bank 2011) which focused on ex post

poverty measures. The message for policy makers is that it is insufficient to solely rely on the past observations of the wealth status of oil palm communities. While the share of the stochastic transient poor is less sensitive to the choice of the poverty line, the results of static poverty assessments are. Using the US $ 1.25 PPP and the national poverty line of 2009 (IDR 200,262 per month), the poverty headcount was 6.53 percent and 4.08 percent respectively while applying the US $ 2 the poverty rate goes up to 35.92 percent.

The effect of contract farming on vulnerability to poverty

A comparison of composition on vulnerability typologies between contract and non-contract smallholders is presented in Table 6.9. Overall, contract smallholders appears to be less vulnerable than non-contract smallholders when using the share of "never poor" and the share of "structurally-chronic" poor. However, we still find a high share of contract smallholders (almost a half) to be stochastically transient poor. This suggests that many of them still have not been safe from falling to poverty in the case of negative shocks.

Table 6.9. Comparison of composition in vulnerability typology between contract and non-contract smallholders using the $ 2 threshold

		Composition in each level (%)		
Types of vulnerability	VEP	Total household	Contract smallholder	Non-contract smallholder
Structural-chronic	1	7.3	0.8	14.3
Structural-transient	0.5≤VEP<1	23.3	11.1	36.1
Stochastic-transient	0<VEP<0.5	42.5	46.0	38.7
Never poor	0	26.9	42.1	10.9
Total		100	100	100

Source: calculated from the oil palm household survey 2010 data.

In Table 6.10 we show results of statistical tests for the mean differences of vulnerability estimates between contract and non-contract smallholders. Thus contract smallholders are significantly less vulnerable than non-contract smallholders across all poverty thresholds. However, such simple mean comparisons cannot distinguish whether the participation reduces vulnerability or a less vulnerable smallholder has a higher chance to participate in the contract since the participation is not randomly

assigned but is determined by a set of covariates. In order to address this problem we implement a propensity score matching analysis.

Table 6.10. Mean comparison of vulnerability estimates between contract and non-contract smallholders

Poverty threshold	Contract smallholders	Non-contract smallholders	T stat
The $ 2 PPP	0.193	0.486	-7.32***
The $ 1.25 PPP	0.034	0.137	-6.20***
The national poverty	0.022	0.097	-5.51***

Source: calculated from the oil palm household survey 2010 data.

Table 6.11 shows the results of a probit model that yields the propensity scores for smallholder participation in the contract based on 14 observable covariates.

Table 6.11. Participation model

	Participation	
Variables	Coef.	Std. Err.
Age of household head	0.031***	0.012
Education of household head	0.010	0.043
Household size	0.084	0.089
Labor capacity	0.806	0.654
Origin dummy	-1.090*	0.558
The length of stay	-0.010	0.016
Allocated land	-0.347	0.303
Oil palm area	0.300***	0.089
Rubber area	-0.044	0.077
Other crop area	-0.015	0.260
Dummy of planting period 1 (1989-1994)	3.350***	0.443
Dummy of planting period 2 (1995-2000)	1.712***	0.395
Wage employment	-0.555*	0.291
Non-farm business	0.068	0.323
Constant	-3.598***	1.156
Number of observation	245	
Psudo R^2	0.61	
LR Chi^2	206.99***	

Source : calculated from the oil palm household survey 2010 data.

As shown by the significant coefficients in the model, participation is unlikely to be a random process. There are certain characteristics that make participation more likely, hence self-selection is likely to exist. The coefficient for land size suggests that either the company tends to choose a larger smallholder or a larger farmer more prefers to participate. The significant coefficients for the planting period dummies also support the self-selection hypothesis. A smallholder is more likely to participate if his oil palm was

planted during the particular periods when the government promoted the contract schemes with subsidized interest rate. We also find that an indigenous farmer is more likely to join the contract. This is largely driven by prevailing land policies where they could only receive compensation for land occupied by the company and migrants if they joined the contract.

As matching algorithm we use three algorithms namely nearest neighbor, caliper and kernel matching (Caliendo and Kopeinig 2008). Considering the distribution of data at hand as shown by Figure 6.2, we impose common support conditions by applying "minima-maxima" and trimming procedure in order to ensure the existence of potential matches in the control group. The minima-maxima excludes all participants, whose propensity score is smaller than the minimum and higher than the maximum in the comparison group while the trimming excludes treated observations in the propensity score range where there is a lack of control individuals (0.5, 0.7). By imposing such common support conditions we lose 69 households.

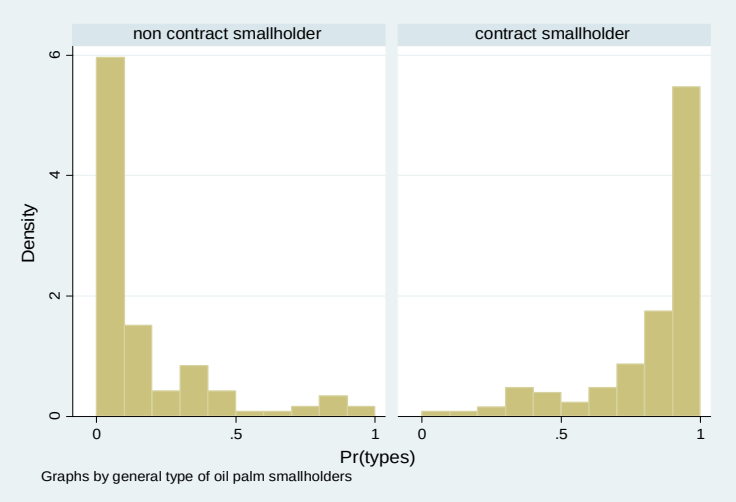

Figure 6.2. The distribution of propensity score densities

Source: created from the oil palm household survey 2010 data.

Based on the balancing tests the kernel matching has been identified as the most appropriate matching method. As shown by Table 6.12, after matching the differences in all covariates between the two groups are no longer significant, the pseudo R^2 strongly decreases (from 0.61 to 0.09) and the likelihood ratio test becomes insignificant indicating that no systematic differences in the distribution of covariates between both groups exists.

Table 6.12. The results of the covariate balancing test

Variable	Sample	Mean		% bias	% reduct |bias|	T
		Treated	Control			
Age of household head	Unmatched	52.095	45.748	51.6		4.04***
	Matched	48.158	45.659	30.5	40.9	1.24
Education of household head	Unmatched	5.952	5.832	3.8		0.30
	Matched	6.228	5.864	2.6	30.4	0.13
Household size	Unmatched	4.333	4.202	8.9		0.70
	Matched	4.246	3.806	29.8	-233.7	1.65
Labor capacity	Unmatched	0.736	0.696	18.8		1.47
	Matched	0.724	0.740	-7.4	60.6	-0.36
Origin dummy	Unmatched	0.865	0.849	4.6		0.36
	Matched	0.825	0.743	23.1	-397.8	1.05
The length of time a household stayed in the area	Unmatched	24.937	23.378	13.2		1.03
	Matched	25.789	24.860	7.9	40.4	0.43
Allocated land	Unmatched	0.563	0.378	37.6		2.94***
	Matched	0.474	0.333	29.2	22.4	1.56
Oil palm area	Unmatched	3.506	1.585	115.7		9.00***
	Matched	2.654	2.565	5.3	95.4	0.33
Rubber area	Unmatched	0.653	0.714	-3.2		-0.25
	Matched	0.979	1.326	-18.1	-467.3	-0.71
Other crop area	Unmatched	0.080	0.066	3.4		0.27
	Matched	0.114	0.150	-8.4	-114.7	-0.31
Dummy of planting period 1 (1989-1994)	Unmatched	0.722	0.059	184.7		14.33***
	Matched	0.544	0.599	-15.5	91.6	-0.59
Dummy of planting period 2 (1995-2000)	Unmatched	0.421	0.370	10.4		0.81
	Matched	0.439	0.370	14.1	-35.4	0.74
Wage employment	Unmatched	0.413	0.630	-44.4		-3.48***
	Matched	0.544	0.641	-19.8	55.4	-1.05
Non-farm business	Unmatched	0.198	0.218	-4.9		-0.39
	Matched	0.158	0.116	10.2	-107.5	0.64
Sample	Unmatched	245		Matched	176	
Pseudo R^2	Unmatched	0.610		Matched	0.092	
LR Chi^2	Unmatched	296.99***		Matched	14.53	

Note: using kernel matching algorithm and imposing common support condition by applying "minima maxima" and trimming procedures, ***p<0.01.

Source: calculated from the oil palm household survey 2010 data.

In Table 6.13, we show the results of propensity score matching on the poverty typology estimates. After matching the mean differences for the vulnerability estimate (probability of falling to poverty) and poverty typology across three different poverty lines poverty are not significant. In contrast to the simple mean comparison with the unmatched sample, the results suggest that contract participation does not significantly reduce vulnerability to poverty.

Table 6.13. Average Treatment Effect on the Treated (ATT) of participation

Poverty line thresholds	Vulnerability estimates		Vulnerability typology	
	ATT	T stat	ATT	T stat
$ 2 PPP	-0.031	-0.28	-0.244	-0.91
$ 1.25 PPP	-0.028	-0.65	-0.173	-1.07
National (200,262/ month)	-0.023	-0.68	-0.069	-0.44

Source : calculated from the oil palm household survey 2010 data.

While we have attempted to control for all observable sources of bias, unobservable covariates may simultaneously affect participation and vulnerability leading to a hidden bias (Rosenbaum 2002). Therefore, a sensitivity analysis by Roosenbaum was applied to determine how strongly an unobservable variable must affect the selection process in order to alter the conclusions. The results of Rosenbaum bound analysis are presented in Table 6.14.

Table 6.14. The results of sensitivity analysis

Γ	P critical value for lower bound		
	$ 2 PPP	$ 1.25	national
1.0	0.0769	0.0005	0.0006
1.1	0.1325	0.0015	0.0017
1.2	0.2025	0.0036	0.0037
1.3	0.2828	0.0073	0.0072
1.4	0.3683	0.0134	0.0127
1.5	0.4542	0.0225	0.0206
1.6	0.5365	0.0351	0.0312
1.7	0.6126	0.0515	0.0448
1.8	0.6807	0.0719	0.0615
1.9	0.7401	0.0961	0.0813
2.0	0.7907	0.1241	0.1039

Source: calculated from the oil palm household survey 2010 data.

The results show that while the inference for the $ 2 threshold could be altered if unobservable presences with the magnitude of 1.1, the inferences for both the $ 1.25 and national poverty line are less sensitive to hidden bias at the magnitude of 2. Therefore, overall we maintain our conclusion that there is no effect of participation on vulnerability reduction (using the $ 1.25 and national poverty lines).

6.7. Summary and Conclusions

Summarizing the results of this study we return to the four specific objectives posed in the introduction. *First,* the results reveal that contract smallholders are more dependent on oil palm than non-contract farmers; hence the former group experienced more oil palm shocks while the latter tend to have a more diversified income portfolio and more often reported non-oil palm shocks.

Second, after controlling for correlation among unobservable factors of experiencing shocks and the participation decision, the results show that a negative impact of price shocks can be reduced by participation; however this is not the case for production shocks. This could be an indication that price premium awarded by the contract effectively works while technical assistance provided through the contract may often not be effective to cope with production shocks.

Third, using the asset based vulnerability approach we find that most of the oil palm smallholders (about 40 percent) belong to the group of stochastically-transient poor. This finding differs from previous literatures on oil palm smallholders' wellbeing that concentrated on static poverty. Our findings thus could serve as a signal for policy makers that reduction of static poverty among oil palm smallholders is not a guarantee that they could not fall back into poverty. We therefore recommend developing better social protection policies for oil palm smallholders.

Fourth, while statistical tests for simple mean difference show that contract smallholders are significantly less vulnerable than non-contract smallholders, the propensity score matching analysis differently suggests that participation does not reduce vulnerability and identifies asset endowment as a decisive factor for participation selection.

In conclusion, this study suggests that the potential of the oil palm smallholder contract farming schemes in Indonesia to sustainably reduce poverty may be less than suggested by earlier literature. There is a need to review the contract scheme if it is to become more pro-poor.

CHAPTER 7

SUBJECTIVE RISK EXPECTATIONS AND FUTURE PLAN OF INVESTMENT AMONG OIL PALM SMALLHOLDERS IN INDONESIA [1]

While the importance of taking into account risks in designing poverty reduction policies has been pointed out in the previous chapter, this chapter further investigates decision making behavior toward risks among oil palm smallholders that would be also relevant to complement a proper policy recommendation.

7.1. Introduction

In recent years, the importance of risk research in agricultural economics and the heterogeneity of behavior among agricultural decision makers when facing uncertainty have been subject to a vast amount of literatures (e.g. Just *et al.* 2002; Just 2002). Risk perception and risk attitude are major factors that determine economic behavior (Nosic and Weber 2010). In agribusiness several examples are now available that shows the relationship between risk perception and risk management strategies (e.g. Flaten *et al.* 2005; Lien *et al.* 2006; Ahsan 2011; Ahsan and Roth 2010; Hall *et al.* 2003; Koesling *et al.* 2004).

Some literatures dealing with risk experiments showed that risk attitudes may vary in response to changing conditions. This has been found in developed countries (e.g. Andersen *et al.* 2008; Dohmen *et al.* 2009) in emerging market economies like Vietnam (e.g. Tanaka *et al.* 2010) and for farmers in poor countries (e.g. Humphrey and Verschoor 2004; Yesuf and Bluffstone 2009).

In this paper we add to this literature by investigating the case of smallholder farmers in Indonesia who have transformed from a traditional cropping system to oil palm plantations in co-existence with large agro industry. These farmers have been attracted

[1] This chapter is based on the article of: Cahyadi, E.R. 2013. Subjective risk expectation and future plan of investment among oil palm smallholders, which was submitted to Journal of Risk Research.

high international prices for palm oil, which made investments in oil palm plantations profitable (Feintrenie *et al*. 2010). On the other hand, market and production risks are higher than in traditional crops like rice. The price of palm oil depends on a volatile global market. Oil palm plantations are monocultures which are susceptible to pest and disease outbreaks (Paterson 2007). In addition the startup costs for oil palm plantations are large and the cash flows turns positive only five years after planting (Pafenfus 2001; Feintrenie *et al*. 2010). The optimal economic life span of an oil palm plantation is in the order of 20 years after which time yields decline and replacement becomes necessary unless the farmer wants to shift to another crop. Hence we have a good case where farmers are confronted with a risky decision, namely whether or not to replace their oil palm plantation, re-allocate their land to other crops or take up other enterprises outside agriculture. Also, our past work has shown that oil palm smallholders are indeed subject to shocks that negatively affect their well-being push them into poverty (Cahyadi and Waibel 2012). In this study we can therefore investigate if the management behavior as measured by smallholders' investment plans can be explained by their subjective risk expectation and risk attitude. We take into account that subjective risk expectation is not exogenous but can be affected by unobservable individual heterogeneity that may simultaneously affect the future plan of investment. Hence, the determinants of subjective risk expectation are also investigated.

The data available to us are from a sample of some 246 households in three villages in the district of Merangin in the province of Jambi in Sumatra. The survey instrument provides information on a rich set of variables including household characteristics, consumption, income and assets. Central to the analysis presented in this paper are data on past shocks, risk expectations and future plans of smallholders currently engaged in oil palm production. Shocks were measured as frequency and severity of negative events during the past five years. Risk expectations were elicited by asking respondents whether they expect the occurrence of a negative event in the near future. Risk attitude was captured by a simple risk item where respondents were asked to place their willingness to take a risk on a six point Likert scale. Although economists in the past have measured risk attitude through incentivized experiments (e.g. Binswanger 1980) recent work in Thailand has shown that survey based risk items can yield a similar degree of reliability (Hardeweg *et al.* 2013). We therefore believe that our data provide an excellent base to investigate the relationship between risk attitude, risk expectations

and actual behavior as measured through the investment plans of oil palm smallholders in Indonesia.

We take the investment plan which was revealed by the respondents as a proxy of decision making behavior. We thus are able to examine whether risk expectations are consistent with investment plans. We hypothesize that a pessimist has a lower propensity to invest in a potentially high return but risky portfolio such as replanting oil palm plantations.

The overall objective of this paper is to better understand the relationship between subjective risk expectations, risk attitude and management behavior, namely the future plan of investment among oil palm smallholders in Indonesia. Hence, the paper has two specific research objectives:

1. To analyze the determinants of subjective risk expectation.
2. To examine whether subjective risk expectation and risk attitude can explain the future plan of investment.

This paper is organized as follows. In the next section, a conceptual framework that explains the links between risk expectation, risk attitude and the future plan of investment is presented together with methodology to address the two specific objectives above. This is followed by study area and data collection procedure in section three. In section four, results are discussed. Finally, conclusions are drawn accompanied with policy recommendations.

7.2. Conceptual framework and methodology

Smallholders commonly react to risks that they perceived. Hence, subjective risk expectation based on past experience, level of information, and degree of risk aversion can be used to explain smallholders decision (Anderson *et al.* 1977). Weber and Hsee (1998) showed that subjective risk expectations are better used than the variances of outcomes in lottery task to improve the goodness of fit of regression analysis in predicting risk behavior.

Van Raaij (1981) provided a framework for the analysis of agents' economic behavior that explains how the economic environment (market conditions, sources of income, type of employment) and agents' characteristics influence perceptions and how such perceptions can determine individual economic behavior. Adapting van Raaij (1981), a

conceptual framework for this study is presented in Figure 7.1. The framework explains how experienced shocks, risk attitude, and smallholder's characteristics influence subjective risk expectation and how such expectations can explain portfolio choice in the future plan of investment. As shown in Figure 7.1 smallholder characteristics (e.g. age, education, household size, and asset endowments) are expected to influence risk expectation in oil palm and non-oil palm enterprises. Risk expectation also could be shaped by experienced shocks in the past. One who experienced a certain shock more frequently and severe may expect the occurrence of that shock in the future. Risk perception can be also influenced by general risk attitude as theoretically argued by Sitkin and Pablo (1992). An individual with high risk aversion may tend to overestimate risk expectation or be a pessimist.

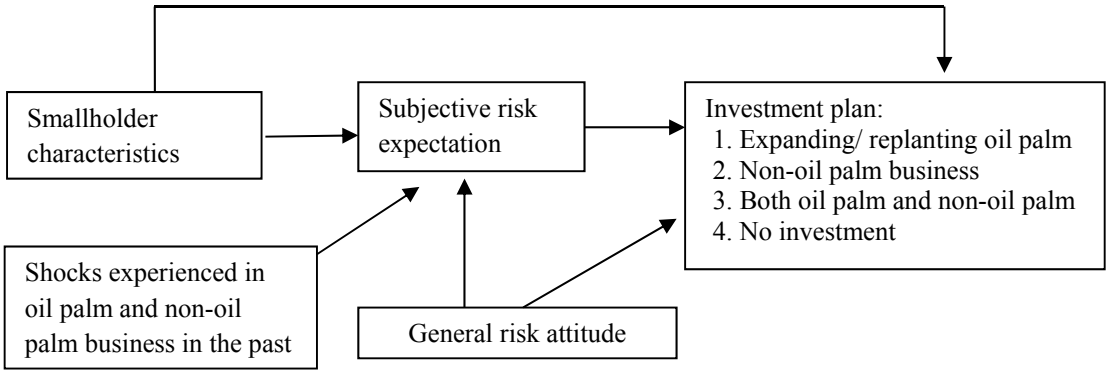

Figure 7.1. The relationship between subjective risk expectation, risk attitude and investment plan

Source: Adapted from Van Raaij (1981)

In planning an investment a smallholder may consider two major strategies, namely (1) investing in a higher return but more risky portfolio such as increasing the economic scale of oil palm or replanting oil palm plantation and (2) investing in another enterprise that may be less risky but generate lower return. Hence, in this paper investment choices in the future plan are classified into two major portfolios, namely oil palm and non-oil palm enterprises.

As argued by Weber and Hsee (1998), people tend to invest more in financial alternatives that they perceive as less risky. Thus, a smallholder is expected to plan for investing in oil palm if he perceives that the risk of oil palm is lower than that of non-oil palm enterprises. However, a risk lover may choose to invest in oil palm even if he perceived it as a risky business. Risk aversion and pessimistic expectation are two different factors that may be correlated and may influence the future plan of investment.

Hence, this study investigates the influence of risk expectation and risk attitude on the portfolio choice of investment plan.

Subjective risk expectation can be formally stated as following.

$$R_{hi}^{*} = \beta' X_h + \gamma' A_h + \delta' S_h + \varepsilon_{hi} \text{ where } i = 1, 2, 3 \quad (1)$$
$$R_{hi} = 1 \text{ if } R_{hi}^{*} > 0, \text{ and 0 otherwise}$$

R_{hi} is subjective expected risk i which is assessed by a smallholder h. R_{ih} is a dichotomous variable defined as one if a smallholder h perceives that he will severely hit by a shock i during the next five years and zero otherwise. For R_{hi} is one, we also can say that a smallholder h is pessimistic on event i. As a mental process containing thoughts, beliefs and constructs the perceived risk R_{hi} is expected to be influenced by household's characteristics $X_{h,}$ general risk attitude $A_{h,}$ and the same shock experienced in the past S_{hi} with error term or disturbance $\varepsilon_{hi.}$ Shocks included in the model are classified into three categories, namely price shocks, production shocks and other economic shocks. The former two relate to oil palm investment including falling price, pest attack, and oil palm diseases outbreak while the latter is associated with non-oil palm investment such as livestock diseases, non-farm business collapse, and job loss. S_{hi} captures the depth of experienced shock which is computed as shock frequency multiplied by subjective shock severity.

Subjective risk expectation is hypothesized to influence the portfolio choice of investment plan among smallholders. The portfolio choice can be formally stated as follows

$$I_{hj}^{*} = \eta' X_h + \lambda' R_{hi} + \rho' A_h + \mu_{hij} \text{ where } i = 1, 2, 3 \text{ and } j = 1, 2 \quad (2)$$
$$I_{hj} = 1 \text{ if } I_{hj}^{*} > 0, \text{ and 0 otherwise}$$

I_{hj} is the decision for choosing a certain portfolio in the future plan of investment. Hence, I_{hj} is a dichotomous variable defined as one if a smallholder chooses portfolio j, and zero otherwise. In this study, there are two major portfolios j, namely oil palm (j=1) and non-oil palm enterprises (j=2). Hence, there are four possibilities for each smallholder in planning his investment, namely investing in oil palm only, investing only in non-oil palm enterprises, investing in both enterprises, or not investing at all.

We expect that the portfolio choice can be explained by household characteristics X_h, subjective risk expectations $R_{hi,}$ and general risk attitude A_h with error term $\mu_{hij.}$

Error terms of risk expectations ε_{hi} in equation 1 could be inter-correlated. Likewise, those can be correlated with error terms of portfolio choices μ_{hij} in equation 2, called as endogeneity problem. If such case occurs, using a probit model could produce biased results. In order to deal with such endogeneity in binary response model, a multivariate probit model can be employed (Arendt and Holm 2006). In addition, the multivariate probit model is also called to deal with the simultaneous nature of smallholders' choices of investment portfolio because the model allows for coexistence of two different investment choices as responses to the risk perceptions. In estimating the multivariate probit model, the GHK (Geweke-Hajivassiliou-Keane) smooth recursive simulator that draws upon the product of sequentially conditioned univariate normal distribution functions with joint probability is applied and Maximum Simulated Likelihood (MSL) estimator is employed.

As empirically shown by Meuwissen *et al.* (2001), socio-demographic household characteristics are included as independent variables of both risk expectation and investment plan. Household characteristics here include age and education of household head, household size, engagement in off-farm employment, and asset endowments such as land size for oil palm, rubber and other crops, livestock asset, equipment for natural resource extraction, and non-farm asset. We include oil palm age to capture the role of technical parameter of oil palm production on shaping perception. The depth of experienced shock computed from the frequency and the perceived severity of shock experienced by a smallholder during the past five years is also included in the risk expectation model.

7.3. Study area and data collection

The empirical base of this this study is the district of Merangin in the province of Jambi, Indonesia. While Indonesia is the largest oil palm producer that contributes almost a half of global palm oil production the province of Jambi is one of the four largest oil palm producing provinces in Indonesia. About 160 thousand people in this province were employed in this sector. Among other districts Merangin has the highest number of oil palm smallholders (BoA 2010).

A household survey was carried out from January to February 2010. We interviewed 245 households which were randomly selected from the list of oil palm smallholders provided by village heads. We asked for basic household characteristics such as age, education, and household members. We also explored existing asset endowments including productive asset such as land, livestock, natural resource extraction asset, non-farm assets as well as non-productive assets such as house, television, motorbike, and electricity generator.

A specific section was designed in our questionnaire to elicit information about shocks incurred during the past five years and risks perceived during the next five years by smallholders. We asked respondents to report the types of experienced bad event, their frequency, their perceived severity, and their magnitude including income loss due to such events. The subjective severity is assessed by the respondent by using scale from 1 (low impact) to 4 (very high impact). In addition the possibility of the occurrence of such events during the next five years was also explored.

The future plan of investment was asked in a specific module. We asked whether the respondents have any investment plan in the near future and in what types of business they were interested. In order to elicit risk attitude we asked respondents to assess their willingness to take a risk in general by using the scale from 1 (very risk averse) to 6 (very risk loving). As shown by Kapteyn and Teppa (2002), simple intuitive measure of risk aversion can be used to explain portfolio choice.

7.4. Results and discussion

First, the dependency of smallholders on oil palm, experienced shocks in the past and expected shocks in the future are described in order to better understand the socio economic situation behind risk taking behavior of smallholders. Second, we present econometric model to understand how perceptions are shaped and how they influence investment behavior.

7.4.1. Descriptive statistics

The characteristics of oil palm smallholders are shown in Table 7.1. Sample households are composed of four individuals on average. Household heads are 49 years old and attain education for six schooling years (elementary school). About a half of sample households participate in contractual arrangements with an oil palm corporation. Our

sample households also engage in other income generating activities such as rubber, other crops, livestock, natural resource extraction, off-farm employment and non-farm business. As shown by Table 7.1, land use seems to be dominated by oil palm, followed by rubber.

Table 7.1. Characteristics of oil palm smallholders

Characteristics	Mean	Standard deviation
Age of household head (years)	49.0	12.7
Education of household head (years)	5.9	3.2
Household size	4.3	1.5
Size of oil palm area (hectares)	2.6	1.9
Size of rubber (years)	0.7	1.9
Size of other crops area	0.1	0.4
Livestock asset (IDR thousands)	2855.7	9609.0
Natural resource extraction equipment (IDR thousands)	73.4	290.3
Non-farm asset (IDR thousands)	3397.6	20966.4
Participation in contract scheme (1=engaged, 0 otherwise)	0.5	0.5

Note :N= 245 smallholders

Source: Calculated from oil palm household survey 2010 data

Among all income sources oil palm contributes the largest share on total net household income (more than a half), followed by off-farm wage employment (24 percent) and rubber (14 percent). Net income of oil palm on average was about IDR 25.7 million a year on average but the amount widely varied from -14.6 million to 533.9 million. Some farmers suffer from negative profit since their plantations were still in the gestation period that needed high cost for maintenance but was not able to produce profitable yield.

We classify 50 percent of sample households with the highest net profit of oil palm as successful smallholders and the rest 50 percent as less successful smallholders. Table 7.2 shows a comparison of some relevant characteristics between both groups.

Table 7.2. Mean of characteristics of successful and less successful oil palm smallholders

Characteristics of smallholders	Successful smallholders	Less successful smallholders	T stat
Age of household head (years)	51.7	46.3	3.40***
Education of household head (years)	5.7	6.1	0.84
Household size	4.3	4.3	0.19
Oil palm size (ha)	3.5	1.6	1.92***
Oil palm age (years)	8.9	15.6	10.25***
Net profit of oil palm (IDR thousand)	44764.6	6456.6	8.38

Source: oil palm household survey data 2010

There is no significant difference in education level of household head and household size between the two groups. However, successful smallholders have twice larger and much older oil palm plot than less successful smallholders on an average. The plantation size and the plantation age may become one of driving factors behind the success of oil palm smallholders. The relation between net income of oil palm (in log form) and land sizes for oil palm is presented in Figure 7.2. Figure 7.2 shows that the net profit from oil palm is highly associated with the scale of the plantation owned. Hence, a smallholder may be encouraged to invest more for increasing oil palm size to get success.

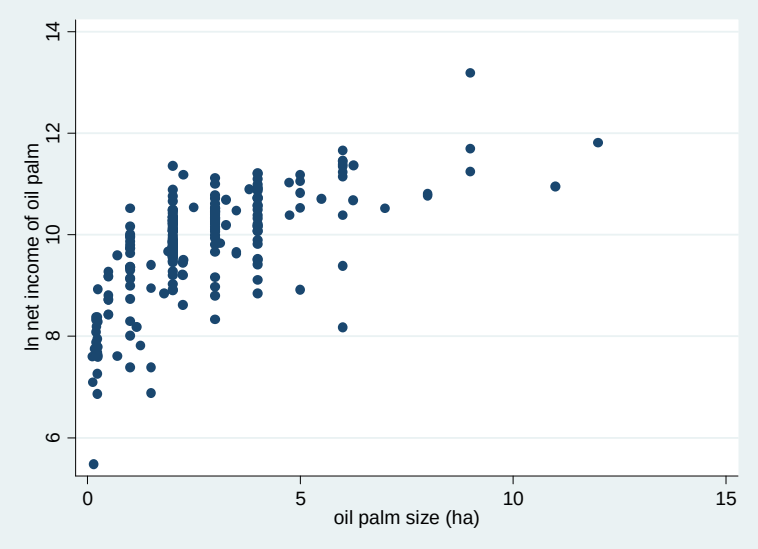

Figure 7.2. The relationship between net income of oil palm (in log form) and oil palm size (ha)

Source: generated from oil palm household survey data 2010

In order to better understand investment plan made by smallholders, their past experience of shocks and risks expectation should be taken into consideration. In Table 7.3 we present a comparison of shocks experience during past 5 years and risk expectation in the next five years between successful and less successful smallholders.

Table 7.3. Shock experiences and risk expectation between successful and less successful smallholders

	Types of shocks	Successful smallholder	Less successful smallholders	T stat
Households that experienced a shock during past 5 years (%)	Oil palm price shock	94	75	4.27***
	Oil palm production shock	85	69	3.12***
	Non-oil palm business shock	28	25	0.39
Shock frequency during past five years	Oil palm price shock	1.2	0.9	4.52***
	Oil palm production shock	1.9	1.7	0.71
	Non-oil palm business shock	0.3	0.3	0.23
Perceived severity of shocks	Oil palm price shock	3	3	0.05
	Oil palm production shock	2.8	2.5	2.63***
	Non-oil palm business shock	2.6	2.6	0.04
Loss income (IDR thousands)	Oil palm price shock	10466.7	4829.5	4.19***
	Oil palm production shock	10693.3	4522.0	3.89***
	Non-oil palm business shock	25062.1	3331.6	0.92
Households that expect experiencing a shock in the next 5 years (%)	Oil palm price risk	50	51	0.19
	Oil palm production risk	90	75	3.19***
	Non-oil palm business risk	15	9	1.31

Source: oil palm household survey data 2010

The results show that successful smallholders experienced price shocks and production shocks (e.g. declined production during the seasonal transition, pest attack, fire) more widely than less successful ones. Successful smallholders also reported more frequently price shocks and more severe production shock. Loss income of successful smallholders due to oil palm price or production shocks is almost double than that of less successful smallholders. There is no significant difference in frequency, perceived severity and loss income of other economic shocks (e.g. livestock diseases or job loss) between both the groups.

Both groups seem to have similar expectation regarding price risk of oil palm. About a half of successful and less successful smallholders have pessimistic expectation about

oil palm price risk during the next five years. The information regarding the prospective market of palm oil in one hand and the experience of suffering from price shock in 2008 on the other hand may explain the 50:50 of price risk expectation. However, for the case of production risks, successful smallholders tend to be more pessimistic than less successful ones. Such expectation may be influenced by shocks experience in the past that caused higher income shortfall. Both groups are more pessimistic on production risks instead of price risks. Most households may realize the nature of oil palm as monoculture which is vulnerable to diseases outbreak. On the other hand, the information about prospective market of palm oil may reduce pessimism on price risks.

Our respondents are also asked to rank five main problems experienced during past five years and expected in the next five years. We find that 30 percent of sample household placed high cost of input as the most important problem during the past five years, followed by the volatility of price, and scarcity of fertilizer. But, in the next five years, beside those problems majority of smallholders also expect the declined production by natural life cycle as one of the major problems since some plantations become too old.

It is noted that oil palm has 25 years life cycle in which after the period the production is expected to be not economically feasible. In order to respond to such risks and ensure sustainability of oil palm income, a smallholder might be encouraged to establish a new oil palm plantation in the near future. However, if they perceive that oil palm might be no longer interesting they may be encouraged to invest in non-oil palm enterprises. Hence, expected risks in both oil palm and non-oil palm business potentially influence their investment plan.

We find that 19 percent of sample households have at least one investment plan which is ready to be implemented in the near future. Almost 70 percent of them plan to invest in non-oil palm business while the rest choose to invest in oil palm.

We present a comparison of investment plan made by successful and less successful smallholders in Table 7.4. There is only 6 to 7 percent of each group that plan for investing in oil palm. A large amount of initial investment required for plantation establishment may be a reason behind this small percentage. We find that there are more successful smallholders (24 percent) that plan for investing in non-oil palm than less successful smallholders (10 percent). They may have a larger accumulated saving or assets that can be used to build up an alternative business.

Table 7.4. Investment plan of successful and less successful smallholders

Having plan for investment in	Successful smallholders (%)	Less successful smallholders (%)
Oil palm	6	7
Non-oil palm	24	10

Source: oil palm household survey data 2010

While the descriptive statistics highlight the dependency of smallholders on oil palm and the pessimism among smallholders about oil palm production in the future, the relationship between such perceptions and the portfolio choices of planned investment has not been established.

7.4.2. Econometric model

The determinants of subjective risk expectations and the effect of those expectations on investment plan are simultaneously analyzed. First, we investigate how subjective risk expectations are shaped. The results are presented in Table 7.5. As shown by column 6, the depth of oil palm price shock experienced during the past five years significantly influences risk expectation on price. A smallholder that experienced price shock in the past more severe and more frequently tends to be more pessimistic on oil palm price. The results show that such pessimism can be reduced by the size of rubber plot, livestock asset and non-farm business asset that he owns. All those assets allow one to have sufficient alternative incomes that may increase his confidence against that shock.

The driving factors behind pessimism in oil palm production are shown in column 7. The results underline the importance of shock experience in shaping subjective risk expectation. Another finding is that the size and the age of oil palm plantation significantly increase pessimism regarding oil palm production risks while non-productive asset reduces such pessimism. A large farmer seems to be more pessimistic since he may associate the potential loss with plantation scale. Likewise, a farmer with too old plantation is more likely to be a pessimist since he may realize the declining trend of production following oil palm life span. On the contrary, non-productive assets such as house or motor bike can be used to apply risk coping strategies, such as selling them or using them as collateral to get loan in case of shocks in order to smooth consumption, and therefore that variable may increase confidence and reduce the worry of suffering from production shock in the future.

Column 8 shows the determinants of subjective risk expectation connected with non-oil palm enterprises. Again, shock experience encourages a smallholder to be more pessimistic in alternative enterprises. Such pessimism is also positively influenced by livestock asset and asset for natural resource extraction. This is understandable since shocks in alternative enterprises in the past were dominated by livestock diseases while income from natural resources extraction activities inherently relies on natural condition.

In all risk categories, the importance of shock experiences in the past in shaping subjective risk expectation is highlighted. On the other hand, general risk attitude does not significantly influence subjective risk expectation.

The determinants of investment portfolio choices are further analyzed. In Table 7.5 we show the results of both simple probit (column 2 to 3) and multivariate probit model taking into account endogeneity (column 4 to 8). The results of both models seem quite similar in term of significant variables and their signs (the effect direction); however there are considerable differences in the magnitudes of estimated effects, especially for subjective risk expectations. As shown in column 4, the disturbances of the plan for investing in oil palm and the expected production risk are significantly correlated. We also find intrinsic correlation between expected risks of oil palm price and non-oil palm business. This could be an indication that smallholders expect oil palm price risks as a prominent covariate risk that could affect other enterprises in the oil palm community. Therefore, multivariate probit model is better employed since it is able to control for such endogeneity while simple probit leads to biased estimates. The effect of pessimism in non-oil palm enterprises on the decision for choosing oil palm investment tends to be overestimated by simple probit model while multivariate probit model corrects the magnitude and the significant level (see column 2 and 4). As shown by column 4 and 5, pessimism in non-oil palm business significantly encourage a smallholder to plan for investing in oil palm while pessimism in oil palm production significantly leads to a plan for investing in alternative enterprises. The results suggest that the portfolio choice is not significantly influenced by risk expectation connected with the chosen portfolio itself but tend to be driven by pessimism in the other one. This could be an indication that the chosen portfolio is planned to generate alternative income in order to mitigate the impact of expected risks in another business that is currently run. Hence, this finding improves our understanding on risk behavior and complement previous literature that

pointed out the tendency of individual to invest in the financial alternative perceived as less risky (e.g. Weber and Hsee 1998).

In column 4 and 5 in Table 7.5, the results also show that a smallholder with low risk aversion tends to plan for investing in oil palm, but this is not the case for non-oil palm investment. As a risky business, obviously oil palm requires a higher willingness to take a risk. The amount of assets for natural resource extraction activities is also significantly associated with the plan for investing in oil palm. Some kinds of equipment, such as chain saw, can be used for land clearing and may be prepared for establishing oil palm plantation. Another finding is that a more educated household head is more likely to invest in non-oil palm business. This is not surprising since education may increase awareness and carefulness for diversifying income sources in order to mitigate the impact of oil palm shocks. The total amount of non-productive assets (for example house, motorbike, electronic devices) significantly influences a smallholder to plan for investing in non-oil palm business. Such assets can be used as collateral to access a formal credit that may be needed to make a new investment. We find that a contract smallholder is less likely to plan for investing in non-oil palm business. There might be just little incentives for him to engage in non-oil palm business since he may benefit from the contract and therefore, pays more attention on the current oil palm plantation in order to meet the required production standards.

Table 7.5. Investment plan and subjective risk expectation model

Variables	Probit	Probit	Multivariate Probit				
	Investing in Oil palm	Investing in Non-oil palm	Investing in Oil palm	Investing in Non-oil palm	Subjective risk expectation on		
					Oil palm price	Oil palm production	Non-oil palm
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age of household head	-0.010	-0.005	-0.010	-0.005	-0.011	-0.001	0.000
	(0.015)	(0.012)	(0.015)	(0.012)	(0.008)	(0.010)	(0.012)
Education of household head	0.012	0.080*	-0.005	0.080*	-0.009	-0.053	0.010
	(0.056)	(0.043)	(0.055)	(0.043)	(0.030)	(0.038)	(0.045)
Household size	0.071	0.024	0.078	0.018	0.064	0.041	-0.004
	(0.108)	(0.087)	(0.103)	(0.088)	(0.060)	(0.086)	(0.085)
Size of oil palm area	-0.038	0.066	-0.015	0.061	-0.040	0.165*	0.091
	(0.105)	(0.066)	(0.101)	(0.067)	(0.055)	(0.085)	(0.075)
Size of rubber area	-0.276	0.010	-0.300	0.025	-0.105*	-0.073	0.104
	(0.272)	(0.075)	(0.273)	(0.077)	(0.063)	(0.056)	(0.072)
Size of other crop area	0.135	-0.234	0.044	-0.198	-0.280	-0.271	-23.676
	(0.279)	(0.819)	(0.267)	(0.997)	(0.235)	(0.192)	(1114)
Ln livestock assets	-0.082	0.019	-0.077	0.024	-0.068***	-0.026	0.088***
	(0.056)	(0.036)	(0.056)	(0.037)	(0.024)	(0.031)	(0.036)
Ln natural resource extraction equipment	0.135*	0.054	0.143**	0.052	-0.004	0.013	0.112*
	(0.071)	(0.061)	(0.068)	(0.060)	(0.049)	(0.061)	(0.060)
Ln non-farm business assets	0.027	0.036	0.028	0.040	-0.050*	-0.010	0.004
	(0.051)	(0.035)	(0.050)	(0.035)	(0.028)	(0.037)	(0.041)
Ln non-productive asset	-0.250	0.567***	-0.276	0.584***	-0.029	-0.337*	-0.090
	(0.200)	(0.196)	(0.195)	(0.200)	(0.124)	(0.178)	(0.172)
Engagement in wage employment	0.471	-0.218	0.412	-0.211	-0.195	-0.289	0.039
	(0.371)	(0.260)	(0.358)	(0.261)	(0.191)	(0.250)	(0.274)
Type of smallholders	0.144	-0.980***	0.279	-1.023***	0.205	-0.463	-0.339
	(0.388)	(0.317)	(0.386)	(0.325)	(0.294)	(0.384)	(0.424)

Note : *p<0.1, **p<0.05, ***p<0.001

Source: Calculated from oil palm household survey 2010 data

Table 7.5. Investment plan and subjective risk expectation model (continued)

Variables	Probit	Probit	Multivariate Probit				
	Investing in Oil palm	Investing in Non-oil palm	Investing in Oil palm	Investing in Non-oil palm	Subjective risk prediction on		
					Oil palm price	Oil palm production	Non-oil palm
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Expected price risk	0.093	0.525**	-0.281	0.692			
	(0.323)	(0.263)	(0.476)	(0.457)			
Expected production risk	-0.270	1.138**	-0.988	1.300**			
	(0.413)	(0.510)	(0.622)	(0.597)			
Expected other economic risk	1.622***	0.386	1.215*	0.285			
	(0.450)	(0.365)	(0.647)	(0.500)			
Subjective risk attitude	0.177**	0.083	0.165*	0.081	0.033	-0.035	-0.117
	(0.089)	(0.061)	(0.087)	(0.061)	(0.045)	(0.056)	(0.072)
Oil palm age					0.023	0.076***	0.052
					(0.026)	(0.027)	(0.039)
The depth of experienced price shocks past 5 years					0.141***		
					(0.053)		
The depth of experienced production shock past 5 years						0.145***	
						(0.035)	
The depth of other economic shocks past 5 yeas							0.273***
							(0.072)
Constant	0.400	-9.271***	1.680	-9.634***	0.427	3.773	-1.447
	(2.371)	(2.392)	(2.401)	(2.451)	(1.435)	(2.015)	(2.048)
Rho12			-0.135				
			(0.249)				
Rho13			0.314				
			(0.222)				
Rho14			0.444*				
			(0.242)				
Rho15			0.295				
			(0.333)				

Note : *p<0.1, **p<0.05, ***p<0.001

Source: Calculated from oil palm household survey 2010 data

Table 7.5. Investment plan and subjective risk expectation model (continued)

Variables	Probit	Probit	Multivariate Probit				
	Investing in Oil palm	Investing in Non-oil palm	Investing in Oil palm	Investing in Non-oil palm	Subjective risk prediction on Oil palm price	Oil palm production	Non-oil palm
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rho23			-0.119				
			(0.248)				
Rho24			-0.146				
			(0.263)				
Rho25			0.0163				
			(0.234)				
Rho34			0.133				
			(0.143)				
Rho35			0.289*				
			(0.156)				
Rho45			-0.194				
			(0.205)				
Prob > chi^2	0.006	0.000	0.000				
Log likelihood	-42.086	-71.354	-402.287				
N	242	242	242				

Note : *p<0.1, **p<0.05, ***p<0.001

Source: Calculated from oil palm household survey 2010 data

7.5. Conclusions and recommendations

Based on the discussion above, conclusions can be drawn in addressing the two specific research objectives previously posted. First, subjective risk expectations are mainly shaped by the depth of experienced shocks in the past including shock frequency and perceived severity. A smallholder that experienced a bad event more frequently and more severe tend to be pessimistic or expect the occurrence of the same bad event in the near future. In addition, asset portfolios also significantly influence risk expectations. For example, a farmer with a larger oil palm tends to be more pessimistic on oil palm production. Another finding is that risk aversion does not significantly affect risk expectations.

Second, the paper analyzes how subjective risk expectations determine the future plan of investment. The results show that a plan for investing in oil palm tends to be mainly driven by the low risk aversion and pessimism in non-oil palm business risks, no matter how risky oil palm itself is expected to be. This indicates that such investment may be planned by smallholders as an ex-ante risk management strategy to mitigate the impact of expected risks in non-oil palm business that currently run. On the other side, a plan for investing in non-oil palm business tends to be determined by pessimism in oil palm production. This could be an indication that such portfolio is also planned to generate alternative income in order to mitigate the impact of oil palm production shock in the future.

Since empirical evidences reveal that an investment portfolio is chosen to respond to subjective expectation toward risks in another portfolio, the suitability of the choice mainly depends on the correctness of the expectation. If the expectations do not match the reality in the future, the smallholders will misallocate resources in investment and therefore they could lose opportunities in another business or suffer from unexpected shocks in the chosen business. While the results suggest that subjective risk expectation is mainly driven by the shock experience, the actual risk in the future does not always relate to shocks in the past. Hence, adequate and accurate information regarding prospects and risks of oil palm and non-oil palm enterprises are important to be facilitated by policy makers in order to offer appropriate investment advice for smallholders.

CHAPTER 8

SYNTHESIS

The objective of this thesis is to investigate the socio-economic conditions of oil palm smallholders in Indonesia. The study is based on two districts in the province of Jambi, Sumatra. The themes dealt with in this research are contract farming, poverty, risks and vulnerability. The cores of the thesis are three journal papers which are complemented by a descriptive case study. The journal papers were presented respectively in chapter 5 to 7 to address the three specific research objectives stated in section 1 while the case study was presented in chapter 4.

In chapter 4 the case of oil palm farmers is introduced in an area where indigenous communities have recently started oil palm plantations under contract farming scheme with oil palm companies. The case study illustrates the pros and cons of oil palm development in Indonesia and serves as good counterfactual for the more rigorous analysis of oil palm smallholders presented in the three subsequent chapters. Chapter 5 analyses the impact of contract farming on the well-being of smallholders in an area where oil palm plantation are in an advanced phase of development. The same data set is used in the paper in chapter 6. Here the question is asked how vulnerable oil palm smallholders are, i.e. what is the risk that they would fall into poverty when they experience shocks? The third paper is presented in chapter 7. Here the question of risk and sustainability is asked, i.e. what is the role of subjective risk expectation for the stated investment behavior and preferences?

This chapter presents a synthesis of the three main chapters and draws some links to the case study of chapter 4. Overall conclusions are drawn and recommendations relevant for policy and future research are submitted.

8.1. Key findings

The first specific research objective was addressed in chapter 5 entitled “Is contract farming in the Indonesian oil palm industry pro-poor?” Chapter 5 investigates the effects of contract participation on the well-being of oil palm smallholders and the equity effect of such schemes among different groups of smallholders. The following can be said about the comparison between oil palm farmers who are under contract with oil palm companies and those who are not. On average, contract smallholders have almost double the household income and total land size of non-contract smallholders. The contract smallholders apply higher inputs and therefore produce higher yields. Contract participation does not generate spill-over effects to other oil palm plots owned and independently established by the same smallholders. Credits are limited to the period of plantation establishment but smallholders are bound by the contract to follow high standard production technologies with high levels of inputs. Hence, smallholders may be forced to pay more attention on their plasma plots while neglecting their non-plasma plots. Contract participation is positively associated with age of household head, indigenous smallholders, oil palm land size, and particular planting periods. Overall contract participation has a positive income effect. However, there are other factors such as the land size for oil palm and rubber as well as the engagement in off-farm activities that also significantly affect income. While non-poor households are much gained, poor households fail to benefit from such contract. One of possible reasons is that loan conditions and management requirements may often be beyond the financial and technical capacity of the poor.

The second specific objective was addressed in chapter 6 entitled “Contract farming and vulnerability to poverty”. Chapter 6 assesses vulnerability to poverty among oil palm smallholders and investigates the effects of contract farming on vulnerability to poverty. The following findings can be submitted. A contract smallholder tends to experience more frequently oil palm shocks than a non-contract smallholder. The likelihood of price shocks can be reduced by contract participation but this is not the case for production shocks. This could indicate that price premium awarded by the contract effectively works while technical assistance under the contract does not. The majority of sample households (about 40 percent) belong to the group of stochastically transient poor who can fall into poverty in the presence of shocks. The share of the stochastically transient poor group seems to be persistent across poverty thresholds. This finding

complements previous studies that relied on static poverty analysis and thus reported low poverty headcount (World Bank 2011; Susila 2004). The findings serve as a signal for policy makers that reduction of static poverty among oil palm smallholders is not a guarantee that they could not fall back into poverty.

The third specific objective was addressed in chapter 7 entitled “Subjective risk expectations and future plan of investment among oil palm smallholders in Indonesia”. It examines whether subjective risk expectations and risk attitude can explain portfolio choice of planned investment among oil palm smallholders. This chapter also investigates the determinants of subjective risk expectations. The results suggest the following. Subjective risk expectation is mainly driven by how often and severe similar shocks were experienced by a smallholder in the past. Asset endowments are also found as key factors. Pessimism in oil palm production significantly increases with the size of oil palm plot. A smallholder who owns a larger rubber plot, livestock assets and non-farm business assets tends to be less pessimistic in oil palm price. Negative assessment in non-oil palm enterprises grows with the value of livestock assets and natural resource extraction equipment currently owned.

The linkages between subjective risk expectation, risk attitude and the decision making behavior in investment plan can be summarized as following. Decision makers who are pessimistic in oil palm production plan to invest in non-oil palm enterprises while those who expect adverse shocks in non-oil palm enterprises are more likely to plan to invest further in oil palm. A future plan for investing in oil palm is also mainly driven by risk loving attitude, no matter how risky oil palm itself perceived. This indicates that while smallholders may realize the risks of oil palm, they may expect higher return that adequately compensate for the risks in the future.

The case study presented in chapter 4 complements our understanding on the well-being and livelihoods of oil palm communities especially in the early stage of oil palm development. In the Muaro Jambi site oil palm production was still low and therefore contributed only minor share on household income. Such condition was associated with the young oil palm plantation. Since the contact arranges that the companies take over management of household oil palm plots, the oil palm benefit received by households mainly depends on the fairness and the transparency of the company in oil palm production and benefit sharing. There are considerable differences in socio-economic conditions among smallholders in different phased plantations. When smallholders in

the advanced phase site more frequently suffered from oil palm shocks due to the higher dependency on oil palm, those in the early phase suffered from little margin left by the company. Inequality rises with the advancement of the oil palm plantations while poverty incidence is higher in the early phase.

8.2. Conclusions and policy implications

The results of the three papers in chapter 5 to 7 complemented with a descriptive case study in chapter 4 allow drawing some conclusions that convey important messages for policy makers. The analyses in chapter 5 finds that while overall contract farming has a positive income effect for smallholders, poorer smallholders mostly do not benefit from such arrangements. Loan conditions and management requirements are often beyond their financial and technical capacity. Hence, if contract schemes are to be designed in a more pro-poor manner this first requires a thorough evaluation of existing contract schemes. This is the first recommendation which can be drawn from this study. It is further suggested that the Government of Indonesia reassess its current policy of smallholder participation as our results suggest that smallholders may not always get a fair share from oil palm development. For example, the rule that the subsidy scheme for fertilizer is limited to the gestation period of the plantation requires reassessment if poor smallholders are to be involved more widely.

A similar recommendation can be derived from the analysis presented in chapter 5. This chapter suggests that contract farming schemes in the oil palm industry in Indonesia may not be very effective to reduce vulnerability to poverty. While poverty headcount among oil palm smallholders was quite low as also reported by previous studies (World Bank 2011; Susila *et al.* 2004), this chapter underlines that the majority of smallholders is expected to be non-poor but can fall into poverty in the presence of shocks. This conveys a critical message for policy makers in order to be more careful and not be satisfied with only the socio-economic condition of oil palm smallholders. A proactive approach in social protection policy targeting to prevent the stochastically transient poor group fall into poverty is highly recommended. For example, providing adequate health service and infrastructure at the village level is needed. In addition, a micro credit scheme and technical assistance that can stimulate the target group to generate alternative incomes, for example combining oil palm and cattle or running small scale business are also suggested in order to mitigate future risks of oil palm.

In order to design effective social protection policy schemes for rural areas, policy makers also should consider risk behavior of oil palm smallholders analyzed in chapter 7. This chapter investigates to what extent subjective risk expectations and risk attitude can explain decision making behavior of oil palm smallholders in planning an investment. This chapter suggests that an investment portfolio seems to be chosen to respond to subjective expectation toward risks in another portfolio. The role of risk attitude is only relevant for the case of oil palm investment but not for the case of non-oil palm enterprises. Since risk expectations can significantly explain portfolio choice of investment, the suitability of the chosen portfolio mainly depends on the quality of subjective risk expectation, i.e. whether the expectations fit the reality in the future. Having poor quality of risk expectations can cause misallocation of resources leading to opportunity loss in another business or worse impact of unexpected shocks in the chosen business in the future. Hence, policy makers need to assist smallholders in improving the quality of their risk expectations, for example through extension service that provides accurate and adequate information regarding prospects and risks of oil palm as well as non-oil palm enterprises.

While based on static poverty measures poverty among oil palm smallholders has declined once the plantations are in their productive phase, a much higher poverty incidence and a higher poverty depth exist in the oil palm communities under early phase plantation as shown in chapter 4. Households lack benefits from the contractual arrangements with oil palm companies. The young phase plantation have not allowed for a high oil palm production. There is also another concern that the contractual arrangements are susceptible to be exploited by the companies since they control the plots of smallholders and the smallholders received benefit sharing based on the companies' calculation. In the early phase of oil palm development poverty is high while inequality is relatively low. This suggests that smallholders have similar conditions under poverty when oil palm contract farming has just commenced. On the contrary, under advanced phase of oil palm development, poverty headcount is much lower but inequality is much higher. This suggests that some smallholders may benefit a lot from the contract but some others are at loss, which is in line with the message in chapter 5. Considering the different problems in two different oil palm development phases a more situation-specific policy is required. In the early phase of oil palm development, the policy should be oriented to escape households from poverty while in the advance phase of development the policy should be more pro-active in order to

prevent vulnerable households falling into poverty. For example, in the former a more intensive labor market intervention is required in order to generate adequate alternative incomes during gestation period and social insurance should be provided in order to deal with risks. In the later, in order to mitigate the impact of oil palm shocks, stimulating vulnerable smallholders to have additional alternative income, for example, combining oil palm and cattle by providing technical assistance and credit is necessary.

8.3. Recommendations for further research

While a forward looking concept has been applied in this study in order to capture the dynamics of well-being, the analysis still relied on cross sectional data and strong assumption on the variability of household consumption. Thus, while the analysis is informative in the policy context, the applied methodology has not been ideal. In order to improve such assessment, the application of panel data is highly recommended for further research.

In the next five years, the socio-economic situation of the oil palm communities in the study area is expected to change considerably. For example, many plantations in the Merangin site would be over 25 years and therefore would not be economically feasible while in the Muaro Jambi site most plantations would have entered mature phase which allows producing commercial yields. In order to capture such expected changes socio-economic household data need to be updated in order to carry out further analyses. In the Merangin site, such data can be employed to analyze coping strategies adopted by smallholders to deal with the end of oil palm life span. In the Muaro Jambi site, such data can be used to examine whether the net margin for smallholders under the contract schemes can significantly increase and the poverty can be reduced when the oil palms have been mature. The dynamics of income inequality among households in the two sites also can be further investigated. In addition such panel data will be useful to evaluate the implementations of investment plans which were reported by smallholders in the first wave of household survey in order to analyze the dynamics of risk behaviors.

While the socio-economic impact of oil palm contract farming has been comprehensively discussed in this thesis, the environmental impact of such policy has not been adequately addressed. The concerns over the environmental impacts of oil palm development including on natural habitat, biodiversity and the global climate were shown by some studies (e.g. Fargione *et al.* 2008; Nantha and Tisdell 2008; Koh and

Ghazaoul 2008; Koh and Wilcove 2008; Hartemink 2005). However, how smallholders perceive such environmental impacts and how smallholders react to their perceptions is still little known. It is important to examine whether the economic benefit of oil palm adequately compensate adverse environmental externalities for smallholders because they may weigh the both benefits differently. Thus, there is a chance to develop a new concept of vulnerability by taking into account either actual or perceived environmental impacts.

REFERENCES

Ahsan, D.A. 2011. Farmers' motivations, risk perceptions and risk management strategies in a developing economy: Bangladesh experience. *Journal of Risk Research*, 14(3), pp. 325-349.

Ahsan, D.A. and Roth, E.. 2010. Farmers' perceived risks and risk management strategies in an emerging mussel aquaculture industry in Denmark. *Marine Resource Economics*, 25, pp. 309–323

Andersen, S., Harrison, G.W., Lau, M.I., and Rustrom, E.E. 2008. Eliciting risk and time preferences. *Econometrica*, 76 (3), pp. 583–618.

Anderson, J.R., Dillon, J.L., and Hardaker, J.B.. 1977. Agricultural decision analysis. Ioawa State University Press.

Arendt, J.N. and Holm, A.. 2006. Probit models with binary endogenous regressors. Discussion Paper on Business and Economics No 4. Department of Business and Economics, University of Southern Denmark.

Balisacan, A.M., Pernia, E.M. and Asra, A. 2002. Revisiting growth and poverty reduction in Indonesia: what do subnational data show? ERD Working Paper No. 25. Asian Development Bank.

Barlow, C., Zen, Z. and Gondowarsito, R. 2003. The Indonesian oil palm industry. *Oil Palm Industry Economic Journal*, 3(1), pp. 8-15.

Baron, R.A. 2004. The cognitive perspective: A valuable tool for answering entrepreneurship's basic 'why questions'. *Journal of Business Venturing* 19, pp. 221–239.

Baumann, P. 2000. Equity and efficiency in contract farming schemes: the experience of agricultural tree crops. Working Paper 139, Overseas Development Institute, London.

Belcher, B., Rujehan, N.I. and Achdiawan, R. (2004) Rattan, rubber, or oil palm: cultural and financial considerations for farmers in Kalimantan. *Economic Botany*, 58(supplement), pp. S77-S87.

Bellemare, M.F. 2010. As you sow, so shall you reap: the welfare impacts of contract farming. MPRA Paper No. 23638.

Bolton, P., and Dewatripont, M. 2005. Contract Theory. The Massachusetts Institute of Technology, MIT Press.

Botterill, L.E.C., and Mazur, N. 2004. Risk and risk perception: A literature review. RIRDC Publication No. 04/043. Canberra: Rural Industries Research and Development Corporation.

Biro Pusat Statistik (BPS) Jambi. 2012. Regional statistics of Jambi province. Statistics of Jambi Province.

Biro Pusat Statistik (BPS) Jambi. 2011. Jambi in figures 2010. Statistics of Jambi Province.

Biro Pusat Statistik (BPS). 2011. Trends of the selected socio economic indicators of Indonesia. Statistics Indonesia.

Bureau of Agriculture (BoA) province of Jambi. 2009. Statistics of crop estates in Jambi.

Bureau of Agriculture (BoA) province of Jambi. 2010. Statistics of crop estates in Jambi.

Cahyadi, E.R. and Waibel, H. 2012. Can contract farming reduce vulnerability to poverty among oil palm smallholders in Indonesia? Paper presented at Tropentag, 19-21 September 2012 in Gottingen, Germany.

Cahyadi, E.R. and Waibel, H. 2013. Is Contract farming in the Indonesian oil palm industry pro-poor? *Journal of Southeast Asian Economies,* 30 (1), pp. 62-76

Cai, J., Ung, L., Setboonsarng, S. and Leuang, P. 2008. Rice contract farming in Cambodia: empowering farmers to move beyond the contract toward independence. Discussion Paper No. 109. Asian Development Bank Institute, Tokyo.

Caliendo, M. and Kopeinig, S. 2008. Some practical guidance for the implementation of propensity score matching. *Journal of Economic Surveys*, 22(1), pp. 31–72.

Calvo, C. and Dercon, S. 2005. Measuring individual vulnerability. Discussion paper no. 229, University of Oxford.

Casson, A. 2000. The Hesitant Boom: Indonesia's oil palm sub-sector in an era of economic crisis and political change. Programme on the Underlying Causes of Deforestation, CIFOR.

Chang, C.C., Chen,C.C., Chin, M.C., and Tseng, W.C. 2006. Is Contract farming more profitable and efficient than non-contract farming? A Survey Study of Rice Farms In Taiwan. Paper presented at the American Agricultural Economics Association Annual Meeting, Long Beach, California

Chaudhuri, S. 2003. Assessing vulnerability to poverty: concepts, empirical methods and illustrative examples. Department of Economics, Columbia University, New York.

Chaudhuri, S., Jalan, J. and Suryahadi, A. 2002. Assessing household vulnerability to poverty from cross sectional data: A methodology and estimates for Indonesia. Discussion paper no. 01052-52. Department of Economics, Columbia University, New York.

Chiwaula, L.S., Witt, R. and Waibel, H. 2011. An asset-based approach to vulnerability: the case of small-scale fishing areas in Cameroon and Nigeria. *Journal of Development Studies*, 47(2), pp. 338-353.

Christiaensen, L. and Subbarao, K. 2005. Towards an understanding of household vulnerability in Rural Kenya. *Journal of African Economies*, 14(4), pp. 520–558.

Colchester, M. and Jiwan, N. 2006. Ghost on our own land: Indonesian Oil Palm Smallholders and the Roundtable on Sustainable Palm Oil. Forest People Program and Sawit Watch, Moreton-in-Marsh, UK.

Da Silva, C.A.B. 2005. The growing role of contract farming in agri-food systems development: driver, theory and practice. Agricultural Management, Marketing and Finance Working Documents No. 9. FAO, Rome.

Daswir and Djafar. 1988. Perkembangan Plasma Pola PIR Khusus Sei Buatan, Riau. *Buletin Perkebunan*, 19 (2), pp. 107-102.

Dercon, S., Hoddinott, J. and Woldehanna, T. 2005. Shocks and consumption in 15 Ethiopian villages, 1999-2004. *Journal of African Economies*, 14(4), pp. 559-585.

Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J. and Wagner, G.. 2009. Individual risk attitudes: measurements, determinants and behavioral consequences. ROA-RM-2009/6. Research Centre for Education and the Labor Market. Maastricht University. *Economies*, 13(1), pp. 44-101.

Eaton, C., and Shepherd, A.W. 2001. Contract Farming: Partnership for Growth. FAO Agricultural Service Bulletin 145, Rome.

Echanove, F. and Steffen, C. 2005. Agribusiness and farmers in Mexico: the importance of contractual relations. *The Geographical Journal*, 171 (2), pp. 166-176.

FAO. 2008. The state of food and agriculture 2008: Biofuel: prospects, risks, and opportunities. FAO, Rome.

Fargione, J.,. Hill, J., Tilman, D., Polasky, S. and Hawthorne, P. 2008. Land clearing and the biofuel carbon debt. *Science*, 319, pp. 1235-1238.

Feintrenie, L., Chong, W.K. and Levang, P. 2010. Why do farmers prefer oil palm? Lesson learnt from Bungo District, Indonesia. *Small Scale Forestry*, 9, pp. 379-396.

Flaten, O., Lien, G., Koesling, M., Valle, P.S. and Ebbesvik, M. 2005. Comparing Risk Perceptions and Risk Management in Organic and Conventional Dairy Farming: Empirical Results from Norway. *Livestock Production Science* 95, pp. 11–25.

Freedman, D.A. and Sekhon, J.S. 2010. Endogeneity in Probit Response Models. Advance Access Publication. Oxford University Press.

Girsang, P., Daswir, M. and Wahyono, T. 1995. Pengembangan Perkebunan Kelapa Sawit Pola PIR LOK dan Pengaruhnya terhadap Pengembangan wilayah. *Warta Pusat Penelitian Kelapa Sawit*, 3 (1), pp. 39-42.

Glover, D. 1984. Contract farming and smallholders out grower schemes in less developed countries. *World Development*, 12(11/12), pp. 1143-1157.

Glover, D. 1987. Increasing the benefit to smallholders from contract farming: problems for farmers' organization and policy makers. *World Development*, 15(4), pp. 441-448.

Glover, D. and Kusterer, K. 1990. Small farmers, big business: contract farming and rural development. The MacMillan Press,

Groot, W., van den Brink, H.M. and Van Praag, B. 2007. The compensating income variation of social capital. *Social Indicators Research*, 82, pp. 189–207.

Grootaert, C. 1999. Social capital, household welfare and poverty in Indonesia. Policy Research Working Paper 2148. Social Development Department, the World Bank.

Günther, I. and Harrtgen, K. 2009. Estimating households vulnerability to idiosyncratic and covariate shocks: a novel method applied in Madagaskar. *World Development*, 37(7), pp. 1222-1234.

Hall, D.C., Thomas, O.K, Allan, E., Keith, H.C. and George, F.P. 2003. Analysis of beef producers' risk management perceptions and desire for future risk management education. *Review of Agricultural Economics* 25, pp. 430–48.

Hardeweg, B., Menkhoff, L. and Waibel, H. 2013. Experimentally-validated survey evidence on individual risk attitudes in rural Thailand. *Economic Development and Cultural Change*, forthcoming.

Hardter, R., Chow, W.Y. and Hock, O.S. 1997. Intensive plantation cropping, a source of sustainable food and energy production in the tropical rain forest areas in Southeast Asia. *Forest Ecology and Management*, 91, pp. 93-102.

Hartemink, A.E. 2005. Plantation agriculture in the tropics: environmental issues. *Outlook on Agriculture* 34, pp. 11–21.

Hennessey, D.A. and Lawrence, J.D. 1999. Contractual relations, control, and quality in the hog sector. *Review of Agricultural Economics*, 21(1), pp. 52-67.

Hoddinott, J. and Quisumbing, A. 2003. Methods for micro-econometric risk and vulnerability assessment. Social protection discussion paper series 0234. The World Bank.

Huddleston, P.S. 2006. Contract farming in oil palm: the case of Ghana and the Philippines. PhD thesis at School of Earth and Geographical Sciences, The University of Western Australia, Perth.

Humphrey, S.J. and Verschoor, A. 2004, 'Decision-making under risk among small farmers in east Uganda', *Journal of African Economies*, 13(1), pp. 44-101.

Index Mundi. 2010. Palm oil monthly price. Available at http://www.indexmundi.com/commodities/?commodity=palm-oil&months=60. Access date: 1 August 2010.

Indonesia Palm Oil Board (IPOB). 2010. Facts of Indonesian oil palm. IPOB, Jakarta.

Ismail, A. and Mamat, M.N. 2002. The optimal age of oil palm replanting. *Oil Palm Industry Economic Journal*, 2(1), pp. 11-18.

Just, D.R., Wolf, S. and Zilberman, D. 2002. Principles of risk management service relations in agriculture. *Agricultural System* 75, pp. 119-213

Just, R.E. 2002. Risk research in agricultural economics: opportunities and challenges for the next twenty-five years. *Agricultural System* 75, pp. 123-159

Kapteyn, A., and Teppa, F. 2002. Subjective measures of risk aversion and portfolio choice. Discussion paper 2002-11, Tilburg University, Center for Economic Research.

Key, N. and Runsten, D. 1999. Contract farming, smallholders and rural development in Latin Amarica: the organization of agroprocessing firms and the scale of Outgrower. *World Development*, 27(2), pp. 381-401.

Kochar, A. (1995) Explaining household vulnerability to idiosyncratic income shocks. *American Economic Review*, 85(2), pp. 159-164.

Koesling, M., Ebbesvik, M., Lien, G., Flaten, O., Valle, P.S. and Arntzen, H. 2004. Risk and risk management in organic and conventional cash crop farming in Norway. *Acta Agriculturae Scandinavica, Sectection C* 1, pp. 195–206.

Koh, L.P. and Ghazoul, J. 2008. Biofuels, biodiversity and people: understanding the conflicts and finding opportunities. *Biological Conservation*, 141, pp. 2450-2460

Koh, L.P. and Wilcove, DS. 2008. Is oil palm agriculture really destroying tropical biodiversity? *Conservation Letters*, 1, pp. 60-64.

Kumar, J. and Kumar, P. 2008. Contract farming: problems, prospects and its effect on income and employment. *Agricultural Economics Research Review*, 21, pp. 243-250.

Lien, G., Flaten, O., Jervell, A.M., Ebbesvik, M. and Koesling, P.S. 2006. Management and risk characteristics of part-time and full-time farmers in Norway. *Review of Agriculture Economics, 1, pp.* 111–131.

Ligon, E. and Schechter, L. 2004. Measuring vulnerability. *Economic Journal*, 113(486), pp. C95-C102.

Little, P.D and Watts, M.J. 1994. Living under contract: contract farming and agrarian transformation in Sub-Saharan Africa. The University of Wisconsin Press, Wisconsin.

Maluccio, J., Haddad, L. and May, J. 1999. Social capital and income generation in South Africa, 1993-1998. FCND Discussion Paper No. 71. IFPRI

Marti, S. 2008. Losing ground: the human rights impacts of oil palm plantation expansion in Indonesia. LifeMosaic, Sawit Watch, Friends of the Earth.

Martin, S. 1996. Risk management strategies in New Zealand agriculture and horticulture. *Review of Marketing and Agricultural Economics* 64, pp. 31–44.

Maryadi., Yusuf, A.K. and Mulyana, A. 2004. Pricing of palm oil fresh fruit bunches for smallholders in South Sumatra. Fakultas Pertanian, Universitas Sriwijaya. Available at http://www.stanford.edu/group/FRI/indonesia/research/palmoil.pdf. Access date: 11 June 2011

Meuwissen, M.P.M., Hurine, R.B.M. and Hardaker, J.B. 2001. Risk and risk management: an empirical analysis of Dutch livestock farmers. *Livestock Production Science*, 69, pp. 43–53.

Ministry of Agriculture (MoA). 2011. Area and production by categories *of producers. Available at*

http://ditjenbun.deptan.go.id/cigraph/index.php/viewstat/komoditiutama/8-Kelapa%20Sawit. Access date: 2 July 2011.

Minot, N. W. 1986. Contract farming and its effect on small farmers in less developed countries. Working Paper No. 31, Department of Agricultural Economics, Michigan State University.

Miyata, S., Minot, N., and Hu, D. 2009. Impact of contract farming on income: linking small farmers, packers, and supermarkets in China. *World Development*, 37(11), pp. 1781-1790.

Nagaraj, N., Chandrakanth, M.G., Chengappa, P.G., Roopa, H.S. and Chandakavate, P.M. 2008. Contract Farming and its Implications for Input-supply, Linkages between Markets and Farmers in Karnataka. *Agricultural Economics Research Review*, 21, pp. 307-316.

Nantha, H.S. and Tisdell, C. 2008. The orang utan oil palm conflict: economic constraints and opportunities for conservation. Working paper on Economics Ecology and the Environment No. 152. university of Quensland, Australia.

Nosic, A. and Weber, M. 2010. How risky do I invest: the role of risk attitudes, risk perceptions, and overconfidence. *Decision Analysis*, 7(3), pp. 282-301.

Owolarafe, O.K. and Arumughan, C. 2007. A review of oil palm fruit plantation and production under the contract growers scheme in Andhra Pradesh and Tamil Nadu States of India. Agricultural Engineering International: the CIGR EJournal. Invited Overview No.4 Vol. IX

Pafenfus, M.M. 2001. Investing in oil palm: an analysis of independent smallholder oil palm adoption in Sumatra, Indonesia. Southeast Asia Policy Research Working Paper No 15. ICRAF SE Asia, Bogor.

Paterson, R.R.M. 2007 Ganoderma disease of oil palm: a white rot perspective necessary for integrated control. *Crop Protection*, 26, pp. 1369–1376.

Patrick, I. 2004. Contract farming in Indonesia: Smallholders and agribusiness working together. ACIAR Technical Reports No. 54, Australian Centre for International Agricultural Research Canberra.

Porter, G. and Howard, K. 1997. Comparing contracts: An evaluation of contract farming schemes in Africa. *World Development*, 25 (2), pp. 227-238.

Povel, F. 2011. Poverty and vulnerability in Southeast Asia. Doctoral dissertation, University of Gottingen, Germany.

Rist, L., Feintrenie, L. and Levang, P. 2010. The livelihood impacts of oil palm: smallholders in Indonesia. *Biodiversity and Conservation* 19(4), 1009-1024.

Rosenbaum, P.R. 2002. Observational Studies. Springer, New York.

Sáenz-Segura, J. 2006. Contract farming in Costa Rica: opportunities for smallholders? PhD Thesis, Wageningen University.

Salanie, B. 2005. The economics of contracts: a primer, the 2nd ed. The MIT Press, Cambridge, Massachusetts.

Salman, F. and Wahyono, T. 1998. Tingkat pendapatan dan ketahanan petani plasma PIR kelapa sawit. Warta PPKS, 6(3), pp. 127-132.

Setboonsarng, S. 2008. Global Partnership in Poverty Reduction: Contract Farming and Regional Cooperation. ADB Institute Discussion Paper No. 89. Asian Development Bank Institute, Japan.

Setboonsarng, S., Leuang., P. and. Stefan, A. 2008. Rice contract farming in Lao PDR: Moving from subsistence to commercial agriculture. ADB Institute Discussion Paper No. 90. Asian Development Bank Institute, Tokyo.

Sharma, V.P. 2008. India's Agrarian crisis and corporate-led contract farming: socio-economic implications for smallholder producers. *International Food and Agribusiness Management Review* 11(4), pp. 25-48.

Sheil, D., Casson, A., Meijaard, E., van Noordwijk, M., Gaskell, J., Sunderland-Groves, J., Wertz, K. and. Kanninen, M. 2009. The impacts and opportunities of oil palm in Southeast Asia: what do we know and what do we need to know? Occasional Paper No. 51. Center for International Forestry Research (CIFOR), Bogor.

Simmons, P., Winter, P., and Patrick, I. 2005. An analysis of contract farming in East Java, Bali and Lombok, Indonesia. *Agricultural Economics*, 33(s3), pp. 513-525.

Singh, S. 2002. Contracting out solutions: Political economy of contract farming in the Indian Punjab. *World Development*, 30(9), pp. 1621–1638.

Sitkin, S.B. and Pablo, A.L. 1992. Re-conceptualizing the determinants of risk behavior. *The Academy of Management Review*, 17(1), pp. 9-38.

Sjoberg, L. 1998. World Views, Political attitudes and risk perception. *Risk, Health, Safety and Environment* 9, pp. 137–152.

Susila, W.R. 2004. Contribution of oil palm industry to economic growth and poverty alleviation in Indonesia. *Jurnal Litbang Pertanian*, 23(3), pp. 107-114.

Susila, W.R. 1991. Rubber and oil palm based farming system for the Southern Sumatra transmigration areas. *Jurnal Agro Ekonomi*, 10 (1), pp. 16- 30.

Tanaka, T., Camerer, C., and Nguyen, Q. 2010. Risk and time preferences: Linking experimental and household survey data from Vietnam. *American Economic Review*, 100, pp. 557–571.

The World Bank. 2006. Making new Indonesia work for the poor. The World Bank, Jakarta.

The World Bank. 2011. The World Bank group framework and IFC strategy for engagement in the oil palm sector. The World Bank and International Finance Corporation.

United Nation (UN). 2005. Income generation and poverty reduction: experiences of selected Asian countries. Development paper no. 26, UN ESCAP, New York.

USDA. 2010. Indonesia: rising global demand fuels palm oil expansion. Commodity intelligence report. Foreign Agriculture Service, USDA. Available at http://www.pecad.fas.usda.gov/highlights/2010/10/Indonesia/ Access date: 2 September 2011.

USDA. 2012. Palm oil: world supply and distribution. Foreign Agricultural Services. United States Department of Agriculture. A. Available at http://www.fas.usda.gov/psdonline/psdReport.aspx?hidReportRetrievalName=Table+11%3a+Palm+Oil%3a+World+Supply+and+Distribution+&hidReportRetrievalID=710&hidReportRetrievalTemplateID=8. Access date: 2 June 2012

Van Raaij, W. F. 1981. Economic psychology. *Journal of Economic Psychology, 1*(1), pp.1-24.

Vermeulen, S., and Goad, N. 2006. Towards better practice in smallholder palm oil production. Natural Resource Issues Series No. 5. International Institute for Environment and Development. London.

Warning, M. and Key, N. 2002. The social performance and distributional consequences of contract farming: an Equilibrium analysis of the Arachide de Bouche Program in Senegal. *World Development*, 30(2), pp. 255-263.

Weber, E.U. and Hsee, C. 1998. Cross-cultural Differences in Risk Perception, but Cross-cultural Similarities in attitudes towards perceived risk. *Management Science*, 44, pp. 1205–1217.

Winoto, J., Triwidodo, H.., Siregar, V.P and Harianto. 1997. Studi Sistem Kelembagaan Kemitraan dalam Pembangunan Pertanian. Lembaga Penelitian Institut Pertanian Bogor.

Winters, P., Simmons, P. and Patrick, I. 2005. Evaluation of a hybrid seed contract between smallholders and a multinational company in East Java, Indonesia. *Journal of Development Studies*, 41(1), pp. 62-89.

World Growth. 2011. The economic benefit of palm oil to Indonesia. Available at http://www.worldgrowth.org/assets/files/WG_Indonesian_Palm_Oil_Benefits_Report-2_11.pdf. Access date: 5 June 2012.

Yesuf, M. and Bluffstone, R.A. 2009. Poverty, risk aversion and path dependence in low income countries: experimental evidence from Ethiopia. *American Journal of Agricultural Economics* , 91 (4), pp. 1022-1037

Zen, Z., Barlow, C. and Gondowarsito, R. 2005. Oil palm in Indonesian socio economic improvement: a review of options. Working Paper in Trade and Economics 11. Research School of Pacific and Asian Studies, Australian National University.

NO Questionnaire

No Entry

Household Survey Jambi, Indonesia

The Impact of Contract Farming in the Oil Palm Industry on Vulnerability to Poverty
Version 1.4
January 2010

Introductory Statement

We are German university researchers who work together with researchers from Indonesia to study the impact of contract farming in the oil palm industry on poverty reduction. We interview 300 households in four villages in three districts in Jambi. This survey will involve contracted smallholders and independent smallholders as our respondents. We will analyze vulnerability of oil palm smallholders to potential shock and poverty. How the smallholders manage changes in several stages of oil palm plantation will be explored further. To achieve the objective of our research we kindly ask for your cooperation. We want to ask some questions regarding your income, asset, expenditure, consumption, risks and changes, and expectation. We also want to ask you about some shocks or big problems that you or your other household members have experienced during the past years or probably will happen in the future. We can assure you that all information you give during the interview is kept strictly confidential.

The Data will be used for scientific purposes only and we will not give away the data to any outside person. As a sign of our great appreciation that you take your time for our interview please accept this small gift from us

Section

1 Survey information
2 Household member
3 Shock
4 Land and crops
5 Production and sales
6 Oil Palm and Other crops Input
7 Livestock
8 Fishing, collecting, hunting
9 Off farm employement
10 Off farm self employement
11 Public Transfer and other payment
12 Expenditure, saving and Insurance
13 Asset
14 Loan and Lending
15 Perception of change over 5 years
16 Investment and future plan
17 Oil Palm contract participation

1 Survey Information

		ID	Name
1 District	:		
2 Sub District ID	:		
3 Village ID	:		
4 Sub village			

12 Date of Interview	
13 Time Started	
14 Time Finished	
15 sign of respondents	
16 Enumerator ID	

Respondent

5 Name	
6 Relation to household	A
7 Name of head household	
8 Live in this village since	
9 Adress	
10 Phone	
11 type of smallholder	B

	Name	Code	Date
Data entered		17	18
Data revised		19	20

CODE A

1	HH
2	Wife
3	Son/ daughter
4	son/ daughter in law
5	Brother/ sister
6	Brother/ sister in law
7	Father/ Mother
8	Father/ Mother in law
9	Cousin
10	Grandchild
11	Nephew
12	Son/ daughter adopted
13	other relatives
98	No answer

ID District

1	Merangin
2	Muaro Jambi
3	Sorolangun

ID Sub District

11	Tabir Selatan
12	Ranto Panjang
21	Kumpeh
31	Air Hitam

ID Village

100	Rawa Jaya
200	Mentawak Baru
300	Dusun Baru
400	Arang-Arang

CODE B

1	contracted oil palm smallholders
2	independent oil palm smallholders
3	mix oil palm smallholders

2 Household Information

2,1 **Household Member**

Please report household members, start with head of household

1	2	3	4	5	6	7	8	9	10	11
ID Code	Name	gender	Age	Marrital status	relation to HH	Ethnic group	Religion	Reason for joining	. live before joining this	history live here
	Code	A		B	C	E	F	G	D	H
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Sub Section 2.1. Household Members

CODE A
1 Male
2 Female

CODE B
1 Unmaried
2 Married
3 Widow
4 Divorced/ separated
98 No answer

CODE C
1 HH
2 Wife
3 Son/ daughter
4 son/ daughter in law
5 Brother/ sister
6 Brother/ sister in law
7 Father/ Mother
8 Father/ Mother in law
9 Cousin
10 Grandchild
11 Nephew
12 Son/ daughter adopted
13 other relatives
98 No answer

CODE D
1 In the same village
2 in the same sub district
3 In the same district
4 in the same province (Jambi)
4 in other provinces in Sumatera
6 In West Java
7 in Center Java / Yogjakarta
8 In East Java
9 In Jakarta
10 in Kalimantan
11 in Sulawesi
12 in Papua
90 Others
97 Don't know
98 No Answer

CODE E
1 Javanese
2 Sundanese
3 Melayu
4 Minangkabau
5 Batak
6 Tioghoa
7 anak dalam
8 bugis
90 others

CODE F
1 Islam
2 Christian
3 Catolic
4 Budhist
5 Hindhu
6 Animist
90 others

CODE G
1 founded HH
2 Married
3 born in HH
4 Found Job
5 Looking for job
6 Schooling
7 Followed the family
8 Came to be looked after (ill, Old, etc)
9 Came to help HH
10 Economic problems
11 Personal problems
90 Others
98 No answer

CODE H
1 originally, indegenous people
2 was born in this village
3 national transmigration program participant
4 local transmigration program participant
5 independent transmigration program participant
6 new comer/ coming by my self initiative

2,2 Occupation

1	2	12	13	14	15	16	17
	Name/ nick name	occupation between 1 jan to 31 Des 09 by time spent			how many days…did stay in the HH from 1 jan to 31 des 2009	Remittance received by…between 1 Jan and 31 Des 2009	Remittance sent from…between 1 Jan and 31 Des 2009
		Main	second	third			
		I	I	I		Rp 000	Rp 000
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

Sub Section 2.2. Occupation

CODE I

1 Oil palm farmer (engaged in own plantation)
2 Rubber farmer
3 Other crops farmer
4 agent / middleman of agricultural commodities
5 Oil palm free labor
6 Rubber free labor
7 the Cooperative manager or staf
8 the cooperative employee
9 chief of farmer group
10 mill labor in nucleus company
11 oil palm estate labor in nucleus company
12 transport service provider for agricultural commodities
13 animal farmer
14 fishing
15 Non farm owned business
16 Non farm labor
17 Government employee
18 spiritual leader
19 student
20 housewife
21 Child below school age
22 Unemployed
90 Others
97 don’t know
98 No answer

2,3 **Education**

1	2	18	19	20	21	22	23	24	25	26	27
ID code	Name	Can read and write?	Is..currently enrolled in schools? if no, go to Q21	what grade is..currently enrolled?	Has..ever been to school? if no go to section 2.4	What was..the highest edu attaintment	why did..leave school?	Where did.. .obtain the highest edu degree?	Who is pay for study?	was ..ever absent for whole school year? if no, go to next row	Why was absent?
		J	J	K	J	K	L	M	O	J	N
1											
2											
3											
4											
5											
6											
7											
8											
9											

Sub Section 2.3. Education

CODE J

1 Yes
2 No
97 don't know
98 no answer

CODE K

1 kindergarten
2 SD-1
3 SD-2
4 SD-3
5 SD-4
6 SD-5
7 SD-6
8 SLTP-1
9 SLTP-2
10 SLTP-3
11 SMU-1
12 SMU-2
13 SMU-3
14 Univ-1
15 Univ-2
16 Univ-3
17 Univ-4
18 Univ-5
97 don't know
98 no answer

CODE L

1 Graduated
2 had to work with family business
3 migrated
4 can not afford to go to school
5 ill
6 don't want to study
7 lack of qualification
8 natural disaster
9 political disruption
90 other
97 don't know
98 No answer

CODE M

1 In the same village
2 in the same sub district
3 In the same district
4 in the same province (Jambi)
5 in other provinces in Sumatera
6 In West Java
7 in Center Java / Yogjakarta
8 In East Java
9 In Jakarta
10 in Kalimantan
11 in Sulawesi
12 in Papua
13 in Overseas
90 Others
97 Don't know
98 No Answer

CODE N

1 had to work with family business
2 migrated
3 can not afford to go to school
4 ill
5 don't want to study
6 lack of qualification
7 natural disaster
8 political disruption
9 other
97 don't know
98 No answer

CODE O

1 financed by household self
2 supported by relatives/ friends
3 get scholarship

2,4 **Health**

1	2	28	29	30	31	32	33	34	35
ID	Name	how healthy is..	Please specify the most severe illness 1 last year	for how many weeks..was unable to pursue his/her main occupation	what did do? If 0 (no treatment) go to Q39	where is the facility where..go to main treatment	distance the facility from home	how much cost must be paid at the time?	if no treatment was sought, why ?
		P	R	weeks	S	M	km	Rp 000	T

Sub Section 2.4. Health

CODE P

1 healthy
2 can manage
3 sick
98 no answer

CODE R

0 none
1 Influenza
2 Cataract and other disorders of lens
3 Ischaemic heart diseases
4 Diarrhoea
5 Cikungunya
6 malaria
7 malignant neoplasm of lip, oral cavity, and pharynx
8 lung cancer
9 diphteria
10 Pertusis
11 tetanus
12 poliomyelitis
13 rubela
14 mumps
15 encephalitis
16 hepatitis
17 tuberculosis
18 epilepsy
19 pneumonia
20 typus
21 Diseases of apendix
22 diabetes melitus
23 hypertension
24 accident related injury
25 cancer
26 liver
27 maag
28 bone disease/ reumatic
90 others

CODE S

0 did nothing
1 went to government hospital
2 went to commune health center
3 went to a pharmacy
4 went to a doctor (clinic)
5 went to health worker
6 went to traditional healer
7 went to private hospital
8 self-treatment
90 others
98 no answer

CODE M

1 In the same village
2 in the same sub district
3 In the same district
4 in the province (Jambi)
5 in other provinces in Sumatera
6 In West Java
7 in Center Java / Yogjakarta
8 In East Java
9 In Jakarta
10 abroad
90 Others
97 Don't know
98 No Answer

CODE T

1 not necessary
2 no facility available
3 facility too expensive
4 transport to facility too expensive
5 low quality of facility
6 could not spare the time
90 others, specify…
97 don't know

3 Shock

3,1 Experienced Shock

1 Please rank the most severe problem from three main shocks that effect your live over past 5 years

	No of Event
1	
2	
3	

Please think any experienced shock you faced for five past years

2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
No event	Type of event	How many times in the last five years, the event has occurred?	When did it happen?	How long times the event has been occured ?	Please estimate the severity level of the event?	Please estimate your loss of income due to the event in the reference period	Estimated total extra expenditure due to the event in the reference period	Estimated total loss of asset due to the event in the reference period	A side from your HH, who was affected by the event? (effect scale)	Coping strategies to deal with the event (C)			Did the HH still reduce consumption expenditure due to the event?	How many month did it take to recover from the event
		times	year	month	A	Rp 000	Rp 000	Rp 000	B	C	C	C	D	month
	general													
1	illness													
2	accident													
3	Death of head of household													
4	Death of household member													
5	birth or person joint to HH													
6	money spend for ceremony													
7	house damage													
8	theft in home													
	natural disaster													
9	earthquake													
10	drought													
11	flood													
12	erotion													

Section 3. 1 Experienced Shock

CODE A

1 low impact
2 medium
3 high
4 very high impact
97 don't know
98 no answer

CODE B

1 no other HH
2 some other HH
3 most HH in the village
4 most HH in the sub district
5 most HH in the province
6 most HH in Sumatera
7 most HH in Indonesia
98 no answer

CODE C

1 did nothing

economic and plant activities

2 reduced input quantity
3 purchase the lower quality of input
4 didn't bought any input at the moment
5 decreased paid labor
6 didn't use paid labor any more
7 diversify agricultural portfolio
8 substitute/ change crop with new ones
9 prepare to replant
10 took up additional occupation
11 veterinery treatment
12 using natural/ biologist enemy
13 using manual/ fog method for pest
14 using chemical material as pestisides
15 make or drill a well
16 make organic traditional fertilizer
17 use anorganic fertilizer (urea, NPK, etc)
18 collective action to improve infrastructure

Finance

19 take a loan
20 credit reschedule
21 using my saving

Security

22 pay security officer
23 take part in collectiveaction to look around in the night
24 invest security devices

Health

25 sport
26 take a rest and decreasing work hours
27 therapy and routine treatment

Demographics

28 took children out of school
29 sent children to relatives/ friends
30 adult migrated to look for job

continue..CODE C

sold assets

31 sold oil palm plantation
32 sold other lands
33 sold livelistock
34 sold house
35 sold motorcycle
36 sold other asset

37 additional effort to take FFB
38 take far way to take water

90 Others

CODE D

1 yes
2 No

2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
No	Type of event	How many times in the last five years, the event has occurred?	When did it happen?	How long times the event has been occured ?	Please estimate the severity level of the event?	Please estimate your loss of income due to the event in the reference period	Estimated total extra expenditure due to the event in the reference period	Estimated total loss of asset due to the event in the reference period	A side from your HH, who was affected by the event? (effect scale)	Coping strategies to deal with the event (C)			Did the HH still reduce consumption expenditure due to the event?	How many month did it take to recover from the event
		times	year	month	A	Rp 000	Rp 000	Rp 000	B	C	C	C	D	month
	Oil palm related shock													
13	the fall of FFB price													
14	strong pest attack													
15	the scarcity of fertilizer													
16	the lack of water supply													
17	fire in oil palm													
18	the damage of infrastructure due to unusual heavy rain													
19	violance due to social/ land conflict													
20	fruit theft													
21	the diminishing of productivity													
	other economic shocks													
22	job loss in agriculture													
23	job loss in non agriculture													
24	deases of livestock													
25	collapse of business													
26	strong increase of interest loan													
90	Others													

Section 3. 1 Experienced Shock

CODE A

1 low impact
2 medium
3 high
4 very high impact
97 don't know
98 no answer

CODE B

1 no other HH
2 some other HH
3 most HH in the village
4 most HH in the sub district
5 most HH in the province
6 most HH in Sumatera
7 most HH in Indonesia
98 no answer

CODE C

1 did nothing

economic and plant activities

2 reduced input quantity
3 purchase the lower quality of input
4 didn't bought any input at the moment
5 decreased paid labor
6 didn't use paid labor any more
7 diversify agricultural portfolio
8 substitute/ change crop with new ones
9 prepare to replant
10 took up additional occupation
11 veterinery treatment
12 using natural/ biologist enemy
13 using manual/ fog method for pest
14 using chemical material as pestisides
15 make or drill a well
16 make organic traditional fertilizer
17 use anorganic fertilizer (urea, NPK, etc)
18 collective action to improve infrastructure

Finance

19 take a loan
20 credit reschedule
21 using my saving

Security

22 pay security officer
23 take part in collectiveaction to look around in the night
24 invest security devices

Health

25 sport
26 take a rest and decreasing work hours
27 therapy and routine treatment

Demographics

28 took children out of school
29 sent children to relatives/ friends
30 adult migrated to look for job

continue..CODE C

sold assets

31 sold oil palm plantation
32 sold other lands
33 sold livelistock
34 sold house
35 sold motorcycle
36 sold other asset

37 additional effort to take FFB
38 take far way to take water

90 Others

CODE D

1 yes
2 No

3,2 **Potential Risk**

2	3	17	18	19	20	21	22	23	24
No Event	Type of event	Do you think that…will happen in the next 5 years?	Do you think that…will happen between 1 Jan and 31 Des 2010	How often, do you think…will occur between 1 Jan and 31 Des 2010 ?	if ..occurs in the next 12 month, estimate impact on your income	if ..occurs in the next 12 month, estimate impact on your asset	Do you do anything to prevent...from happening or mitigate its impact ?	What do you do to prevent it or mitigates its impact ? The main strategy (do not ask if Q21 no)	Concerning…approximately how much does it cost you per year to prevent/ mitigate? (incl for gone income) (do not ask if Q21 no)
		D	D	E	A	A	D	F	Rp 000
	general								
1	illness								
2	accident								
3	Death of head of household								
4	Death of household member								
5	birth or person joint to HH								
6	money spend for ceremony								
7	house damage or renovation								
8	theft in home								
	natural disaster								
9	earthquake								
10	drought								
11	flood								
12	erotion								
	Oil palm related shock								
13	the fall of FFB price								
14	strong pest attack								
15	the scarcity of fertilizer								
16	the lack of water supply								
17	fire in oil palm								
18	the damage of infrastructure due to unusual heavy rain								
19	violance due to social/ land conflict								

Sub Section 3.2. Potential Risk

CODE F

1 Nothing

Saving and Investment

2 Saving in the cooperative
3 Saving account in the commercial bank
4 Saving account in the microfinance institution (BPR)
5 Saving in gold
6 membership in the rotating saving

Income source

7 switch to more secure income source
8 Crop or livestock diversification
9 income source diversification

Collective action

10 collective action for improving infrastucture
11 managing common property of natural resource
12 take part in village security system
13 demonstration/ insist

agricultural treatment

14 veterinery treatment
15 using natural/ biologist enemy
16 using manual/ fog method for pest
17 using chemical material as pestisides
18 make or drill well
19 make organic traditional fertilizer
20 using appropriate anorganic fertilizer composition

Health

21 sport
22 take a rest and decreasing work hours
23 therapy and routine treatment

Security

24 pay security fee
25 invest security devices

90 others

CODE D

1 yes
2 No
97 don't know
98 no answer

CODE E

1 almost none
2 rare
3 moderately
4 often

CODE A

1 low impact
2 medium
3 high
4 very high impact
98 no answer

2	3	17	18	19	20	21	22	23	24
No	Type of event	Do you think that…will happen in the next 5 years?	Do you think that…will happen between 1 Jan and 31 Des 2010	How often, do you think…will occur between 1 Jan and 31 Des 2010 ?	if ..occurs in the next 12 month, estimate impact on your income	if ..occurs in the next 12 month, estimate impact on your asset	Do you do anything to prevent...from happening or mitigate its impact ?	What do you do to prevent it or mitigates its impact ? The main strategy (do not ask if Q32 no)	Concerning…approximately how much does it cost you per year to prevent/ mitigate? (incl for gone income) (do not ask if Q32 no)
				A	A		D	E	Rp 000
20	fruit theft								
21	the diminishing of productivity								
	other economic shocks								
22	job loss in agriculture								
23	job loss in non agriculture								
24	deases of livestock								
25	collapse of business								
26	strong increase of interest loan								
90	others,….								

Note of Interviewer

Sub Section 3.2. Potential Risk

CODE F

1 Nothing

Saving and Investment

2 Saving in the cooperative
3 Saving account in the commercial bank
4 Saving account in the microfinance institution (BPR)
5 Saving in gold
6 membership in the rotating saving

Income source

7 switch to more secure income source
8 Crop or livestock diversification
9 income source diversification

Collective action

10 collective action for improving infrastucture
11 managing common property of natural resource
12 take part in village security system
13 demonstration/ insist

agricultural treatment

14 veterinery treatment
15 using natural/ biologist enemy
16 using manual/ fog method for pest
17 using chemical material as pestisides
18 make or drill well
19 make organic traditional fertilizer
20 using appropriate anorganic fertilizer composition

Health

21 sport
22 take a rest and decreasing work hours
23 therapy and routine treatment

Security

24 pay security fee
25 invest security devices

90 others

CODE D

1 yes
2 No
97 don't know
98 no answer

CODE E

1 almost none
2 rare
3 moderately
4 often

CODE A

1 low impact
2 medium
3 high
4 very high impact
98 no answer

4 Land

4,1 Land

Please report the household's land and the area used for agriculture since 1 Jan 2009 separately for each parcel. Please start with the homeste

1	2		3	4	5	6	7	8	9	10	11	12	13	14	15
Parcel No	Land area (Ha)	Land use		Tenure status	type of land docume	what is land use status before?	how was the land obtained?	when did you obtain the land?	what is the current value if you sell the land now?	Rental rate per year if rented out or rented in	land infrastructure	Distance from home	Transport cost from home per trip	Distance from the nucleus mill (only ask if Q3, A=2)	Distance from the nearest other mill (only ask if Q3, A=2)
			A	B	C	D	E	year	Rp million	Rp 000	F	in Km	Rp 000	in Km	in Km
1		homestead	1												

Sub Section 4.1. Land

CODE A

1 Homestead
2 Oil palm plantation
3 Other tree crops
4 food crops farm
5 Animal farm
6 Aquaculture
7 Forest
8 Non agriculture business
9 Vacant land
10 Rented out
90 Others

CODE B

For row 1
1 house and homestead land owned
2 house and homestead rented
For next rows
3 Contracted land
4 Independent owned land
5 Rented
6 Mortgagor
7 Mortgage
8 Rented from relative, no rent paid
9 Rented from non relarive, no rent paid
10 Sale redeem
11 Sale redeemer
12 customary land

CODE C

1 Ownership certificate (SHM)
2 Right to use construction certificate (HGB)
3 Right to use for enterprising certificate (HGU)
4 Act of sell - buy
5 no document
90 Others

CODE D

1 primery forest
2 secondary forest
3 rubber plantation
4 oil palm plantation
5 other cultivated crops
6 open land
7 swamp
8 peat land
90 Others,…

CODE E

1 adopt contract scheme
2 bought
3 inherited
4 government allocated
5 obtained as present
6 collateral seized
7 land claimed
8 trade with another land
90 Others

CODE F

1 In the same village
2 in the same sub district
3 In the same district
4 in the same province (Jambi)
4 in other provinces in Sumatera
6 In West Java
7 in Center Java / Yogjakarta
8 In East Java
9 In Jakarta
10 in Kalimantan
11 in Sulawesi
12 in Papua
90 Others
97 Don’t know
98 No Answer

4,2 **Crops**

1	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
No Kavling	No planting	Crops	varietas	Area planted	planting planted since	who is develop or plant it?	if Q21 =1, how much does initial investment?	yielding starting from..	harvest period	Unit	Total production 1 Jan and 31 Des 09	Usage of production between Jan and Des 09			
												Consump-tion	sales	animal feed	seeds (reserved)
		A	B	ha	year	C	Rp 000	year	D	E					
1	1														

Sub Section 4.2. Crops

	Code A
1	Oil palm
2	rubber
3	cocoa
4	coconut
5	sugar cane
6	durian
7	banana
8	duku
9	paddy
10	corn
11	vegetable
90	others

	Kode D
1	per year
2	per smester
3	per quarter
4	per two months
5	per month
6	three times a month
7	twice a month
8	per week
9	per day
90	Others

	Code B For A=1
1	Dura
2	Psifera
3	Tenera
97	don’t know

	Code E
1	tonnes
2	kilogram
3	kuintal (100 kilogram)
4	bundle

	Code C
1	my self
2	by nucleus with contractual arrangement

5 Oil Palm Production and Sales

Please tell your production and sales between 1 Jan and 31 Des 2009?

1	2	3	4	5	6	7	8	9	10	11
Crops	No of sale	To whom do you usually sell your FFB?	Why do you sell to..	What is type of payment?	taken price of oil palm fruit between 1 Jan and 31 Des 2009 (Rp / kg)			Unit of sale	Total sales between 1 Jan and 31 Des 2009	
A		B	C	D	The highest	Average	the lowest	E	amount	Rp 000

12 Do you sell oil palm fruit through the cooperative? F

if no, go to Q 20

Section 5. Production and Sales

CODE A

1 Oil palm
2 rubber
3 cocoa
4 coconut
5 sugar cane
6 durian
7 banana
8 duku
9 paddy
10 corn
11 vegetable
12 rambutan
90 others

CODE B

1 the nucleus
2 other mills
3 agents or middleman

CODE C

1 to seek the highest price
2 to meet the contractual arragement
3 to look for buyer who accept appropriate standard product
4 to get faster payment
5 the easiest way to sell my FFB
90 others
97 don't know
98 No answer

CODE D

1 monthly
2 twice per month
3 weekly
4 at the time
5 pay in advance

CODE E

1 kilogram
2 butir
3 bundle
90 Others

CODE F

1 Yes
2 No

6 Oil Palm and other crops input

Please, tell your expenditure detail in agriculture between 1 jan and 31 Des 2009

		2	3	4	5	6	7	8	9	10	11	12
1	Type of crops	Oil Palm plantation										
	Agricultural Input	total area (ha)	quantity	unit A	price/ unit Rp 000	times (1 jan to 31 des 2009)	total cost Rp 000		B total cost Rp 000	B total cost Rp 000	B total cost Rp 000	B total cost Rp 000
2	Land preparation											
3	Seedling											
4	Fertilizer											
5	Pestisides											
6	Others											
7	Total input											
		13	14	15	16	17	18		19	20	21	22
No	Hired Labor	No of labor	duration	unit (C)	wage/ unit (Rp 000)	times (1 jan to 31 Des 2009)	total cost Rp 000		total cost (Rp 000)	total cost (Rp 000)	total cost (Rp 000)	total cost (Rp 000)
7	Land preparation											
8	Planting											
9	maintenance											
10	harvest											
11	total labor											

Section 6. Input of Oil Palm and Other Crops

	CODE A
1	package
2	kg
3	gram
4	liter
5	seeds

	CODE C
1	hour
2	day
3	week
4	ton
5	kilogram

	CODE B
1	Oil palm
2	rubber
3	cocoa
4	coconut
5	sugar cane
6	durian
7	banana
8	duku
9	paddy/ rice
10	corn
11	vegetable
90	others

7 Livestock and Aquaculture

7,1 Stock

1 Did you keep any the stocks listed below between 1 Jan and 31 Des 2009?

1	Yes
2	No

go to section 7.2

Please report your livestock since 1 Jan 2009

2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Animal species/ production activity	Stock at the beginning of the period (1 Jan 2009)		addition			Disposal						stock at the end of the period		cash expenditure between 1 Jan - 31 Des 09)				
			birth	purchased or received in kind		looses (death, thiefed)		home consumption		sale				for restocking	feed	veterinery threatment	hired labor	others
	Unit	value	unit	unit	value	unit	value	unit	value	unit	value	unit	value					
A		Rp 000			Rp 000		Rp 000		Rp 000		Rp 000		Rp 000	Rp 000	Rp 000	Rp 000	Rp 000	Rp 000

Sub Section 7.1. Stock

	CODE A
1	dairy cattle
2	beef cattle
3	goat
4	chicken
5	duck
6	fish
7	shrimp
8	pig
90	others

7,2 Live stock product

21 Did you produce livestock product between 1 Jan and 31 Des 2009?

1	Yes
2	No

go to next section

22	23	24	25	26	27	28	29	30	31
Livestock product	total production		home consumption		sale		cash cost of input		
	amount	unit	amount	value	unit	value (IDR 000)	packaging and storage	specification of other inputs	other cash cost
A		B		Rp 000			Rp 000	Ro 000	Rp 000

Sub Section 7.2. Livestock Products

CODE A

1 milk
2 yogurt
3 chicken egg
4 duck egg
5 honey
6 silk

CODE B

1 liter
2 pieces
3 kg
4 gram
90 lainnya

8 Fishing, Collecting, hunting, Logging

1 Is your household involved in fishing, collecting, hunting, or logging activities between 1 Jan and 31

1	Yes
2	No

if no go to next session

2	3		4	5	6	7	8	9	10	11	12	13		14
No ID	type of activity		Where do you conduct any these activities?	who control access to this resource?	payment for access in cash or kind/ year/ activity	what is the normal season for the activity from 1 jan to 31 Des 2009?		How often do you conduct the activities during the session?	fuel cost which is used for these activities in a year	Hired labor in cash this year (2009)	Other variable cost this year (2009)	Type of produce extracted		Output unit
		A	B	C	in Rp (000)	From	To	(days/ session)	in Rp (000)	in rp (000)	in Rp (000)		D	E
1														

2	15	16	17	18
No ID	Price/ output unit (Rp/ unit)	Total yield	Sold	Consummed

Section 8. Fishing, Collecting, Hunting, and Logging

CODE A

1 fishing
2 collecting
3 hunting
4 logging
98 no answer

CODE B

1 lake
2 dam
3 pond
4 river
5 forest
6 canal
7 vacant land
8 ocean
9 swamp
90 others
98 no answer

CODE C

1 head of village
2 adat or informal leader
3 private person
4 private corporation
5 government
6 community
7 no body
97 didn't know

CODE D

1 cat fish
2 river fish
3 marine fish
4 shrimp
5 crab
6 cuttlefish
7 mollusk
8 mushroom
9 fire wood
10 log
11 deer
12 wild pig
13 rabbit
14 bird
15 honey
16 medicine plant
17 animal eggs
18 fruits
19 snake
20 lizard
21 insects
22 bamboo
23 vegetable
90 others,…
98 tidak menjawab

CODE E

1 Ton
2 kg
3 m3
4 bundle
5 gram
6 piece
7 m
90 others, specify

9 Off Farm Emloyement

In this section and in the following section we would like to talk about all off-farm employment
By off-farm employment we refer to all activities not related to agricultural production on your own farm.
we ask you about the wage-employed activities, for example: agricultural worker on other farms, factory worker, service worker ..).

1 Has any one of HH members worked as a wage labor between 1 jan to 31 Dec 2009? A [ ] if no, go to next section
2 How many members of your HH have worked as a wage labor beween 1 Jan to 31 Dec 2009? [ ]

3	4		5	6	7	8	9	10	11	12	13	14
HH ID NO	type of occupation		Since when ..is working in this job?	At which company…is employed?	where is ...working?	how many days in a week comuting from home village to work place ?	how many weeks in a year go to workplace from home?	estimate cost of one way trip	how far is the place of work from the home?		what is your type of contract?	How secure this job?
		B	year	C	D	days	weeks	Rp 000	in KM	in hour	E	I
1												

Section 9. Off Farm Employement

CODE A
1 Yes
2 No

CODE B
Agriculture
1 oil palm estate labor
2 rubber estate labor
3 fisher
Industry worker
4 oil palm mills
5 wood product
6 rubber product
7 miner
8 food processing
services
9 construction worker
10 barber
11 tailor
12 car washer
13 servant
14 driver
15 cleaner
16 vendor/ salesman
17 carpenter
18 mechanician
19 electrician
20 shoemaker
21 waiter
22 cooker
23 plumber
Public sector
24 nurse
25 doctor
26 teacher
27 policeman
28 soldier
29 government employee
90 others…….

CODE C
1 the nucleus company
2 other company
3 individual smallholder
4 government
5 cooperative

CODE D
1 In the same village
2 in the same sub district
3 In the same district
4 in the same province (Jambi)
5 in other provinces in Sumatera
6 In West Java
7 in Center Java / Yogjakarta
8 In East Java
9 In Jakarta
10 in Kalimantan
11 in Sulawesi
12 in Papua
13 in Overseas
90 Others
97 Don't know
98 No Answer

CODE E
1 unlimited (written contract)
2 unlimited (verbal agreement)
3 limited (written contract)
4 limited (verbal agreement)
90 others
98 no answer

CODE I
1 almost not secured
2 less secure
3 secure
4 very secure

		15	16	17	18	19	20	21	22	23	24
HH ID NO	how did you know about the job?		How much was the agency fee?	which is the most important requirement		cash income between 1 Jan and 31 Dec 09		average number of hours worked per day	average number of days worked per month	average number of months worked in this year	if you get irregular bonus, pls estimate it per year (Rp 000)
				most important	others		time unit				
		F	Rp (000)	G	G	Rp (000)	H	hour			

Section 9. Off Farm Employement

CODE F

1 from user or employer
2 media (newspaper, radio, etc)
3 family or friends
4 private job agency
5 public job agency
90 others
98 no answer

CODE G

1 job experience
2 gender
3 age
4 family and friends
5 primery school
6 junior high school
7 senior high school
8 university degree
9 technical/ computer skill
10 language skill
11 vocational skill
12 place of resident
13 good health
14 cooperative membership
90 others
98 no answer

CODE H

1 hour
2 days
3 month
4 lump sum payment
90 others

10 Off farm self employement (existing investment)

Off farm self employement include: (1) work for yourself without employee or (2) has own business and involve employees (family or non family members)

1 Has any one of HH members worked as self employement between 1 jan to 31 Des 2009? A [ ] if no, go to next section

2 How many members of your HH have worked as self empolyement labor beween 1 Jan to 31 Des 2009? [ ]

3	4		5	6	7	8	9	10	11	12	13	14	15	16	17	18
ID HH (head of busine	No of business	Type of business		amount of initial investment	number of employement		monthly pay roll	no of customer	main type customer	sales per month	does your HH consume or use	Average monthly value self consummed	monthly cost for input	monthly transport or other operational cost	No of month enganged in this business	depresiation per year
			B	Rp 000	family	non family	Rp 000		B	Rp 000	C	Rp 000	Rp 000	Rp 000		Rp 000
	1															
	2															

Section 10. Off Fam Self Employement

CODE A

1 Yes
2 No

CODE B

Production

1 Oil Palm mill
2 Rice mill
3 Food proccessing
4 souvenir
5 furniture

agricultural services

6 transportation for agricultural commodities
7 Middleman/ agent of agricultural commodities
8 Agricultural input provider

trade and service

9 car rent
10 public transportation
11 car dealer show room
12 car/ motorcycle workshop
13 restaurant
14 Food stall
15 hotel/ guset house
16 Hair salon/ barber
17 tailor
18 car washing
19 retailer
20 construction material retail
21 civil contractor
22 fuel shop
23 nternet shop
24 general trading
25 doctor / nurse
90 Others

CODE C

1 person or household
2 trader or agent
3 manufacture or industry

90 others

11 Public transfer and other payment

Which public transfer and other payment did HH receive in 2009?

1	2	3	4
No	Type of program A	Type of payment B	Total value between 1 Jan and 31 Des 2009 (Rp 000)

Section 11. Public Transfer and Other Payment

CODE A
Social assistance
1 Bantuan Langsung Tunai (BLT)
2 social relief for natural disaster
3 poverty alleviation project
4 allowance for war veterans and martyrs

Social security
5 allowance for transmigrant
6 retirement pensions
7 sickness benefit
8 occupational accident
9 survivor benfit
10 scholarship
11 social allowance for children
12 gas fuel subsidy
13 Food security program
14 other government programs

CODE B
1 in cash
2 in kind
3 in cash and in kind

12 Asset

1		2	3	4	5	6
No	Asset	how many items does the HH own?	What was the value of the most recently obtained item at the time when you got it?	how old is the most recently obtained item?	how much would you get if you sold all items todays?	what is the use of asset
		(unit)	Rp (000)	years	Rp (000)	A
1	house					
2	truck					
3	pick up					
4	car					
5	motorbike					
6	bike					
7	diesel machine					
8	tractor					
9	water tank					
10	water pump					
11	pipe					
12	other farm instruments					
13	palm oil mill					
14	rice mill					
15	fishing net					
16	floating thrawl					
17	fishing trap					
18	boat					
19	manual saw					
20	chain saw					
21	TV					
22	DVD					
23	refrigerator					
24	tape and radio					
25	mobile phone					
26	regular phone					
27	water heater					
28	gas stove					
29	washing machine					
30	personal computer					
31	notebook computer					
32	electric fun					
33	iron					
34	water dispenser					
35	electric rice cooker					
36	sound system					
37	furniture					
38	sofa set					
39	jewellery					
40	mattress					
41	bed					
42	vacuum cleaner					
43	picture and other art things					
44	Others					
	Total					

Section 12. Asset

CODE A
1 mostly for business use
2 mostly for private use
3 business and private use
90 others, specify
98 no answer

7 how well-off do you consider your HH in comparation to other residents in the village ? Code B

8 how well off do you consider your HH in comparation to other residents in this country? Code B

9 What do you consider as an absolute minimum net income per month for a household such as yours? Rp (000)

Code B
1 much better off
2 better off
3 same
4 worse off
5 much worse off

13 Expenditure and Saving

13 1 Expenditure

How much did you spend for following items monthly between 1 Jan and 31 Des 2009

			1	2
	No	Items	average amount per month (Rp 000)	
Food	1	Rice		
	2	Vegetable		
	3	fruit		
	4	Cooking oil		
	5	fish		
	6	beef		
	7	chicken		
	8	eggs		
	9	cigarretes		
	10	alcohol		
	11	processed food		
	12	salt and sugar		
	13	beverage (tea, coffee, milk)		
	13	other		
		Total food		
Non food	14	electricity		
	15	water supply		
	16	liquid gas		
	17	kerosine		
	18	cloths, shoes		
	19	detergen/ washing powder		
	20	personal care supplies		
	21	rental fee		
	22	servant wage		
	23			
		Total non food		
transport and comm	21	telecommunication credit		
	22	fuel for car and motorcycle		
	23	public transportation		
	24	maintenance for car and motorbike		
	25	insurance and tax for car and motorbike		
	26	other transportation		
		Total transport and communication		
education	27	tuition fee		
	28	books fee		
	29	rental fee (dormitory etc)		
	30	students dress/ uniform		
	31	pocket money and lunch		
	32	school bus		
	33	other education		
		Total education		

health	34	Medicine	
	35	Doctor fee	
	36	Other health	
	37		
		Total health	
social	38	celebration	
	39	donation	
	40	recreation/ entertaintment	
	41	lottery	
	42	taxes	
		others	
		total social	

13 2 Saving

3	Do you have any saving?	Code A	If No, go to Q14
4	what is the form of your saving	Code B	
5	what are two most important sources of saving in 2009?	Code C	
6	what for do you expect to use savings in the future ?	Code D	
7	Do you or your HH have any account in bank or other financial institution?	Code A	if No, directly go to Q11
8	At what institution do you have saving accounts?	Code E	
9	Where do you hold this saving ?	Code F	
10	how many account do your HH members have?		
11	what is the current value of all these saving?	Rp 000	
12	how much totally could be saved between 1 jan to 31 des 2009?		
13	how much totally your withdrawl between 1 jan and Des 2009?		

Sub Section 13.2. Saving

CODE A
1 Yes
2 No

CODE B
1 cash money
2 kind of account
3 gold or jewelry
4 livestock
5 land
90 others
98 no answer

CODE C
1 profit from oil palm
2 profit from rubber
3 profit from other crops
4 profit from livestock
5 profit from collecting, hunting, fishing
6 profit from other business
7 salary/ wages
8 money transfers from relatives
9 money transfers from families
10 public transfers
11 selling land
12 selling other assets
13 inheritence
90 others, specify
97 don't know
98 no answer

Code D
1 save for old age
2 leave bequest for children
3 save for replanting oil palm
4 save for purchasing land/ oil palm plantation
5 buy input of oil palm
5 save for other business investment
6 buy car or motorcycle
7 buy mobil phone
8 buy electronic equipment
9 use for medical threatment
10 use for ceremony
11 study
12 live in case of emergency
13 do hajj, go to mecca
90 others
97 don't know
98 No answer

CODE E
1 the cooperative
2 BRI
3 BNI or other comercial bank
4 BPR
5 Agent or middleman
6 money lender
7 relative in the village
8 relative outside village
9 relative outside district
10 friends in the village
11 friends outside village
12 friends outside district
13 business partner
14 rotating fund group
15 poverty reduction project
16 student loan fund
17 insurance company
90 Others

CODE F
1 In the same village
2 in the same sub district
3 In the same district
4 in the same province (Jambi)
5 in other provinces in Sumatera
6 In West Java
7 in Center Java / Yogjakarta
8 In East Java
9 In Jakarta
10 in Kalimantan
11 in Sulawesi
12 in Papua
13 in Overseas
90 Others
97 Don't know
98 No Answer

13 3 Insurance

14 Do you or your HH members take any insurance program? Code A [ ] if no Go to Q24

No	Insurance program		1	2	3
15	Type of insurance	Code H			
16	who offer the insurance?	Code I			
17	Where did you get the insurance?	Code J			
18	Did you pay for the insurance? If no, go to Q22	Code A			
19	What premium have you paid totally ? (Rp 000)				
20	What premium do you pay in 2009? (Rp 000)				
21	Amount compensation payment received during 2009 (Rp 000)				
22	Would you keep and continue the insurance program? (A)				
23	If no, why? (Code G)				

24 If your HH members don't have any insurance, why? Code G [ ]

Sub Section 13.3. Insurance

CODE H

1 replanting insurance
2 crops/ agriculture insurance
3 health insurance
4 life insurance
5 education
6 occupation
7 livestock
8 property
9 pension fund

90 others
98 no answer

CODE I

1 Bumipetera
2 Manulife
3 Beringin life
90 lainnya

CODE J

1 There is no insurance offered here
2 I don’t need insurance
3 poor trust due to bad experience
4 too expensive
5 there is no adequate insurance for me
90 others
97 don’t know

CODE F

1 In the same village
2 in the same sub district
3 In the same district
4 in the same province (Jambi)
5 in other provinces in Sumatera
6 In West Java
7 in Center Java / Yogjakarta
8 In East Java
9 In Jakarta
10 in Kalimantan
11 in Sulawesi
12 in Papua
13 in Overseas
90 Others
97 Don’t know
98 No Answer

CODE A

1 Yes
2 No

14 Loan and Lending

14,1 Loan

1	Did you ever borrow cash or goods (rice, fertilizer etc) or buy something by installment?	A		if no, go to Lending
2	Do you have any loans that are still owed or that have been completely repaid from 1 Jan to 31 Des 2009?	A		if no, go to Lending

Please record all loans that are still owed or loans that have been completely repaid in the period between 1 Jan and 31 Des 200

	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Loan	What is the amount of loan that the HH borrowed? Type of loan	Value (Rp 000)	To whom did you borrow?	what for actually did the HH borrow money?	did you borrow due to a shock? (A)	what was the type of shock?	when did you receive the loan?		What is the duration of loan?		repayment as initially agreed			
	B		C	D		E	month	year	on	F	type of payment B	repayment schedule G	frequency per year	interest rate per month
1														
2														
3														
4														
5														
6														

Sub Section 14.1. Loan

CODE A

1 Yes
2 No

CODE B

1 credit
2 cash
3 agricultural input
4 agricultural product
5 food
6 jewellery/ gold
90 others…..

CODE C

1 the cooperative
2 BRI
3 BNI or other comercial
4 BPR or baitul maal
5 agent or middleman
6 money lender
7 relative in the village
8 relative outside village
9 relative outside district
10 friends in the village
11 friends outside village
12 friends outside district
13 business partner/ nucleus
14 rotating fund group
15 farmer group
16 car/ motorbike dealer
90 Others

CODE D

1 Develop new oil palm (with contract scheme)
2 Develop or buy new oil palm (without contract scheme)
3 buy oil palm input
4 Other agricultural investment
5 Non agricultural business investment
6 Medical treatment
7 study
8 ceremony
9 pay back other debt
10 house renovation
11 buy house or land
12 relend to relatives or friends
13 buy car or motorbike
14 buy electronic instrument
15 buy mobile phone
16 buy other durable goods
90 others

CODE F

1 year
2 month
3 week
4 day

CODE G

1 pay fixed amount periodically
2 pay varied but specific amount at scheduled t
3 pay whenever I have enough money
98 no answer

CODE E

general

1 illness
2 accident
3 Death of head of household
4 Death of household member
5 birth or person joint to HH
6 money spend for ceremony
7 house damage
8 theft in home

natural disaster and climatic change

9 earthquake
10 drought
11 flood
12 erotion

Oil palm related shock

13 the fall of FFB price
14 strong pest attack
15 the scarcity of fertilizer
16 the lack of water supply
17 fire in oil palm
18 the damage of infrastructure due to heavy rain
19 violance due to social/ land conflict
20 fruit theft
21 the diminishing of productivity

other economic shocks

22 job loss in agriculture
23 job loss in non agriculture
24 deases of livestock
25 collapse of other business
26 strong increase of interest loan
90 Others

Loan	18 Actual repayment stream from 1 to 12/09	19	20	21	22	23	24	25	26 other requirement	27	28	29
	no of payment	Total amount (Rp 000)	total repayment as of end 12/09	remaining debt as of end 2009	repayment status H	what is the consequence if Q22=2 or 3 I	what is the collateral for this loan? J	estimate value of the collateral (Rp 000)	main K	second K	third K	where is the lender located L
1												

CODE H

1 on schedule
2 default
3 paid late

CODE I

1 none
2 not able to borrow from the lender
3 not able to borrow from this lender or others
4 collateral was seized
5 had to pay higher interest
90 others,…
98 No answer

CODE J

1 Land
2 oil palm plantation
3 other crops plantation
4 house
5 saving
6 other asset
7 single guarantor
8 multi guarantor
9 no collateral required
10 salary/ wage

CODE K

1 credit group membership
2 must sell the product to the nucleus
3 transmigration program participant
4 local people
5 custom/ adat community
6 saving account at the bank
7 membership in social or political group
8 single guarantor
9 multi guarantor
10 currently enrolled in school or university
11 salary/ wage
90 other, specify
98 No answer

CODE L

1 In the same village
2 in the same sub district
3 In the same district
4 in the same province (Jambi)
5 in other provinces in Sumatera
6 In West Java
7 in Center Java / Yogjakarta
8 In East Java
9 In Jakarta
10 in Kalimantan
11 in Sulawesi
12 in Papua
13 in Overseas
90 Others
97 Don’t know
98 No Answer

14,2 Lending

30 Did you ever lend out cash or goods (rice, fertilizer etc.) or sell by installments? A [ ] if no, go to next section

31 Do you have any lendings that still own or that have been completely repaid to you between 1 Jan and 31 Des 2009? A [ ] if no, go to next section

32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
Loan	what is the amount of loan the HH lend? type of loan B	the amount (Rp 000)	to whom you lend it? C	what for the borrower need the loan? D	did they borrow due to a shock related to oil palm? (A)	what was the type of shock? E	when did you give the loan? month	year	What is the duration of loan? on	time unit F	repayment as initially agreed type of payment B	repayment schedule G	frequency per year	interest rate per month
1														

Sub Section 14.2. Lending

CODE A

1 Yes
2 No

CODE B

1 credit
2 cash
3 agricultural input
4 agricultural product
5 food
6 jewellery/ gold
90 others…..

CODE C

1 relative
2 friend
3 not relative/ friend

CODE D

1 Develop new oil palm (with contract scheme)
2 Develop or buy new oil palm (without contract scheme)
3 buy oil palm input
4 Other agricultural investment
5 Non agricultural business investment
6 Medical treatment
7 study
8 ceremony
9 pay back other debt
10 house renovation
11 buy house or land
12 relend to relatives or friends
13 buy car or motorbike
14 buy electronic instrument
15 buy mobile phone
16 buy other durable goods
90 others

CODE E

general

1 illness
2 accident
3 Death of head of household
4 Death of household member
5 birth or person joint to HH
6 money spend for ceremony
7 house damage
8 theft in home

natural disaster and climatic change

9 earthquake
10 drought
11 flood
12 erotion

Oil palm related shock

13 the fall of FFB price
14 strong pest attack
15 the scarcity of fertilizer
16 the lack of water supply
17 fire in oil palm
18 the damage of infrastructure due to heavy rain
19 violance due to social/ land conflict
20 fruit theft
21 the diminishing of productivity

other economic shocks

22 job loss in agriculture
23 job loss in non agriculture
24 deases of livestock
25 collapse of other business
26 strong increase of interest loan
90 Others

CODE F

1 year
2 month
3 week
4 day

CODE G

1 pay fixed amount periodically
2 pay varied but specific amount at scheduled t
3 pay whenever I have enough money
98 no answer

Lending

Loan	47	48	49	50	51	52	53	54	55	56	57	58
	Actual repayment stream 1 to 12/09		total repayment as of end 12/09 (Rp 000)	remaining debt as of end 2009 (Rp 000)	payment status H	what is the consequence if Q51=2 or 3 I	what is the collateral for this loan? J	estimate value of the collateral (Rp 000)	other requirement			where is the borrower located
	no of payment	Total amount (Rp 000)							main K	second K	third K	L
1												
2												
3												
4												
5												

CODE H

1 on schedule
2 default
3 paid late

CODE I

1 none
2 not able to borrow from the lender
3 not able to borrow from this lender or others
4 collateral was seized
5 had to pay higher interest
90 others,…
98 No answer

CODE J

1 Land
2 oil palm plantation
3 other crops plantation
4 house
5 saving
6 other asset
7 single guarantor
8 multi guarantor
9 no collateral required
10 salary/ wage

CODE K

1 credit group membership
2 must sell the product to the nucleus
3 transmigration program participant
4 local people
5 custom/ adat community
6 saving account at the bank
7 membership in social or political group
8 single guarantor
9 multi guarantor
10 currently enrolled in school or university
11 salary/ wage
90 other, specify
98 No answer

CODE L

1 In the same village
2 in the same sub district
3 In the same district
4 in the same province (Jambi)
5 in other provinces in Sumatera
6 In West Java
7 in Center Java / Yogjakarta
8 In East Java
9 In Jakarta
10 in Kalimantan
11 in Sulawesi
12 in Papua
13 in Overseas
90 Others
97 Don’t know
98 No Answer

15 Perception of Change Over 5 Years

Please compare the following items at now and 5 years ago, and please estimate them compare to now

No	Several items that may change		1 Now, compare to 5 years ago	2 Next 5 years, compare to now
	household			
1	your HH wealth generally?	C		
2	your income?	C		
3	your HH assets?	C		
4	your HH members health	A		
5	your HH loan?	C		
6	your style of expenditure	B		
7	your saving behaviour	A		
	village			
8	environment safety	A		
9	water availability	A		
10	food crops availability	A		
11	poverty	C		
12	public infrastructure	A		
13	growth of new oil palm plantation	C		
14	deforestation	C		
15	social conflict on land tenure	C		
	relation between the nucleus and smallholders			
16	conflict resolution	A		
17	transperency	A		
18	technical support for smallholders	A		
19	trust	A		

Considering your experience in past 5 years,

20	If you are oil palm contracted smallholder, what do you want to do with the contract? If you are not, go to Q 25	D	
21	Do you want to convert a part or all your oil palm into other crop?	E	
22	Do you want to sell your oil palm plantation?	E	
23	Do you want to buy other oil palm area?	E	
24	when was the best year for oil palm business?	year	
25	Do you want that your son/ daughter become oil palm smallholders like you?	E	

Section 15. Perception of Changes Over 5 years

CODE A

1 Much worse off
2 worse off
3 same
4 better off
5 much better off

CODE B

1 much more consumptive
2 more consumptive
3 same
4 less consumptive
5 much less consumptive

CODE C

1 much lower
2 lower
3 same
4 higher
5 much higher

CODE D

1 continue and commit to implement all those contract
2 drop contract arangement
3 just do a part of contract arrangement
90 others

CODE E

1 Yes
2 No

16 Investment and Future Plan

1 Do you or your HH members have any plans to invest your money in any interesting business? A [ ] if no go to Q11

2	3	4		5	6	7	8	9	10
ID	No of invest plan	Type of business		required initial amount investment	what is your plan to finance it?	Do you have enough experience in…before?	What is your main consideration to choose it?	please estimate, how long times do you need to achieve break event?	compare to oil palm, please estimate how profitable is it in the future?
			B	Rp 000	C	A	D	year	E
1	1								
	2								
	3								

11 Are you generally a person who is fully prepared to take risks or do you try to avoid taking risk? (Please choose a number on a scale 1 to 6) F [ ]

Suppose you had received gift or money around Rp 100 million,

12 what would you do in the first priority' G [ ]

13 What percentage would you allocate to make a business investment? % [ ]

14 With that amount (Q13), in what type of business would you invest? A [ ]

Suppose you had received 2.0 ha additional land from the government for agricultur

15 what would you plant in the land? H [ ]

if H=1 go to Q18

16 what percentage of the area that you would plant non oil palm crops? % [ ]

17 What kind of non oil palm crops would you plant in the area? I [ ]

18 only ask if you plan to grow oil palm, what will you do to work it? P [ ]

Section 16. Investment and Future Plan

CODE A

1 Yes
2 No

CODE B

Agriculture

1 Oil palm
2 Rubber
3 Other crops
4 Livestock and aquaculture
5 Logging
90 Others,…..

Processing and production

6 Oil palm mill
7 rice mill
8 food processing
9 handicrafts/ carver
10 meuble/ furniture

Service in agriculture

11 transport for agricultural product
12 agent / middleman
13 agri input n equipment provider

Trade and Service

14 car rent
15 public transporation
16 automotive dealer
17 workshop/ repair shop
18 restaurant
19 food stall
20 hotel/ guest house
21 Hair salon / barber
22 Tailor
23 Car washing
24 retail shop
25 construction material shop
26 civil contractor
27 gasoline station/ sell fuel
28 internet shop
29 general trading
30 doctor or nurse clinic
90 lainnya

CODE C

1 Use my saving
2 borrow from the bank or other financial institutions
3 borrow from relatives/ friends
4 sell my asset
5 mortgage my asset
90 Others

CODE D

1 It doesn't require high skill/ experience
2 it allows low capital
3 it will be prospective (produce high profit)
4 it produce more stable income
5 it is my passion
6 I am very expert and experienced on it
90 others…

CODE E

1 much more profitable
2 more profitable
3 same
4 less profitable
5 much less profitable
97 don't know

CODE F

1	2	3	4	5	6
Avoid risks					fully prepared to take risks

CODE G

1 make a business investment
2 buy new car or motorbike
3 buy new house
4 buy electronic equipment
5 renovate house
6 married again
7 do hajj, go to mecca
8 sent child to university
9 move to urban area in Sumatra
10 move to java
90 Others…….

CODE H

1 Oil palm in all area
2 Other crops in all area
3 Combine oil palm and other crops in the area
4 Oil palm
90 others
97 don't know

CODE P

1 participate in a contract scheme
2 work it independently

CODE I

1 rubber
2 cocoa
3 coconut
4 sugar cane
5 durian
6 banana
7 duku
8 paddy/ rice
9 corn
10 vegetable
90 Others

Replanting Plan

19 What is the most important thing that make you worry about future? J

20 Do you aware that you should replant your oil palm after it has been 25 years?
1 Yes
2 No

21 Please estimate cost for technical aspect in replanting

	1 cost component	2 area (ha)	3 cost/ha Rp 000	4 total cost Rp 000
1	land clearing			
2	seed			
3	planting			
4	fertilizer			
5	pesticides			
6	others			
	Total			

22 Have you made a preparation and planning for replanting? C
if no, go to Q28

23 What do you do now to face replanting period in the future? K
Tell maximum three main actions that you do
1
2
3

24 What do you plan the replanting implementation? L

25 Have you save your money regularly to prepare replanting? C
if C=2, go to Q28

26 How much do you allocate to save for replanting regularly? Rp 000

27 What time basis do you use for it? M

28 Why you do not save particularly for replanting? N

Imagine that you are in replanting period which may take 4 years. During the period you can not receive income from oil palm area which is replanted.

29 Have you think about alternative source of income during the period? C
if C=2, go to next section

30 What alternative income do you think that can equally substitute oil palm? A
Please tell max three main alternative incomes
1
2
3

31 What kind of livelihood would you really take in the period? A

32 What is your main consideration to choose it (Q30)? D

Sub Section 16.2. Replanting

CODE J

1 my oil palm will become too old and less yield
2 my income will be drop if the price of oil palm is going down
3 natural disaster such as earthquake will break all
4 all agricultural input will be very expansive
5 all daily needs becomes more expansive and can not be met
6 policy changes in oil palm
7 violance and social conflict
90 others

CODE K

1 Develop new oil palm plantation
2 Saving
3 make an investment in other crops
4 make an investment in non agricultural business
5 take insurance for agriculture
6 ask other HH members to work in non oil palm sector
7 Substitute part of oil palm with other crops
90 Others

CODE L

1 by nucleus/ contract
2 by my self

CODE M

1 per week
2 per month
3 per quarter
4 per smeseter
5 per year
6 not routine

CODE D

1 It doesn't require high skill/ experience
2 it allows low capital
3 it will be prospective (produce high profit)
4 it produce more stable income
5 it is my passion
6 I have high expertise or experience on it
90 others

CODE N

1 I don't have enough money to save
2 It is still too far. I still have a long time
3 I don't want to continue oil palm business
4 my income is very fluctuative so that I can not allocate regularly saving
90 others

CODE A

1 Yes
2 No

CODE B

Agriculture

1 Oil palm
2 Rubber
3 Other crops
4 Livestock and aquaculture
5 Logging
90 Others,…..

Processing and production

6 Oil palm mill
7 rice mill
8 food processing
9 handicrafts/ carver
10 meuble/ furniture

Service in agriculture

11 transport for agricultural product
12 agent / middleman
13 agri input n equipment provider

Trade and Service

14 car rent
15 public transporation
16 automotive dealer
17 workshop/ repair shop
18 restaurant
19 food stall
20 hotel/ guest house
21 Hair salon / barber
22 Tailor
23 Car washing
24 retail shop
25 construction material shop
26 civil contractor
27 gasoline station/ sell fuel
28 internet shop
29 general trading
30 doctor or nurse clinic
90 Others,…..

17 Oil Palm Contract Participation

	Experience		
1	How many years experience in farming do you have before growing oil palm?	year	
2	How many years your experience in growing oil palm?	year	
3	Do you have experience in other tree crops? If no go to Q5	A	
4	What are two major kind of other tree crops ?	B	
		B	
	Transaction of Oil Palm Plantation among Smallholders		
5	Did you ever sell your oil palm plantation to others? If no go to Q7	A	
6	Why did you sell the oil palm plantation?	C	
7	Have you bought any contracted oil palm area from contracted smallholders?	A	
8	Have you bought other oil palm plantation from independent smallholders?	A	
9	if Q 7 or Q 8 yes, Why did you buy the oil palm area ?	D	
10	Do you have other land where you have cultivated other crops? If no go to Q 14	A	
11	Did you convert your other land to be oil palm plantation? If no go to Q13	A	
12	If Yes, Why?	D	
13	Why did you not convert other land to be oil palm plantation?	E	

Relied on your position as contracted, independent or mix oil palm smallholders:

14 Please rank five main constrains/ problems that you have still faced for past 5 years

	U
1	
2	
3	
4	
5	

15 Please predict and rank five main constrains that you will face for next 5 years

1	
2	
3	
4	
5	

Section 17. Contract Participation

CODE A

1 Yes
2 No
98 no answer

CODE B

1 Rubber
2 Cacao
3 Soybean
4 Corn
5 Sugar cane
90 others
98 no answer

CODE C

1 I need a big cash at the time to pay something urgent
2 I didn't have enough ability to work in oil palm farm
3 I saw that there are too much risk and uncertainty in this business
4 That was my strategy to invest my money in a better business choice
5 I found that the size of area is not enough efficient for profitable business
90 Others
98 no answer

CODE D

1 to make my oil palm business more efficient
2 profitable investment due to promising prospect
3 just follow other smallholders
90 others
98 no answer

CODE E

1 I don't have enough money to do planting which costly
2 To minimize risk due to monoculture
3 Other crops may have higher profit
4 we still need other food crops to fulfill daily need
90 Others
98 No Answer

CODE U

1 Delayed payment
2 high cost of input
3 limited information
4 market access
5 scarcity of fertilizer
6 difficulties to meet the nucleus quality standard
7 fluctuated price of product
8 scarcity of water for irrigation
9 lack of seed quality
10 lack of credit for input
11 too high investment
12 cheating by agent/ middleman
13 too high transaction cost
14 It is not efficient enough due to small area
15 scarcity of labor during peak period
16 less transperency of the nucleus
17 conflict of land tenure status
18 lack of experience in oil palm
19 the diminishing of productivity due to too old plant
20 less income due to not already yielded oil palm
21 pest attack
22 oil palm credit installment is too high
23 Not suitable land condition
90 others

16	**Are you contracted smallholder or adopt at least one contract scheme?**	A		if no, go to Q 49
17	Do you adopt more than one contract scheme?	A		if no, please just fill Scheme 1

			1	2
	If you are contracted smallholders		Scheme 1	Scheme 2
18	What is type of contract schemes that you adopted?	F		
19	What is the main requirement to be involved in the contract scheme?	G		
20	When did you join the contract scheme (was approved to be contracted smallholder) ?	year		
21	What was land tenure status of contracted land before?	H		
22	Have you received officially the ownership of the contracted land? If No, go to Q 24	A		
23	When did contracted area covert into yourown officially?	year		
24	When will the contracted area be converted to your own?	year		
		years		
25	What is the status of credit repayment?	I		
26	What was your main reason to take part in the contract scheme?	K		
27	Who offered you the opportunity to be involved in the contract scheme?	J		
28	Was there some pressure from someone for you to join the scheme? If no, go to Q30	A		
29	Who did force you?	J		
	Contractual arrangement			
30	How was the contract made and signed?	L		
31	Do you have a writen contract with the nucleus company? If no go to Q 33	A		
32	Do you think the writen contract is detail enough and clear for both parties?	A		
33	Do you think the contract is fair for both parties? Go to Q46	A		

Section 17. Contract Participation

CODE A

1 Yes
2 No

CODE F

1 PIR
2 PIR TRANS
3 KKPA
4 operator scheme 20:80
5 PIR TRANS LOCAL

CODE G

1 transmigration program participant
2 originaly local people
3 indegenous people
4 have land certificate
90 Others

CODE H

1 HGU
2 Custom/ adat land
3 individual ownership
97 don't know
98 no answer

CODE I

1 fully paid
2 above 80 percent paid
3 30 - 80 percent
4 below 30 percent paid

CODE J

1 Head of village
2 local government
3 central government
4 the nucleus company
5 informal leader
6 Other smallholders
7 Cooperative manager
8 Head of farmer group
90 Others

CODE K

1 Did not see another option to get more income
2 to get market access
3 to minimize cost and risk
4 to get more technical advice and infrastructure support
5 It will be more easy to get credit and input
6 To get more approriate price
7 To keep relationship with government or informal leader in the village
8 Just follow other farmers
9 Did not have other option (top down policy)
90 others
98 no answer

CODE L

1 The nucleus and I made and signed it directly
2 It was made by the nucleus and the cooperative
3 I don't have the writen contract
97 don't know
98 No answer

	If you are pure independent smallholders		
34	Why did you not take part in the contract scheme?	Q	
35	If a similar contract scheme is offered to you now, what will you do?	R	
36	Have you get opportuniy to become contracted smallhloder offered by the nucleus?	A	
37	What did you do to develop your oil palm at the time?	V	
38	What was your source of funding to develop it?	W	

	Considering your position as contracted, mix, or independent smallholder,...		
39	What is your main learning source to work in your oil palm plantation?	S	
40	How do you get learning from the source?	T	
41	Do you get technical advice from the nucleus?	A	
42	What do you think about the technical advice from the nucleus?	P	
43	Who is really do agronomy treatment or maintain your oil palm?	M	
44	Who is really do harvesting activities in your oil palm?	M	
45	who is transport your oil palm fruit from plantation ?	M	
	How do you get the input materials such as		
46	Fertilizer, herbisides, and pesticides	N	
47	Seedling	N	

Note of Interviewer

48

Section 17. Contract Participation

CODE Q

1 contracted land has been sold
2 Did not get opportunity to become contracted smallholder
3 I can seek a higher profit in free market
4 I don't believe with commitment and transperency of nucleus company
5 I prefer to sell my fruit to the agent due to a faster and flexible payment
6 I don't like restricted rule by nucleus
90 others

CODE S

1 Technical advice from the nucleus
2 regular meeting in farmer group
3 experience sharing with other smallholders
4 learning by doing
5 reading books and other media
6 previous experience
90 Others

CODE R

1 I will adopt the contract scheme
2 I will consider several factors before making a decision
3 I will reject the offered contract
90 Others
97 don't know

CODE T

1 regulerly
2 often, but not regular
3 rare
4 almost never

CODE P

1 It is very helpful and useful
2 It is useful but I have known it, so it is no so important for me
3 It is not useful
97 don't know
98 No answer

CODE A

1 Yes
2 No

CODE M

1 the nucleus company do the activities and will account it as discount factor of the price
2 I do the activities by myself
3 I involve the members of household to help me
4 I pay several labors or service providers to do the activities
5 the activities are coordinated and done under supervise of the cooperative
6 agent or middleman
90 others

CODE V

1 I worked it by myself
2 I involved family labor to help me
3 I paid wage labor

CODE N

1 The nucleus provides the input and it will be accounted in the end
2 The nucleus sell directly the input with subdsidized price
3 The input procurement is coordinated by the cooperative
4 The nucleus recommends it and I buy it in free market by myself
5 I buy it without considering the nucleus recommendation
90 Others

CODE W

1 Took credit from bank
2 Used household saving
3 Supported by relatives or friends